

## 対話型論証モデルを用いた課題解決型グループワークの 成果に関する検討

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### Examining the Outcomes of Problem-Solving Group Work Using the Dialogical Argumentation Model

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#### ＜和文抄録＞

【目的】対話型論証モデルを用いた課題解決型グループワークの成果について、批判的思考態度をグループワーク前後の3時点、グループワークの取り組みの程度を2時点で測定・比較することにより検討することを目的とした。

【方法】本研究は前後比較デザインを用いた準実験的研究であり、グーグル社のオンラインプラットフォーム（Google Forms）を用いて質問紙調査を合計3回行った。対象者は看護大学2年生で延べ87名が参加した。測定用具には、「看護学生の批判的思考傾向尺度」と「協働問題解決満足度尺度」を使用した。分析には、Kruskal-Wallis検定とMann-Whitney U検定を用い、有意水準は $p < .05$ とした。

【結果】参加者はグループワークを通して様々な意見に触れ、テーマについて考えを深めたり広げることができたと述べたが、批判的思考態度において統計的有意差は見られなかった。協働問題解決満足度についても同様に統計的有意変化はなかった。

【結論】批判的思考態度に関しては、短期間かつ限定的なグループワークであったことから、対話型論証モデルの使用による有意な変化は見られなかったと考える。また、グループワークへの取り組みの程度すなわち協働問題解決満足度についても、グループメンバーとの協同的作業よりも課題を効率的に完了させ提出することが優先されたことにより、有意な変化が見られなかったと考えられる。これらのことより、対話型論証モデルを用いた教育方法の再検討が今後の課題といえる。

#### ＜ Abstract ＞

Aims: This study examined the outcomes of problem-solving group work using the Dialogical Argumentation Model by comparing critical thinking disposition scores at three points in time and the extent of engaging in group work at two points.

Methods: This quasi-experimental, questionnaire-based study used a time-series design and targeted second-year students at a nursing university. A cumulative total of 87 students participated in this study using the Critical Thinking Disposition Scale of Nursing Students and the Satisfaction Scale with Collaborative Problem Solving as instruments. Three surveys were administered, but the data were not linked to individual respondents. Data collected using an online survey platform were analyzed using Kruskal-Wallis and Mann-Whitney U tests. Statistical significance was set at  $p < .05$ .

Results: While participants stated that they had opportunities to obtain various opinions from each other and

deepened and widened their thoughts about a given topic, their scores on critical thinking disposition did not exhibit any significant differences. Additionally, no significant changes were identified in the satisfaction scale for collaborative problem solving.

Conclusions: Regarding critical thinking disposition, it is considered that the scores did not increase sufficiently to prove the model's efficacy, owing to the short-term and limited work conducted. Concerning the level of engagement in group work, which was measured by satisfaction with collaborative problem-solving, there is a probability that the scores did not significantly increase because they may have prioritized completing and submitting the task efficiently over working collaboratively with their group members. It is a profound challenge to reconsider a program using a dialogical argument model.

#### キーワード

看護学生

nursing students

対話型論証モデル

dialogical argumentation model

批判的思考

critical thinking

グループワークへの取り組み

engagement in group work

## I. INTRODUCTION

Critical thinking is one of the most important skills required by nurses. In this research, critical thinking skills are defined, based on Kusumi and Tsuhako's <sup>1)</sup> definition, as the ability to think objectively and multilaterally, without bias. According to the Japanese Nursing Association <sup>2)</sup>, nurses need to play the role of medical team members who can clearly convey their opinions and judgments from their perspectives in ways that are understandable to other medical professionals. Additionally, nurses should strive to understand the perspectives of other medical professionals. Moreover, Kusumi and Tsuhako <sup>1)</sup> stated that when nurses gain critical thinking skills, they can judge complex scenarios, adjust to new circumstances, listen to varied perspectives, and cooperate to solve problems without self-centered thinking and biases. Thus, nursing educators need to cultivate this skill in students from their early school years to prepare them for their required role in a clinical setting.

Various teaching strategies to enhance critical

thinking in nursing students have been developed <sup>3)</sup>. Particularly in Japan, there has been an increasing trend in research on critical thinking skills in nursing schools since 2012. Some nursing educators have focused on developing this skill through group work in lectures, school practice, and clinical practice <sup>4)</sup>. However, Okabayashi <sup>5)</sup> reported a statistically significant decrease in first-year college and university students' confidence in their relationships with others from 1997 to 2019. Additionally, about 15% of new university students have experienced interpersonal anxiety for over 20 years since 1996 <sup>6)</sup> and some students tend to be not good at communicating with acquaintances <sup>7)</sup>. Therefore, although nursing students need to acquire critical thinking skills, they can encounter difficulties in group work – designed to improve these skills – as it requires them to engage in discussions with others. Consequently, it is currently a challenge to discuss the methods by which nursing students can actively participate in group work and acquire critical thinking skills. To solve this problem, we suggest using the Dialogical

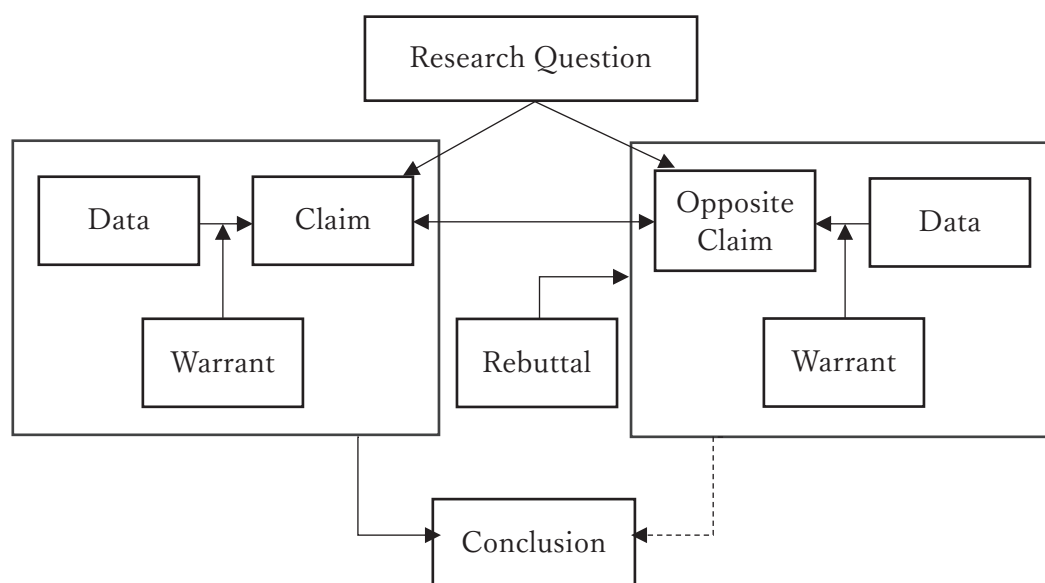
Argumentation Model (Figure 1), which includes critical thinking practices. Topics related to dialogical argumentation have been less explored in the context of facilitating critical thinking among nursing students. Dialogical argumentation is work in which individuals construct pieces of evidence and draw conclusions while dialogizing with others<sup>8)</sup>. This model (Figure 1) was designed and revised by Matsushita<sup>8)</sup> based on the Toulmin Model<sup>9)</sup> and the Cross Model<sup>10)</sup>. In this model, participants are required to construct their claims about a topic or problem using concrete data, evidence, and abstract warrants, and then discuss these claims with individuals holding opposite views. Additionally, they rebut the opposite claim with further logical reasons. Eventually, they derive a concrete conclusion by integrating both claims. This series of thoughts and discussions requires students to apply logical and critical thinking skills. In addition, this model can serve as a facilitator for argumentation among students by providing a structured model sheet which outlines what they should discuss and write. In other words, this model might enable students who are less comfortable speaking with others or hesitant to share their opinions to

express themselves more easily than they would in group work without this model. Therefore, this model was included in our lectures' group work on patient safety to enhance students' critical thinking skills through effective dialogue. Hence, this study aimed to examine the outcomes of problem-solving group work using the Dialogical Argumentation Model by comparing scores on critical thinking disposition at three points in time: before group work, after the first group work, and after the second group work, and by comparing the extent of engagement in group work at two points: after the first and second group works.

## II. METHOD

### 1. Study Design and Setting

A quasi-experimental study using a time series design was conducted to explore the outcomes of problem-solving group work using the Dialogical Argumentation Model with 98 second-year students at a nursing university. Group work related to patient safety was implemented twice, and students were included in the study before and after the group work sessions and presentations. They had to complete the group work outside of class within a maximum of two weeks. The first discussion's



**Figure 1** The Dialogical Argumentation Model<sup>8)</sup>, which was partly modified by the author.

theme was, “Is it appropriate for a nurse to force a patient who has self-removed an intravenous drip to wear mittens?” The second theme was, “Is it appropriate for a nurse to force an agitated patient to stay at the nurses’ station?” As we identified the changes resulting from repeated group work using this model, three explorations were conducted from October 2023 to January 2024 (Figure 2). The first was conducted before the group work, and the second and third were conducted after the first and second group work sessions and presentations, respectively. However, the data from these three surveys were not linked to individual respondents. They conducted group work using online worksheets from the model and were required to present their outcomes in class after each session. In addition, each group comprised different members from the first and second group work sessions. These explorations were conducted as data related to dialogical argumentation among nursing students are scarce.

## 2. Data Collection

Demographic data and two types of questionnaires were collected using Google Inc.’s online platform (Google Forms). Demographic data included age, sex, school year, and feelings of weakness in engaging in dialogue and critical thinking. Moreover, participants were asked to answer qualitative questions, including “Would you like to engage in group work using the Dialogical Argumentation Model again? Please explain why,” and “Please describe in detail what you found impressive things

about this group work.” This approach allowed for data collection without personal information, and participants could respond regardless of their location or time.

## 3. Instruments

### 1) Critical Thinking Disposition

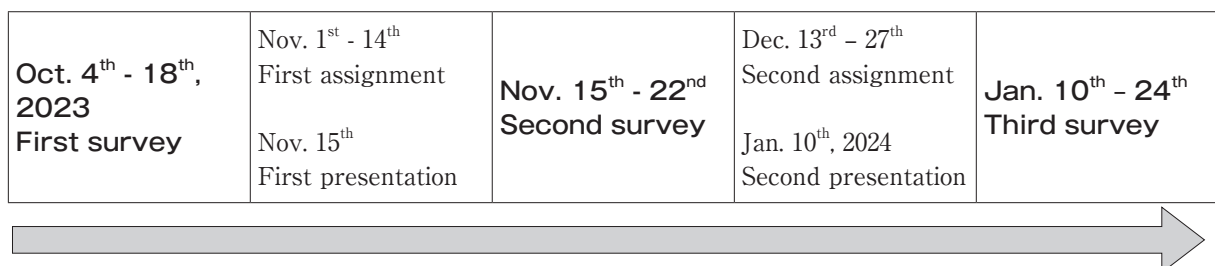
The Critical Thinking Disposition Scale for Nursing Students<sup>11)</sup>, which includes four factors and 24 questions, was used to assess critical thinking disposition. The responses were rated on a five-point Likert scale. This questionnaire was revised for nursing students based on the initial development by Hirayama *et al.*<sup>12)</sup> and showed a Cronbach’s  $\alpha$  of .82 in the developers’ study<sup>11)</sup>, suggesting internal consistency.

### 2) The Extent of Engaging in Group Work

The Satisfaction Scale with Collaborative Problem Solving<sup>13)</sup> was used to measure the extent of engagement in group work. It included three factors: 47 questions related to students’ task performance, sense of unity with other members, and positive changes in cognition. The responses were rated on a five-point Likert scale. The developers’ study<sup>13)</sup> showed that this questionnaire had a Cronbach’s  $\alpha$  of .81, indicating internal consistency.

## 4. Data Analysis

The Kruskal-Wallis test was used to examine the relationship between group work sessions and critical thinking disposition scores. The Mann-



**Figure 2** The flow of the survey process in this study

Whitney U test was used to examine the relationship between group work sessions and satisfaction scores with collaborative problem solving. Data were analyzed using SPSS software (ver.27) and statistical significance was set at  $p < .05$ . In addition, effect sizes were calculated using Cliff's  $d$ , as outlined in "Psychological Statistics in Order to Tell"<sup>14)</sup> and interpreted based on the report of Romano *et al.*<sup>15)</sup>.

### 5. Ethical Considerations

This study was reviewed and approved by the Ethics Committee of the Faculty of Health Sciences of Kyorin University (2023-10). The researchers informed the participants that their school grades would not be affected if they did not participate in this study. Consent for participation was obtained from all participants who were informed about the study by asking them to tick the box online.

## III. RESULTS

### 1. Overview of Participants

In the first investigation, 49 participants had a response rate of 50% (49/98) and there were no invalid questionnaires. There were two male and forty-seven female participants. The percentages

of those who felt weak in engaging in dialogue and critical thinking were 53.06% and 57.14%, respectively.

For the second investigation, 24 participants had a response rate of 48.89% (24/49) with no invalid questionnaires. There were two male and twenty-two female participants. The percentages of those who felt weak in engaging in dialogue and critical thinking were 45.83% and 41.67%, respectively.

In the third investigation, 14 participants had a response rate of 58.33% (14/24), with no invalid questionnaires. There were two male and twelve female participants. The percentages of those who felt weak in engaging in dialogue and critical thinking were 42.86% and 50%, respectively.

The mean age was not shown in this report to avoid identifying a particular participant in all investigations.

### 2. Outcomes of Problem-Solving Group Work Using the Dialogical Argumentation Model

None of the significant differences concerning the Critical Thinking Disposition Scale of Nursing Students were indicated by the Kruskal-Wallis test (Table 1). Although the Mann-Whitney U test did not find any significant differences in the

**Table 1** Comparing scores on the Critical Thinking Disposition between three periods

Variable	Time	<i>Mdn (IQR)</i>	<i>p</i>
Inquisitiveness	Before the group work	40.0 (34.0-44.0)	.953
	After the first group work	39.0 (35.5-44.0)	
	After the second group work	39.5 (31.0-44.0)	
Analyticity	Before the group work	22.0 (16.0-26.0)	.802
	After the first group work	23.5 (15.5-27.0)	
	After the second group work	24.0 (15.0-27.0)	
Maturity for thinking	Before the group work	11.0 ( 9.0-12.0)	.963
	After the first group work	11.5 ( 8.5-12.5)	
	After the second group work	11.0 ( 8.0-13.0)	
Open-mindedness	Before the group work	13.0 (12.0-14.0)	.849
	After the first group work	13.0 (13.0-14.0)	
	After the second group work	13.0 (12.0-14.0)	

*Note:* The Kruskal-Wallis test was used.

$n$ (Before the group work) = 49.  $n$ (After the first group work) = 24.  $n$ (After the second group work) = 14.

primary factors of “member satisfaction in collaborative problem-solving” and the effect sizes (Cliff’s  $d$ ) were negligible (Table 2), the test identified significant differences and the effect sizes were medium for the following three items (Table 3): “I won’t review the contents of this assignment later” ( $p = .020$ ,  $d = -0.429$ ), “I could work on this assignment with adequate responsibility” ( $p = .012$ ,  $d = -0.452$ ), and “I felt there were members who had developed variously through this assignment” ( $p = .020$ ,  $d = -0.443$ ). The first item showed a significant increase on the inverted scale. The second and third items also showed significant increases. These items were translated from Japanese into English by the researcher and then confirmed and approved by the developer.

### 3. Qualitative Data

Participants described that they could gain a

variety of opinions about the given topic from each other after the first group work session, while some students struggled with time adjustment for argumentation with their group members and found it burdensome. After the second session, they stated that they had the opportunity to deepen and widen their thoughts about the topic through group work using the Dialogical Argumentation Model. Moreover, they felt a sense of enjoyment and achievement when discussing the subject with other members. However, they also referred to struggles related to time adjustment with their members, as in the first group work session. Additionally, some groups divided their roles and completed the framework without discussion.

## IV. DISCUSSION

This study explored the outcomes of problem-solving group work using the Dialogical

**Table 2** Comparing scores on the Satisfaction Scale with Collaborative Problem Solving

Variable	Time	<i>Mdn (IQR)</i>	<i>p</i>	Cliff’s <i>d</i>
Task performance	After the first group work	52.5 (48-55)	.893	-0.030
	After the second group work	52.5 (49-55)		
Sense of unity with other members	After the first group work	50.5 (47-53)	.940	-0.018
	After the second group work	49.5 (47-55)		
Positive changes in cognition	After the first group work	39.0 (37-41)	.846	0.042
	After the second group work	38.5 (35-43)		

*Note.* The Mann-Whitney U test was used.

$n$ (After the first group work) = 24.  $n$ (After the second group work) = 14.

**Table 3** Excerpting items that indicated significant differences from the Satisfaction Scale with Collaborative Problem Solving

Variable	Time	<i>Mdn (IQR)</i>	<i>p</i>	Cliff’s <i>d</i>
“I won’t review the contents of this assignment later”	After the first group work	2 (2.0-3.0)	.020*	-0.429 medium
	After the second group work	3 (2.0-4.0)		
“I could work on this assignment with adequate responsibility”	After the first group work	4 (3.5-5.0)	.012*	-0.452 medium
	After the second group work	5 (4.0-5.0)		
“I felt there were members who had developed variously through this assignment”	After the first group work	3 (2.5-4.0)	.020*	-0.443 medium
	After the second group work	4 (3.0-5.0)		

*Note.* The Mann-Whitney U test was used.

$n$ (After the first group work) = 24.  $n$ (After the second group work) = 14

\* $p < .05$



Argumentation Model by examining whether the group work using this model influences critical thinking disposition and the extent of engagement in group work. We discuss these outcomes from the perspective of these two factors.

### 1. Critical Thinking of Nursing Students

In this study, participants stated in the qualitative sections that they deepened and widened their perspectives on a given topic by exchanging opinions with members using the dialogical argumentation worksheet. However, critical thinking scores did not significantly increase through group work using the model. The following factors were considered as the reasons for this result. Although critical thinking requires more processing time for critical consideration<sup>16)</sup>, the working term given to students in this study was at most two weeks. This suggests that the term was insufficient for improving nursing students' critical thinking scores. Moreover, Kusumi, Tanaka *et al.*<sup>17)</sup> revealed that critical thinking attitudes significantly increased through a learning program targeting first-year students at a university that consisted of 13 lectures of 90 minutes each. Nevertheless, in our study, the group work was conducted twice. From these perspectives, we can consider that group work using this model in this study did not significantly increase the scores on nursing students' critical thinking disposition enough to prove the model's efficacy, owing to the short-term and limited work conducted.

### 2. Extent of Engaging in Group Work

Regarding the promotion of the extent of engagement in group work, which was measured using the Satisfaction Scale with Collaborative Problem Solving<sup>13)</sup>, one item's score for each factor differed significantly between the first and second group work sessions, whereas there were no

significant differences in the primary three factors. The effect size of each factor was negligible, and the effect size of each item showing significant differences was medium, as calculated using the Cliff's *d* formula and interpreted based on the report of Romano *et al.*<sup>15)</sup>.

In the group work in our study, students may not have collaborated enough to experience increases in scores on the satisfaction scale for collaborative problem solving for the following reasons: because they had to engage in group work outside of class and within a short timeframe, they may have prioritized completing and submitting the task efficiently over collaborating with their group members, which was the primary purpose of the group work. Furthermore, they may have broken down the elements of the Dialogical Argumentation Model and assigned them to individual members rather than working together sufficiently to complete the task more efficiently. Incidentally, collaboration is considered a situation in which learners interact cooperatively<sup>18)</sup>, and interpersonal cohesiveness enables groups to communicate more freely and effectively coordinate their efforts<sup>19)</sup>. Nevertheless, reflecting on the situations in our study, it cannot be said that the students effectively interacted to achieve the task, as they may have prioritized efficiency over collaboration. Furthermore, the interpersonal relationships that facilitate productive communication may not have been adequately established. As a result, students may not have engaged in the group work as effectively as intended, leading to no significant change in their scores on satisfaction with collaborative problem-solving.

From the abovementioned views, it can be considered that a long-term, step-by-step approach should have been planned to achieve positive outcomes in group work using the Dialogical Argumentation Model. In other words, even if the

working time was short, students should have been given opportunities to participate in group work using the model throughout all units of the class, rather than just in some parts, with the class lasting for at least several months. Additionally, a few facilitators should have been assigned during the first few sessions to guide students on how to effectively engage in and proceed with group work. Therefore, it is an urgent challenge for us to reconsider and reconstruct the program using the Dialogical Argumentation Model. In addition, we must address the limitation that many participants withdrew from this study, resulting in a final sample size that decreased to almost one-third.

## V. CONCLUSION

This study explored the outcomes of problem-solving group work using the Dialogical Argumentation Model by comparing the scores on critical thinking disposition at three points in time and the level of engagement in group work at two points. However, no significant changes were identified on either scale. The reasons for these results might be because of the short-term, limited assignments conducted, as well as a focus on efficient task completion over collaboration with group members.

## AUTHOR CONTRIBUTIONS

Sonoka Miyashita and Yoko Jinguji were responsible for all processes of this study, including design, data collection, analysis, and manuscript preparation. Both authors have read and approved the final version of the manuscript.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## ADDENDUM

A portion of this study was presented at the 44th Annual Conference of the Japan Academy of Nursing Science.

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