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## The Influence of Case-Based Learning on Clinical Reasoning of New Graduate Occupational Therapists

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## Abstract

This study aimed to explore the influence of case-based learning (CBL) on the clinical reasoning of new graduate occupational therapists. A quasi-experimental single-arm study with a convergent mixed methods approach was conducted. The intervention was the 10-week CBL program, which included (1) guidance and mentorship in clinical practice and (2) case reports and presentations. Quantitative data collection consisted of the self-assessment of clinical reasoning in occupational therapy (SA-CROT) and the professional identity scale (PI scale); paired t-tests were conducted ( $p < .05$ ). The qualitative data collection was through a questionnaire with one open-ended question and reflexive thematic analysis was performed. The quantitative analysis results indicated that the CBL program improved the total score of the SA-CROT ( $p = .001$ , effect size  $r = .65$ ), and all four of the SA-CROT's subfactors indicated improvement with moderate to large changes. In addition, the PI scale's two subfactors improved. Qualitative analysis revealed that the CBL program was an experience of "learning multidimensional thought processes" and "learning skills to improve clinical reasoning themselves" for participants. This study's results provide information on the positive influence of CBL on the clinical reasoning of new graduate occupational therapists and highlight the integration of the CBL program into continuing education, the importance of supervisors' guidance and mentorship, and learners' reflection and verbalization of clinical practice.

## Keywords

Clinical reasoning, case-based learning, continuing education, professional identity

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## The Influence of Case-Based Learning on Clinical Reasoning of New Graduate Occupational Therapists

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### ABSTRACT

This study aimed to explore the influence of case-based learning (CBL) on the clinical reasoning of new graduate occupational therapists. A quasi-experimental single-arm study with a convergent mixed methods approach was conducted. The intervention was the 10-week CBL program, which included (1) guidance and mentorship in clinical practice and (2) case reports and presentations. Quantitative data collection consisted of the self-assessment of clinical reasoning in occupational therapy (SA-CROT) and the professional identity scale (PI scale); paired t-tests were conducted ( $p < .05$ ). The qualitative data collection was through a questionnaire with one open-ended question and reflexive thematic analysis was performed. The quantitative analysis results indicated that the CBL program improved the total score of the SA-CROT ( $p = .001$ , effect size  $r = .65$ ), and all four of the SA-CROT's subfactors indicated improvement with moderate to large changes. In addition, the PI scale's two subfactors improved. Qualitative analysis revealed that the CBL program was an experience of "learning multidimensional thought processes" and "learning skills to improve clinical reasoning themselves" for participants. This study's results provide information on the positive influence of CBL on the clinical reasoning of new graduate occupational therapists and highlight the integration of the CBL program into continuing education, the importance of supervisors' guidance and mentorship, and learners' reflection and verbalization of clinical practice.

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## **Introduction**

In recent years, occupational therapists have been required to improve quality and fulfill accountability based on their professional perspectives as autonomous professionals who provide services (World Federation of Occupational Therapy [WFOT], 2024). Based on occupational therapy beliefs and evidence, occupational therapists are required to incorporate ideas of contemporary occupational therapy into their clinical reasoning (CR), such as client-centeredness and occupation-focused practice (Bowyer et al., 2020; Fisher, 2013; Jewell et al., 2016; McGrath, 2015). However, novice therapists take time to think about each problem and might need help dealing with complex information because they lack a sufficient framework or mental model to organize their reasoning (Paterson et al., 2006). Moreover, the transition from an occupational therapy student to an occupational therapist can be overwhelming with client caseload responsibilities (Turpin et al., 2021), and students may need more preparation for all aspects of occupational therapy practice as compared to practicing therapists (Moir et al., 2021).

Clinical reasoning (CR) is a multidimensional thought process occupational therapists use to plan, direct, perform, and reflect on client care in practice (Da Silva Araujo et al., 2022; Maruyama et al., 2021a; Schell & Benfield, 2023). In occupational therapy, CR is positioned as essential in educational guidelines and competency frameworks for occupational therapists (American Occupational Therapy Association, 2021; Japan Association of Occupational Therapists [JAOT], 2019; WFOT, 2016). Occupational therapists acquire CR through case experience and reflection in daily practice (Mattingly, 1991; Rassafiani et al., 2009; Slater & Cohn, 1991). However, the information required of occupational therapists has increased and become more specialized in recent years, making it increasingly necessary to apply learned knowledge to practice and to create an environment for continuous learning (Guy et al., 2020; Hazelwood et al., 2019; Moir et al., 2021; Turpin et al., 2021).

Case-based learning (CBL) and workplace-based learning dominate CR curricula for students in health professions education (Elvén et al., 2023). Case-based learning is an educational approach for CR that connects theory and practice by applying knowledge to cases (Burgess et al., 2021; Hamilton, 2022; Murphy & Radloff, 2018; Rodríguez-Bailón et al., 2021; Srinivasan et al., 2007; Thistlethwaite et al., 2012). Case-based learning can provide an opportunity to reflect through the case on the therapy processes and CR, making it a helpful learning approach to developing mental models and performing more effective CR (During et al., 2015; Norman, 2005; Unsworth, 2001). Therefore, CBL is essential education for CR of occupational therapists with limited clinical experience. Case-based learning is conducted for new graduates' workplace and continuing education in Japan (JAOT; Shiota et al., 2022). However, there is a lack of evidence regarding the impact of CBL on the CR of new graduate occupational therapists (Maruyama et al., 2023; Unsworth & Baker, 2016). Thus, educational research is needed that explores ways to reflect on practice through cases and develop CR during the transition from occupational therapy students to occupational therapists.

Therefore, this study aims to explore the influence of CBL on the CR of new graduate occupational therapists. This study is expected to provide information on the efficacy of CBL for the CR of new graduate occupational therapists and offer valuable insights for developing approaches and environments for continuing occupational therapy education.

### **Methods**

A quasi-experimental single-arm study was conducted to explore the influence of CBL on the CR of new graduate occupational therapists. A convergent mixed methods design was used, as pre- and post-intervention comparisons within a single group offer limited insights into CR education. This approach integrated quantitative and qualitative findings, drawing on methodologies from Creswell and Creswell (2022) and Fetters (2021). Such designs, which merge data from both perspectives, have been successfully applied in recent CR education research (Márquez-Álvarez et al., 2019; Maruyama et al., 2023). By adopting this convergent design, the study aimed for a comprehensive interpretation of results, focusing on how new graduates perceived their learning experiences.

This study was approved by the first author's institutional human research review boards (provided number 21-004). All participants provided written informed consent before inclusion. The study was registered in the University Hospital Medical Information Network Clinical Trial Registry (registered number UMIN000052945).

### **Participants and Settings**

Participants were new graduate occupational therapists employed at a general hospital in the Tokyo metropolitan area of Japan. This general hospital (230 beds) employed 40 occupational therapists, and occupational therapy clients were typically inpatients who had a subacute stroke, proximal femur fractures, traumatic brain injury, lumbar compression fracture, spinal cord injury, and dementia.

The inclusion criteria for participants were: (1) new graduate occupational therapists (with less than one year of experience) and (2) those employed full-time. The exclusion criterion was being on maternity or parental leave. Among those participating in the CBL program offered to all new graduate occupational therapists at this hospital, those who agreed to voluntarily participate in this study were selected.

The sample size was estimated to be 22 participants. This estimate was calculated using G\*Power 3.1, as effect size (ES)  $d = 0.80$ ,  $\alpha$  error probability = 0.05, Power ( $1 - \beta$  error probability) = 0.95, based on the results of a pilot study ( $n = 10$ , which indicated a large effect size,  $r = .63$ ), and 10% of 20 participants were expected to drop out.

### **Educational Program**

#### ***CBL Program***

The CBL program was conducted as part of the new graduate educational program at the hospital. The new graduate occupational therapists transitioned to the CBL program after a two-month preparation period to familiarize themselves with the clinical setting. The CBL program in this study was based on the model of a learning

cycle co-constructed by supervisors and learners (Farber & Koenig, 2008). In addition to transferring and acquiring knowledge and skills, the CBL program focused on scaffolding to foster deeper understanding and growth. Table 1 shows two phases of the 10-week CBL program: (1) guidance and mentorship in clinical practice and (2) case report and presentation.

**Phase 1: Guidance and Mentorship in Clinical Practice.** Supervisors guided and mentored new graduate occupational therapists through on-the-job training (Table 1). The supervisor explained their ideas about the occupational therapy process (i.e., assessment, intervention plans, re-assessment) for one client to new graduate occupational therapists and answered their questions. This phase was conducted for four weeks, one hour a day, three to four times a week.

**Phase 2: Case Report and Presentation.** Participants reported and presented their occupational therapy practice after guidance and mentorship in the clinical practice phase (see Table 1). Supervisors helped new graduate occupational therapists access relevant literature and connect their practice with research evidence. Also, they discussed the content of the case report and provided feedback. The phase of case report and presentation lasted six weeks and concluded with an oral presentation to their supervisor and other experienced occupational therapists, including answering their questions.

The report and presentation utilized the occupation-focused practice (OFP) case report format (see Appendix). Occupation-focused practice is described as "to have occupation as the proximal focus of the evaluation or the proximal intent of the intervention" (Fisher, 2014) and reflects modern occupational therapy (Coppola et., 2023). The occupation-centered perspective, the basis of OFP, guides occupational therapists' CR (Bowyer et al., 2020; Fisher, 2014; Jewell et al., 2016; McGrath, 2015). In CBL, using this format may positively impact CR learning (Neistadt, 1998). Therefore, in this CBL, we aimed to promote learners' understanding of CR using the OFP format.

### **Supervisors**

The supervisors in this CBL program were occupational therapists who (1) had over six years of clinical experience in the physical disability field and (2) had completed a course for educational qualifications as fieldwork supervisors in Japan. The reason for these criteria was that in Japanese occupational therapy education, meeting these standards indicates that a person has received clinical education and can provide a necessary level of instruction (JAOT, 2019).

In this CBL program, eight supervisors had a median age of 30, with an IQR of 29–32.8; median years of experience were 8, with an IQR of 7–10.8; and academic degrees included two master's degrees, four bachelor's degrees, and two diplomas.

**Table 1***An Overview of the 10-Week CBL Program*

	Phase 1 (4 weeks)	Phase 2 (6 weeks)
Phases	Guidance and mentorship in clinical practice.	Case report and presentation.
Learners' actions	The learners (participants) collaborated with their supervisors to perform an occupational therapy process (assessment, intervention plans, and re-assessment) for one client. They searched for and referred to literature, such as guidelines and research papers, as necessary.	The learners reflected and reported on their occupational therapy for one client as a case report. This phase terminated with an oral presentation and discussion, in which the learners also answered questions from their supervisors and other experienced occupational therapists.
Supervisors' actions	Supervisors guided and mentored learners through on-the-job training about the comprehensive occupational therapy process. The supervisor also taught them how to research literature as needed.	Supervisors helped learners access relevant literature and connect the occupational therapy process with research evidence. They also discussed the content of the case report and provided feedback.
Educational materials	Client's electronic medical records, books, and literature research databases.	The OFP case report format.

*Note.* OFP: Occupation-focused practice, Case format: This format consisted of the title, introduction, general information of the client, occupational therapy assessment, interpretation of the occupational problem, intervention plan and implementation process, re-assessment, discussion, and references. This format guided learners in writing the content of a case report that focuses on the client's occupation, with itemization and example descriptions (see Appendix).

## Data Collection

### **Quantitative Data Collection**

The self-assessment of CR in occupational therapy (SA-CROT) was the primary outcome measure, and the professional identity scale (PI scale) was a secondary measure. A third party independent of the authors collected these scales from participants twice (one week before and one week after the CBL program). The data was entered as anonymous and subsequently passed on to the authors for analysis.

**SA-CROT.** The SA-CROT is a CR self-assessment scale comprising 14 items and five stages for occupational therapy students and therapists in Japan (Maruyama et al., 2022). Gordon et al. (2022) recommended ensuring that assessment items appropriately reflect the concept when using a CR assessment scale. We adopted the SA-CROT as the primary outcome measure because its conceptual background is based on the CR concept in occupational therapy (Maruyama et al., 2021a), and it has proven validity and reliability (Maruyama et al., 2021b, 2022). The following four factors of the SA-CROT were verified by confirmatory factor analysis (Maruyama et al., 2022): (1) scientific evidence (4 items), (2) client's narrative (4 items), (3) professional ethics (3 items), and (4) practice context (3 items). The five rating stages of SA-CROT (i.e., 1 = *unknown*, 2 = *attention/remembering*, 3 = *explaining/interpreting*, 4 = *applying*, 5 = *analyzing*) are based on the revised version of Bloom's taxonomy (Richard et al., 2001). The SA-CROT's person separation reliability was 0.94, item separation reliability was 0.97, Cronbach's alpha coefficient was 0.93, and the intraclass correlation coefficient for test-retest reliability was 0.87 (Maruyama et al., 2022).

**PI Scale.** The PI scale has proven validity and reliability (Suzuki et al., 2019). Improving CR can deepen understanding of the profession (Burke & DePoy, 1991; Neistadt, 1996), and continuing education opportunities can change perceptions of the profession (Souto-Gómez et al., 2023; Walder et al., 2022). Therefore, we assumed a change in PI as a secondary effect of the CBL program and adopted the PI scale as a supplementary measure in this study. The PI scale has 29 items, and a five-point Likert scale is a self-reported measure of occupational therapists' PI with 0 to 2 years of clinical experience in Japan (Suzuki et al., 2019). The following four factors of the PI scale were verified by confirmatory factor analysis: (1) confidence in practice (10 items), (2) career and growth (7 items), (3) contribution (7 items), and (4) pride in profession (5 items).

### **Qualitative Data Collection**

A third party independent of the authors collected a questionnaire from participants after the CBL program. The question was, "How did you experience the effectiveness of the CBL program?" The data was entered as anonymous and subsequently passed on to the authors for qualitative analysis.



## Data Analysis

### **Quantitative Data Analysis**

Descriptive statistics were performed on the quantitative data collected, and normality tests were conducted. Paired t-tests were performed on the total score and each subfactor score of the SA-CROT and PI scale (two-tailed test, significance level  $p < .05$ ). The ES ( $r$ ) was interpreted as  $0.1 \leq r < 0.3$ : small,  $0.3 < r < 0.5$ : medium,  $r \geq 0.5$ : large (Cohen, 1988). The analysis was performed using SPSS Statistics ver.26 (IBM).

### **Qualitative Data Analysis**

To further explore how participants experienced the effectiveness of the CBL program, we used a reflexive thematic analysis (Braun & Clarke, 2006). The analysis focused on "What kind of experience was the case study for participants' CR and their learning?" The reflexive thematic analysis was conducted in six steps (Braun & Clarke, 2006): (1) the first author read the verbatim transcripts and generated codes, (2) the codes were summarized into constructs of latent semantic patterns and then into themes, (3) the first and second authors examined the relationships between themes and how they fit into the overall story, (4) they refined the scope and content of the themes, (5) described the relationship between themes and constructs, and (6) synthesized the findings for dissemination. MAXQDA 2022 (VERBI) was used for the analysis.

### **Merging of Quantitative and Qualitative Analysis**

Quantitative and qualitative results were merged to derive meta-inferences based on a convergent design of mixed methods research (Creswell & Creswell, 2022; Fetters, 2021). In this study, we considered merging how participants perceived their learning experiences and responded to the scales, leading to a comprehensive interpretation of the results. This integration was performed by the first and second authors, refined with comments from the third, fourth, fifth, and sixth authors, and described in the discussion section.

## Results

The participants were 22 new graduate occupational therapists who consented to participate in the study (participation rate 95.7%). As shown in Table 2, the characteristics of the research participants were as follows: Median age = 23, Interquartile range (IQR) = 22–23; 12 had bachelor's degrees, and ten had diplomas. The participants participated in the CBL program during the following periods: June–August 2021 (45.5%), June–August 2022 (27.3%), or July–September 2023 (27.3%). No harm was observed from this CBL program.

**Table 2***Characteristics of the Participants*

Characteristics		<i>n</i> = 22
Age, MEDIAN (IQR)		23 (22–23)
Degree	Bachelor (%)	12 (54.5)
	Diploma (%)	10 (45.5)
Implementation duration	June–August, 2021 (%)	10 (45.5)
	June–August, 2022 (%)	6 (27.3)
	July–September, 2023 (%)	6 (27.3)

Note. IQR = interquartile range

**Quantitative Results**

The pre-and post-CBL program data for the SA-CROT and PI scales showed a normal distribution.

As shown in Table 3, the SA-CROT total score was 32.95 ( $SD = 5.93$ ) pre-CBL and 37.00 ( $SD = 6.67$ ) post-CBL, indicating a significant improvement ( $p = .001$ ,  $ES r = .65$ ). Additionally, all four subfactors of SA-CROT showed significant improvement with medium to large effect sizes (see Table 3) as follows: scientific evidence was  $p = .015$ ,  $ES r = .50$ ; client's narrative was  $p = .024$ ,  $ES r = .47$ ; professional ethics was  $p = .01$ ,  $ES r = .52$ ; and practice context was  $p = .002$ ,  $ES r = .62$ .

The PI scale total score was 95.23 ( $SD = 16.14$ ) pre-CBL and 99.73 ( $SD = 18.04$ ) post-CBL, indicating no significant difference ( $p = .066$ ,  $ES r = .39$ ). In the two subfactors of the PI scale showed significant improvement with medium effect sizes as follows: confidence in practice was  $p = .032$ ,  $ES r = .45$ ; pride in profession was  $p = .033$ ,  $ES r = .45$ . On the other hand, two subfactors of the PI scale showed no significant difference as follows: career and growth was  $p = .117$ ,  $ES r = .34$ ; and contribute was  $p = .392$ ,  $ES r = .19$  (see Table 3).

**Table 3***Changes in the SA-CROT and PI Scale by the CBL Program (n = 22)*

		Pre-CBL		Post-CBL		P-value <sup>a</sup>	ES( <i>r</i> )
		MEAN	SD	MEAN	SD		
SA-CROT	Total (range: 14–70)	32.95	5.93	37.00	6.67	.001*	.65
	Scientific evidence (range: 4–20)	8.86	1.93	10.14	2.21	.015*	.50
	Clients' narrative (range: 4–20)	9.95	1.99	10.91	2.24	.024*	.47
	Professional ethics (range: 3–15)	7.18	1.44	8.14	1.91	.01*	.52
	Practical context (range: 3–15)	6.95	1.36	7.82	1.30	.002*	.62
PI scale	Total (range: 29–145)	95.23	16.14	99.73	18.04	.066	.39
	Confidence in practice (range: 10–50)	29.59	6.04	31.95	6.88	.032*	.45
	Career and growth (range: 7–35)	23.27	5.23	24.14	4.93	.117	.34
	Contribute (range: 7–35)	27.91	4.06	27.41	4.33	.392	.19
	Pride in profession (range: 5–25)	14.45	3.45	16.23	3.48	.033*	.45

*Note.* CBL: case-based learning, ES: effect size, M: mean, PI scale: professional identity scale, SA-CROT: self-assessment scale of clinical reasoning in occupational therapy, SD: standard deviation, <sup>a</sup>paired-t test, \*indicates  $p < .05$ , The ES ( $r$ ) was interpreted as  $0.1 \leq r < 0.3$ : small,  $0.3 < r < 0.5$ : medium,  $r \geq 0.5$ : large (Cohen, 1988).

## Qualitative Results

As a result of qualitative analysis, two themes were identified regarding the influence of the CBL program on the experiences of new graduate occupational therapists: *learning multidimensional thought processes* and *learning skills to improve CR themselves*. Each theme includes two subthemes (see Table 4).

**Table 4**

*Themes of the Learning Experience of New Graduate Occupational Therapists Through the CBL Program*

Themes	Subthemes	Codes
Learning multidimensional thought processes	Learning a model of logical thinking based on evidence	Learn a model of reasoning for goals Learn a model of evaluation and interpretation Learn evidence and methods for recommended assessments and interventions Learn to use OFP terminology as the language of the profession
	Understanding of the client's perspective	Learn the importance of the client's context Build trust relationships with clients Acquire thinking skills to understand narratives
Learning skills to improve clinical reasoning themselves	Monitoring and correcting their thinking through feedback	Self-reflect on reasoning Notice biases and errors in thinking from feedback Recognize their knowledge gaps for practice
	Learning from the ideas in literature and from colleagues	Obtain new knowledge through information searches Obtain ideas on assessment and intervention from colleagues

*Note.* CBL: case-based learning, OFP: occupation-focused practice

### **Learning Multidimensional Thought Processes**

Through the CBL program, participants gained insight into multidimensional thinking. This theme includes two subthemes: *learning a model of logical thinking based on evidence* and *understanding the client's perspective*.

**Learning a Model of Logical Thinking Based on Evidence.** Participants learned a model of logical thinking based on evidence. They acknowledged their initial lack of a structured thinking model and realized the necessity to enhance their cognitive processes. Consequently, their supervisors provided guidance on assessment,

interpretation, and logical comprehension of goals and interventions within occupational therapy practice. Participants articulated the acquisition of analytical frameworks for understanding the root causes of occupational challenges and the rationale behind interventions. Additionally, they learned to use OFP terminology as the language of the profession, receiving feedback from their supervisors.

Participant E reflected on their transformative journey, noting instances where they previously struggled to discern the underlying causes of clients' occupational issues. With guidance from their supervisor, they developed a deeper understanding of the necessary interventions and their underlying rationales. Similarly, participant P recognized the fundamental perspectives driving supervisors' interventions, indicating a heightened awareness gained through the CBL program.

*“There were many times when I didn't understand the cause of a client's occupational problems. After getting advice from the supervisor, I was able to understand what interventions the client needed and the rationale behind them.”*  
(Participant E)

*“I was able to realize the essential point of perspective on which supervisors conduct interventions.”* (Participant P)

**Understanding the Client's Perspective.** The CBL program facilitated an appreciation for the clients' perspective among participants. This subtheme involved recognizing the contextual nuances of clients' lives and fostering an empathetic approach to understanding their narratives. Participant B highlighted the significance of considering not only functional improvement but also the broader context of clients' lives. Similarly, participant D emphasized the importance of building trust with clients through active listening and understanding, underscoring the value of empathetic engagement in therapeutic relationships.

*“I learned that occupational therapy programs need to not only focus on improving functions but also consider the client's perspective and the context of their lives. I learned the importance of understanding the client's life in detail.”* (Participant B)

*“I learned how to build a relationship of trust with clients. This is necessary to understand how a client thinks and their life history. I learned that demonstrating an attitude of listening and understanding is important in building trusting relationships.”* (Participant D)

### **Learning Skills to Improve CR Themselves**

Additionally, participants reported their experience of learning skills to improve their CR through feedback from their supervisors, self-reflection, and colleagues. This theme includes two subthemes: *monitoring and correcting their thinking through feedback* and *learning from the ideas of literature and colleagues*.

**Monitoring and Correcting their Thinking Through Feedback.** Through the CBL program, participants could monitor and correct their thinking through feedback. They expressed a need for opportunities for reflection in their daily clinical practice.

Participation in the CBL program enabled participants to self-reflect on their reasoning and receive external supervisor feedback. Participants reported that the CBL program helped them to identify biases and errors in their thinking. Additionally, participants identified their knowledge gaps for practice and progressed in their CR skills. Participant J recounted receiving constructive feedback from their supervisor, which prompted a reevaluation of their interpretive framework and thought processes. Additionally, compiling case reports facilitated a retrospective analysis, enabling the identification of areas for improvement. Conversely, participants recognized their knowledge gaps and actively sought to address them by engaging in information retrieval and reviewing their colleagues' presentations. The CBL program thus fostered a culture of continuous learning, empowering participants to refine their skills in clinical settings.

*“To write the report with format, I wrote down the client's general information, the interventions based on the assessment and its interpretation, and the results of the interventions. The process of writing the report helped me to organize my mind.”*  
(Participant N)

*“I received corrective feedback from my supervisor about areas where my interpretation was mistaken or lacking, and I learned from which perspective I should think. Also, compiling the case report allowed me to look back and recognize where I was lacking.”* (Participant J)

**Learning from the Ideas of Literature and Colleagues.** Participants learned from the ideas in literature and from colleagues. Participant Q highlighted their growth from a novice with limited skills in evidence-informed practice to someone proficient in searching and adapting literature to occupational therapy. Similarly, Participant I lauded the informative nature of their colleague's report, acknowledging its contribution to their understanding of evaluating and intervening in cases of higher brain dysfunction. These reflections underscore the efficacy of the CBL program in equipping participants with the necessary skills for evidence-based practice and professional growth.

*“When I was a student, I didn't collect much literature and didn't know how to research it, but I learned how to use literature as a reference for interventions.”*  
(Participant Q)

*“My colleague's report was very informative as it gave a lot of thought to the occupational therapy evaluation, interpretation, and intervention of higher brain dysfunction.”* (Participant I)

## Discussion

### **Influence of the CBL Programs on CR of New Graduate Occupational Therapists**

This study aimed to explore the influence of CBL on the CR of new graduate occupational therapists. To our knowledge, this is the first experimental study to investigate the influence of CBL on CR among new graduate occupational therapists using quantitative and qualitative data. In the discussion section below, we integrate how participants perceived the learning experience and responded to the outcome measures to interpret the results comprehensively.

In the CR study, Gordon et al. (2022) recommended using outcome measures that reflect each profession's CR concept. In this CBL program, we used the SA-CROT, developed by Maruyama et al. (2021b, 2022), as the outcome measure for learning CR. By utilizing a validity and reliability scale that reflects the CR concept of occupational therapy, this study was able to measure comprehensive changes in participants' CR. Quantitative results (see Table 3) showed the mean total SA-CROT score increased from 32.95 ( $SD = 5.93$ ) pre-CBL to 37.00 ( $SD = 6.67$ ) post-CBL, indicating a large effect size ( $p = .001$ ,  $ES r = .65$ ). Additionally, the four subfactors of SA-CROT (i.e., scientific evidence, client's narrative, professional ethics, and practice context) indicates improvement with medium to large effects. These findings suggest that the CBL program effectively improved new graduate occupational therapists' competence in the comprehensive CR aspects of their practice.

The qualitative analysis (see Table 4) revealed that the CBL program fostered "learning multidimensional thought processes." This theme includes "learning a model of logical thinking based on evidence" and "understanding the client's perspective" for participants. In this CBL program, supervisors guided and mentored participants in daily practice. Consistent with the recommendations for effective CR instruction in undergraduate medical education (Cooper et al., 2021), this CBL program included a whole-case approach to reduce cognitive load and coaching and feedback on the CR process. The participants had only been starting their careers for about three months, and they reported a need for a structured thinking model, realizing the necessity to enhance their cognitive processes. Their total score of SA-CROT before CBL was  $M = 32.95$ ,  $SD = 5.93$ , close to the score of occupational therapy students after fieldwork,  $M = 32.2$ ,  $SD = 6.3$  (Maruyama et al., 2022). Novice practitioners may need more mental models to integrate knowledge into practice because they have less clinical experience (Paterson et al., 2006). The program likely facilitated their access to supervisors' mental models, acting as a scaffold to bridge knowledge and reasoning in clinical practice, ultimately fostering the development of their mental models. Therefore, the CBL program positively influenced the CR development of new graduate occupational therapists.

In addition, participants further reflected on the mental models developed with supervisors using the OFP framework, expressing these models in case reports. The qualitative analysis revealed that participation in the CBL program fostered self-reported and reflective skills in "monitoring and correcting their thinking through feedback." Cooper et al. (2021) recommended self-explanation (getting learners to make connections and elaborate by explaining their thinking and rationale) as an effective teaching strategy that builds understanding. Despite the focus on reflection and verbalization in CR education (Schell & Benfield, 2023), participants reported limited opportunities for such practices in their daily clinical routines. Thus, the CBL program was an opportunity for them to develop CR by reflecting on and verbalizing their thoughts and becoming aware of their biases and errors.

A professional identity is essential in continuing professional education (Souto-Gómez et al., 2023; Walder et al., 2022). From the secondary outcome results, the two subfactors of the PI scale improved (i.e., confidence in practice was  $p = .032$ ,  $ES r = .45$ , and pride in profession,  $p = .033$ ,  $ES r = .45$ ). Despite the relatively short 10-week duration of the CBL program, it influenced their understanding of the profession, as evidenced by increased confidence in practice and pride in the profession, likely due to improved thinking processes and learning skills. In other words, the results of this study support the hypothesis that improving CR may deepen the understanding of the profession (Burke & DePoy, 1991; Neistadt, 1996). However, no significant differences were found in the two subfactors (i.e., career and growth, and contribute), which would probably improve with another long-term intervention or work experience.

### **Implications for Occupational Therapy Education**

This study highlights three key implications for the continuing education of new graduate occupational therapists:

1. **Integration of CBL programs into continuing education:** Incorporating CBL programs into occupational therapy continuing education can positively influence various aspects of CR skills of new graduate occupational therapists. On the other hand, remuneration for healthcare professionals is determined in increments based on the time spent with patients in the Japanese healthcare system (Ministry of Health, Labor and Welfare, n.d.). This suggests that developing efficient training programs could help to balance revenue and education. Case-based learning programs are linked to clinical practice so that they could be a highly feasible educational approach in actual clinical settings.
2. **Supervisors' guidance and mentorship:** Supervisors can facilitate the development of the mental models necessary for integrating knowledge into practice, especially for therapists with limited clinical experience. However, Shiota et al. (2022) noted that it was suggested that young occupational therapists who did not fulfill the requirements for clinical practice supervisors might be supervising newly graduated occupational therapists. The supervisor for this CBL program was an occupational therapist with at least six years of clinical experience and had completed a course to qualify for education as a fieldwork supervisor. Therefore, to increase the impact of supervisors' guidance and mentorship in CBL programs, it is necessary to develop supervisor requirements such as training for educators or clinical experience.
3. **Learners' reflection and verbalization of clinical practice:** Implementing reflective practices, such as verbalizing thoughts and reflections on practice, can promote self-awareness and continuous improvement in CR skills. However, verbalizing CR is difficult for even occupational therapy practitioners (Da Sliva Araujo, et al., 2022; Fleming, 1994). Therefore, for learners' reflection and verbalization of clinical practice, it is recommended to use the OFP case format and the CR assessment.



### Limitations and Future Research

Four methodological limitations warrant consideration when interpreting the study results. Firstly, this study was confined by a restricted pool of research participants and the absence of a control group. Future research endeavors should integrate a control group into the study design and participants from multiple sites, thereby enhancing the robustness of the evidence regarding the program's efficacy in fostering CR skills. Secondly, this study was constrained by the data collection method employed for qualitative analysis, which relied solely on an open-ended questionnaire. It is recommended that future research incorporate in-depth interviews to achieve a more comprehensive understanding of the learners' experiences with the CBL program. In-depth interviews can provide richer data on participants' experiences and can more deeply offer insights into how the CBL program influences a CR.

Thirdly, this study's data collection perspective was limited to the participants' subjective perspectives. Subjective perspectives, such as self-evaluation, are essential in lifelong learning but are influenced by the learner's perspective, such as underestimation or overestimation (Leach, 2012). Future research should identify the learning outcomes of CR using subjective and objective perspectives and contribute to accumulating evidence in occupational therapy education.

Finally, this study was conducted in a Japanese hospital-based setting. Therefore, it is uncertain whether the findings can be generalized to other clinical areas, different healthcare settings, or new graduated occupational therapists in other countries. Future research should investigate the generalizability of the findings by conducting studies with new graduated occupational therapists in various clinical areas and different countries.

### Conclusion

This quasi-experimental single-arm study explored the influence of a 10-week CBL program on the CR of new graduate occupational therapists. The CBL program's positive influence on CR from the quantitative and qualitative findings. Quantitative results showed improved SA-CROT scores ( $p = .001$ , ES  $r = .65$ ), while qualitative findings revealed experiences of "learning multidimensional thought processes" and "learning skills to improve CR themselves." These results show that new graduate occupational therapists' self-assessment of comprehensive CR aspects of occupational therapy has improved throughout the CBL program. The results of this study provide information on the positive influence of CBL on the CR of new graduate occupational therapists and highlight the integration of the CBL program into continuing education, the importance of supervisors' guidance and mentorship, and learners' reflection and verbalization of clinical practice.

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## Appendix

### Occupation-Focused Practice (OFP) Case Report Format

Title: ○○○○○○○○

Presenter: ○○ ○○. Supervisor: ○○ ○○

#### **【Introduction】**

Key points: Clearly state the outline and purpose of this case report.

#### **【General Information】**

##### 1) Medical Information

E.g., Disease, date of onset, medical history, medication, etc.

##### 2) Life History

E.g., ADLs, productive activities (or roles), leisure, etc.

##### 3) Social Information

E.g., Requests and supports from client's family, physical environment, insurance, etc.

##### 3) Tests and Measurements

E.g., FMA, ARAT, MAL, MMSE, etc.

##### 4) Interpretation of the Occupational Problem

Key points: Explain what the client's occupational problems are, what their possible causes are, and what changes can be expected (prognosis prediction).

#### **【Assessment】**

##### 1) Interviews (client's subjective)

E.g., COPM, etc.

##### 2) Observes (performance)

E.g., AMPS, PQRS, FIM total score, etc.

#### **【Intervention】**

##### 1) Goal Settings

Key points: Write for "SMART"

E.g.,

1. Can independently and safely perform ○○○ only during the day (duration: 4 weeks).
2. Can reduce ○○○ to about once a week (duration: 4 weeks).

##### 2) Approaches and Progresses

Key point: Describe the underlying theory or model

E.g.,

1. Upper limb approach consisting of task-oriented training and transfer package
2. ADL practice and home modifications based on MOHO

Table 1. ○○○○○○ (examples)			
	Phase 1 (day 1–14)	Phase 2 (day 15–29)	Phase (day 30–44)
COPM			
1.			
2.			
3.			
AMPS			
Motor			
Process			
FIM total			
<p><b>Key point:</b> Describe progress in phases as needed.</p>			
<p><b>Key point 3:</b> In addition, interpret the possibility that changes will spread to others.</p>			
<p><b>【Re-assessment】</b></p> <p><b>Key point:</b> Describe both objective changes and the client's subjective changes in whether goals were achieved.</p>			
<p><b>Key point 4:</b> Finally, describe limitations and challenges.</p>			
<p><b>【References】</b></p> <p>1) Author: article title. journal name. volume number (issue number): start-end page, year of publication.</p> <p>E.g.,</p> <p>1) Law M, et al: The Canadian occupational performance measure: An outcome measure for occupational therapy. Can J Occup Ther 57(2): 82-87, 1990.</p>			
<p><b>【Discussion】</b></p> <p><b>Key point 1:</b> First, write a summary of the results and the perspective of the discussion.</p>			
<p><b>Key point 2:</b> Second, explain factor analysis related to change.</p>			
2			

*Note.* SMART: This acronym stands for things to consider when setting goals, such as "S" being specific, "M" being measurable, "A" being attainable, "R" being relational, and "T" being timebound. The headline item is shown in this format; examples are in gray, and important points are in red. This format can be flexibly changed depending on the report's contents.