

Effects of Parallel-repeated Design of Argumentation and Management on Higher Education

Mika Nakano

Department of Electrical Engineering, Fukuoka Institute of Technology, Japan, nakano@fit.ac.jp

Abstract: In Japan, the number of schools in higher education that introduce argumentation into classes is now increasing. Despite this trend, however, empirical studies on how to teach argumentation are scarce, and its effect has not yet been sufficiently tested. The present study aims to (1) introduce the parallel-repeated learning design of argumentation and management and (2) examine the effect of the course by comparing two studies conducted in 2011 and 2012. The prior 4-year pilot study revealed that the following three elements should be included in education to acquire the skills necessary for completing tasks: (A) the “knowledge phase,” to acquire knowledge on the theme, (B) the “argumentation phase” to acquire skills of argumentation and oral presentation, and (C) the “management phase,” to acquire the necessary management skills. The program was designed for students to learn (B) and (C) in parallel with the domain of (A), which are repeated twice in one academic semester. Three types of questionnaires were used to test the effect. The results of analyses revealed that the presented framework was effective over two years, which revealed the learning process of students. This notion of an educational program for argumentation education can be applied to other educational contexts outside higher education.

Keywords: argumentation, curriculum design, management, presentation, educational effect

I. INTRODUCTION

Recently, argumentation has been receiving increasing attention from educational researchers as a method of exploring human interaction. Previous studies have focused on how society influences the development of reasoning, and how argumentation facilitates deep understanding and elaborative learning [1] [2] [3]. In Japan, the number of schools that introduce argumentation into higher education classes is now increasing. Despite this trend, however, empirical studies about how to teach argumentation are scarce, and its effect has not yet been sufficiently tested [4]. Argumentation skill is one of the most important factors in developing a base for creativity, innovation and integrating various types of learning. On the other hand, we have two academic challenges regarding argumentation education in Japan. One is a cultural matter: the Japanese rarely use argumentation as an approach to interpersonal communication and score high in argument avoidance. Another is a practical matter: teachers lack sufficient knowledge on how to teach to teach argumentation. Therefore, a course for learning and using argumentation suitable for Japanese students needs to be designed. The author has been experimenting with several studies to foster Japanese students’ communication skills [5] [6]. For over a decade, she has developed textbooks on communication [7] and presentation skills [8].

The author conducted a 4-year practice from 2008 to 2011, with about 100 students each year, on the subject “presentation.” It was revealed that the course structure with the following three elements is effective, as shown in Fig. 1 [9] [10]: (A) “knowledge phase” to acquire

knowledge on the theme, (B) “argumentation phase” to acquire skills of argumentation and oral presentation, and (C) “management phase” to acquire management skills necessary for completing tasks. The program was designed for students to learn (B) and (C) in parallel with (Fig. 2) the domain of (A), which is repeated twice in 15 classes in one academic semester. This design was introduced in the teaching of the subject of “presentation,” which comprised 15 classes (90 minutes) in one academic semester, from April to July 2012, for sophomores in the engineering department in Fukuoka, Japan.

The previous studies that examined the effect of the first attempt in 2011 revealed that this program was effective [9] [10] [11]. For the next year (2012), the textbook for this class [8] was written as a learning tool and introduced to the class. The same questionnaire research was continuously conducted [12] [13]. Although the same program is used, students and their learning environment changes every year. Therefore, the effectiveness of the program needs to be tested over a longer period of time.

From the viewpoint of management, several studies elucidate the importance of a psychological approach. A previous study revealed that confidence, hope, optimism, and resilience—four positive psychological capacities—are measurable and can be improved and managed for better work performance [14]. The study revealed that for positive results, it is important to focus on the understanding and development process of the right people [15]. From an academic standpoint, how we deal with management in higher education needs to be examined using practical data.

The present study aims to (1) introduce the parallel-repeated learning design of argumentation and

management and (2) examine the effect of the course by comparing two studies conducted in 2011 and 2012. After considering the two-year results, the future of argumentation education in higher education will be discussed.

II. THE PARARELL- REPEATED DESIGN

A. Contents of “Presentation”

The course “presentation” was set for sophomores in the Engineering Department at Fukuoka Institute of Technology, Fukuoka, Japan, in 2008, as the second related subject, following “Communication Theory,” which deals with debating and oral communication in the freshman year. This class aims to develop students’ applicable presentation skills, which will be useful not only during student life but also after graduation. This course was a compulsory subject from 2008 to 2012 and pegged as a selective subject since 2013 for highly motivated students.

The contents of the course “presentation” have been improved through the 4-year practice period, from 2008 to 2011. In 15 classes, students are provided with the opportunity to deliver presentations twice in front of the class with two themes: “clean energy” and “company research for job hunting.” Students can select their topic within the limitation of these themes. To prepare the presentations, students work in pairs or groups and choose a leader. The group/pair changes for each presentation. Their major conditions to complete one presentation are as follows: (1) preparation must be done within six or seven weeks and (2) the duration of the presentation must be 3–5 minutes followed by a three-minute question and answer session.

and the practice of group work. In the first class, students form groups/pairs, select their topic, and prepare drafts for their presentation. In the second class, students learn how to organize their opinions and gather information and organize the rough draft prepared by them in the first class. In the third class, they learn how to make persuasive slides. In the fourth class, students modify their slides by accepting comments from a teacher and TA. In the fifth class, they rehearse for the presentation in front of a teacher, a teaching assistant, and other students. In the sixth and seventh classes, on a day selected by the students, they deliver the final presentation and respond to questions from the audience. Thereafter, they discuss their presentation and evaluate themselves to set a new goal. In the class, when students do not have a presentation, they ask questions to the other groups. After all the presentations are delivered, we discuss which was the best presentation and why.

B. The Design and Function of the Framework

The pilot studies revealed that a course framework comprising the following three elements was necessary: (A) “knowledge phase,” to acquire knowledge on the theme; (B) “argumentation phase,” to acquire skills of argumentation and oral presentation; and (C) “management phase,” to acquire management skills necessary for completing tasks. The “knowledge phase” includes information regarding the theme that the students have selected for the presentation. The (B) “argumentation phase” covers how the students prepare a persuasive presentation. Finally, the (C) “management phase” comprises how the students deliver the presentation. The program was designed for students to learn (B) and (C) in parallel with the domain of (A), which is repeated twice in 15 classes in one academic semester, as shown in Fig. 1.

In the class, (A), (B), and (C) have the following functions. (A): Students have the opportunity to thoroughly understand the theme through research, by preparing presentations either on “clean energy” or “company research for job hunting,” which includes necessary knowledge of both a specialized field and career development. (B): Students can learn how to prepare and present their ideas in presentation format. (C): Students can learn how to manage themselves under specific conditions to achieve goals. The framework with (A), (B), and (C) offers an ideal learning environment to students for acquiring presentation skills.

As for the framework, to maximize learning from only 15 classes in one academic semester, the course needs to include both basic and application stages that share the same framework to understand the learning system offered in the class (i.e., Repetition). This structure that includes repetition offers students a model of practice and opportunities to apply what they learned from the first attempt to the second attempt in the class. This experience is effective to make them more open to new, similar experiences outside the class. Students need to know the “what” and “how” of both phases in parallel with fostering their practical skills (i.e., Parallel).

TABLE I. PROCESS OF LEARNING IN THE COURSE

Class	Process	Contents
1	Group setting	Students are randomly divided into pairs or groups of three.
	Theme	Students discuss and decide the theme of the presentation.
	Draft	Students prepare a draft on the background, objectives, and the reason to select the theme.
2	Organization	Students organize the framework of the presentation in a paper.
	Research	Students research the theme and gather data and information.
3	Slide	Students prepare slides for presentation using PowerPoint.
4	Modification	Students modify their slides by accepting comments from a teacher and TA*.
5	Rehearsal*	Students rehearse their presentation in front of a teacher, TA*, and other students.
6-7	Presentation	Students make a presentation in front of an (i.e., the class).
	QA	Presenters answer audience questions after the presentation.
	Self-evaluation	Presenters self-evaluate after presentation. Non-presenters write some comments.

*Teaching Assistant, **See III, B. Research 2

The contents of the classes for one presentation are shown in Table 1. The 90-minute class includes lecture

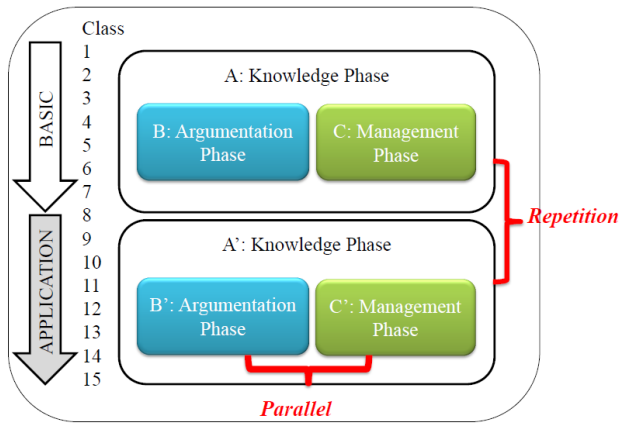


Figure 1. The Parallel-Repeated design in “presentation”



Figure 2. Parallel elements of argumentation and management

The contents of “parallel learning” of argumentation and management (Fig. 2) are related to the contents of the course shown in Table 1. In the (B) argumentation phase, students learn (1) framework, (2) organization, (3) expression, (4) story, (5) layout, (6) presentation, and (7) evaluation. In the (C) management phase, students learn (1) setting goals, (2) time management, (3) self-analysis, (4) assessing progress, (5) mutual evaluation, (6) goal achievement, and (7) resetting goals. By practicing the presentation, within the knowledge domain, students learn how to connect the knowledge of (B) argumentation and (C) management. These learning contents offer students an ideal learning environment for delivering a presentation, which can serve as a model for when they encounter opportunities to deliver a presentation outside the class.

III. METHOD

To test the long term effectiveness of the design, this study compares and summarizes the result of the two studies in the first two years, since the framework was

introduced in 2011 in the course “presentation.” Research phase 1 was conducted in 2011, based on References [9], [10], and [11]. Research phase 2 was conducted in 2012, based on References [12] and [13]. The detail of each method is as follows. Each research phase includes an analysis of three aspects using the same questionnaires: A. basic skills, B. motivation to learn, and C. learning process.

A. Research Phase 1

A total of 48 ($M = 46$, $F = 2$) students took the 2011 “presentation” course; three aspects were analyzed to test the effectiveness.

The first analysis concerned “the basic abilities.” In February 2006, the Ministry of Economy, Trade and Industry defined the basic abilities required for working together with various people in a workplace and local communities as “Fundamental Competencies for Working Persons,” which consist of three competencies (composed of 12 competency factors). These competencies were formulated at a committee comprising intellectuals in businesses and universities [16]. The three competencies are “Ability to step forward (action),” “Ability to think through (thinking),” and “Ability to work in a team (teamwork).” The competency factors of action are (1) Initiative (ability to initiate things proactively), (2) Ability to influence (ability to influence and involve others), and (3) Execution skill (ability to set goals and execute with conviction). The factors of thinking are (4) Ability to detect issues (ability to analyze the status quo and clarify issues), (5) Planning skill (ability to clarify procedures to solve issues and prepare), and (6) Creativity (ability to create new values). The factors of teamwork were (7) Ability to deliver messages (ability to deliver own opinions clearly), (8) Ability to listen closely and carefully (ability to listen to other peoples’ opinions carefully), (9) Flexibility (ability to appreciate different opinions and perspectives), and (10) Ability to grasp situations (ability to comprehend relationships between yourself and other people as well as things surrounding you), (11) Ability to apply rules and regulations (ability to comply with social rules and keep promises to others), (12) Ability to control stress (ability to deal with the original cause of stress). Students evaluated themselves by answering the questionnaire three times: pre-test (April 6th), mid-term (June 1st), and post-test (July 20th). In this study, the results used the scores of the three categories with the highest scores: action, thinking, and teamwork.

The second analysis concerned how students think about the presentation pre- and post-test. The questionnaire included the following questions on a 5-scale self-evaluation: “Q1: I’m good at presentation,” “Q2: I like presentations,” and “Q3: anyone can acquire presentation skills.” Students responded to the questionnaire twice during the course: before the first presentation and after the second presentation.

The third analysis concerned how they reflected about themselves regarding the aforementioned basic skills. The question of “which skills do you think you need to improve for yourself” was used for qualitative analysis.

B. Research Phase 2

A total of 39 ($M = 39, F = 0$) students took the same course in 2012. The questionnaires used were the same as in the first phase. For basic skills, Research phase 1 draws the following hypothesis: “students learn from their own practice in this design.” To test this hypothesis, we added one more practice time after rehearsal before the second presentation, and conducted four practices in total. In the rehearsal, the students delivered presentations in front of the class and discussed their positive points and task afterward. If the hypothesis is correct, the score would increase between the first presentation and after rehearsal before the second presentation, and then each score would increase gradually over four points. Students answered the questionnaire four times: pre-test (April 6th), mid-term (June 1st), before the second presentation (July 13th), and post-test (July 21st).

For the second analysis about the presentation, using the same questionnaire as Research phase 1, students responded twice during the course: before the first presentation (May 17th) and after the second presentation (July 19th).

For the third analysis, considering the results of Research phase 1, to clarify the individual differences in the process of learning, we analyzed the data of the same questionnaire by dividing the students in two groups of “higher than average” and “lower than average” at the point of post test. Students in the “lower than average” group might have had some problems in self-evaluation; on the other hand, students in the “higher than average” group might have used strategies for self motivation. For example, those students might see the problem as solvable, and change their views or attitudes adjusting with their own goal.

IV. RESULTS AND DISCUSSION

In this section, we will compare the results of the 2011 and 2012 studies. The results will be divided into A. basic skills, B. motivation to learn, and C. learning process, according to the questionnaires.

A. Basic Skills

In Research phase 1, the results of basic skills in 2011 are shown in Fig. 3. A two-way ANOVA with repeated measures was implemented to examine the effects of basic skills factors (action, thinking, and teamwork) and measurement time (pre-test, after first presentation, and post-test). The results showed significant main effects of basic skills ($F = 26.275, df = 2, p = < .000$) and measurement time ($F = 11.353, df = 2, p = < .000$). Interaction was not significant. Significant main effects were further decomposed using pairwise comparisons with Bonferroni’s correction for multiple comparisons. We found a significant difference between thinking and teamwork ($p = < .000$), and action and thinking ($p = < .000$) in the basic skills factor and between pre- and post-test ($p = < .000$), and after the first presentation and post-test in the effect of measurement time ($p = .004$). This result shows the effectiveness of repetition of the framework; the more students experienced practice, the

more the self-evaluation increased. A close examination of each category revealed the following three characteristics: (1) the biggest gap between mid and post-test was for action and teamwork, and (2) there were gradual changes over the three periods for thinking. All the scores improved at the post-test stage; this implies that the repetition framework is appropriate for all the elements.

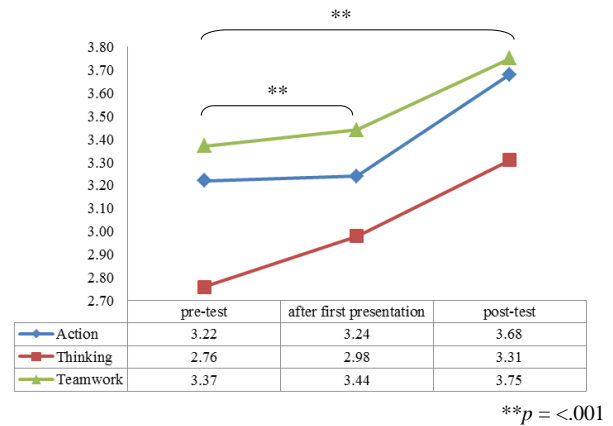


Figure 3. The average scores of basic skills in 2011

The hypothesis drawn from Research phase 1 is that students learn from their own practice in this design. To clarify this, we added one more time after rehearsal and conducted four rehearsals in total. In the rehearsal, the students delivered presentations in front of the class and discussed their good points and task afterward. If the hypothesis is correct, the score would increase between the first presentation and after rehearsal, and then each score would increase gradually over four points.

In the results of Research phase 2, improvements in basic skills are evident, but the gaps between pre- and post-test are smaller than that of Research phase 1 as shown in Fig. 4. A two-way ANOVA with repeated measures was implemented to examine the effects of the basic skills factor (action, thinking, and teamwork) and measurement time (pre-test, after first presentation, before second presentation, and post-test). The result showed significant main effects of basic skills ($F = 4.156, df = 2, p = .019$) and measurement time ($F = 4.140, df = 2.059, p = .019$). Interaction was not significant. Significant main effects were further decomposed using pairwise comparisons with Bonferroni’s correction for multiple comparisons. We found significant difference between thinking and teamwork in the basic skills factor ($p = .029$) and between pre-test and before second presentation in the effect of measurement time ($p = .039$). This result in Research phase 2 also shows the effectiveness of repetition of the framework, although the significance can be seen only between pre-test and before the second presentation. For all three points before the second presentation, all the scores were highest among pre-test and after first presentation. However, at the last point of the post-test, certain scores for action and

thinking decreased. This indicates that the one- or two-week practice between before the second presentation and post-test is relatively short to improve the self-evaluation of thinking and action, which are both individual abilities. On the other hand, the score of teamwork, which is an interactive ability, increased over the four points. This result shows that the repetition framework is appropriate for all the elements, but the tendency of each category differs according to the property of the category, individual, or interactive ability.

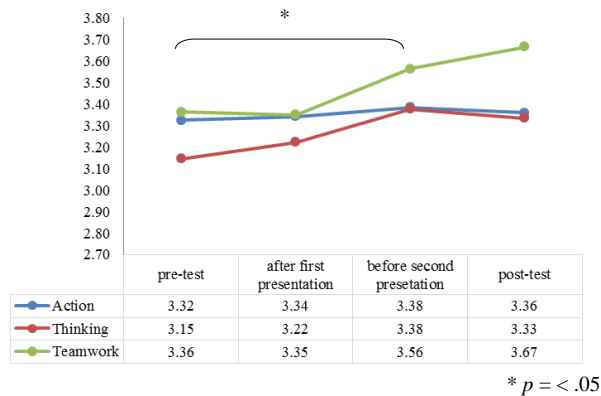


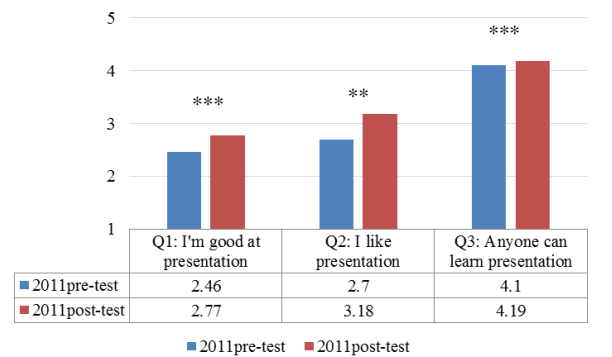
Figure 4. The average score of basic skills with four research points in 2012

B. Motivation to Learn

In Research phase 1, how students think about the presentation is shown in Fig. 5. At the pre-test, the average scores of Q1, Q2, and Q3 were 2.46, 2.70, and 4.10, respectively. After the course, at the post-test, the average for each question was 2.77, 3.18, and 4.19, respectively. A comparison of the two results at different times using a paired t test revealed a significant difference between pre- and post-test for all the questions (Q1: $t = 5.90$, $df = 43$, $p < .0001$; Q2: $t = 4.03$, $df = 43$, $p < .001$; Q3: $t = 5.03$, $df = 43$, $p < .0001$). From this result, at pre-test, some students felt that they were not good at presentation and they did not like presentation. On the other hand, at post-test, all the scores increased. The scores of Q3 did not change much between pre- and post-test, which shows that the students possessed learning efficacy before beginning the class. This might be because they had already taken a communication class and had a positive attitude toward the class when they were freshmen. From these results, we found that the students improved their recognition toward presentation as a result of the classes.

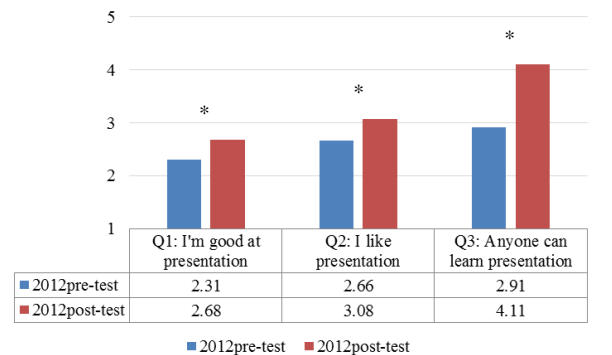
In Research phase 2, how students think about presentation and job search, is shown in Fig. 6. At the pre-test, the average scores of Q1, Q2, and Q3 were 2.31, 2.66, and 2.91, respectively. After the course, at the post-test, the average for each question was 2.68, 3.08, and 4.11, respectively. A comparison of the two results at different times using a paired t test revealed significant difference between pre- and post-test for all the questions (Q1: $t = 2.42$, $df = 33$, $p < .05$; Q2: $t = 2.19$, $df = 33$, $p =$

$< .05$; Q3: $t = 1.74$, $df = 33$, $p < .05$). Although most of the students seemed unconfident about the presentation, after post-test, all the scores increased, especially for Q3. The textbook written for this class [7] was first introduced this year. This textbook might have functioned as a tool for learning and helped students by fostering self-efficacy in acquiring presentation skills.



** $p < .001$, *** $p < .0001$

Figure 5. How students think about presentation in 2011



* $p < .05$

Figure 6. How students think about presentation in 2012

C. Learning Process

In Research phase 1, the characteristic of time difference was found by examining the students' written descriptions shown in Table II. At the pre-test, students evaluated themselves referring to past experiences, which were perceived notions without clear reasons for the self analysis. At the mid-test, the students evaluated themselves referring to their experience during the class. More analyses included clear reasons for the evaluation other than pre-test, but were still based on partial reflection. At the post-test, students evaluated themselves referring to their own principles and rules derived from multiple experiences in the class. The attempts to integrate several actions for total reflection are also observed.

Students in the “higher than average” group tended to evaluate themselves positively at pre test. On the other hand, at post-test, they focused on the problem or task of themselves. This result indicated that they learned from practices in the class and noticed something lacking in their skills. The answers can be seen as future oriented. Students in the “lower than average” group, however, described their weakness and low self-evaluation at pre test. At post-test, the students still evaluated their weakness the same as pre test. These results indicated that those students did not learn anything new from the practices or did not change their view even though they realized something. The comparison between the two groups illustrated that higher scores were supported in their change of self-evaluation and in setting the next goal. By contrast, lower scores were supported by static self-image or difficulties in changing themselves when confronting hardships. Lower-achieving students answered that they were lacking in stress management skills in general, which might make personal growth difficult, since stress management is the basis for the other skills.

TABLE II. PROCESS OF LEARNING IN A COURSE

Phase	Students comments	Reason
Pre-test	<ul style="list-style-type: none"> <i>I'm not good at expressing myself to others.</i> <i>I want to be able to manage myself to achieve goals.</i> 	Past self-evaluation, perceived notion
Mid-test	<ul style="list-style-type: none"> <i>I truly understand the importance of how we think of others' opinions in the first presentation.</i> <i>I found that a lot of errors and problems exist even when I think it's perfect.</i> 	experience in the classes, partial reflection
Post-test	<ul style="list-style-type: none"> <i>When we act with initiative, things go well.</i> <i>We can do well without self-management.</i> 	Own principles and rules, total reflection

TABLE III. COMPARISON OF SELF-EVALUATION BETWEEN HIGHER AND LOWER THAN GROUP

	Pre-test	Post-test
“higher than average” Students N = 26	<ul style="list-style-type: none"> <i>I sometimes take action myself.</i> <i>I'm not creative, but have ability to get things done.</i> <i>I like doing something by collaborating with others.</i> 	<ul style="list-style-type: none"> <i>I'm not creative.</i> <i>I don't have ability to take action.</i> <i>I want to develop independence.</i>
“lower than average” Students N = 13	<ul style="list-style-type: none"> <i>I follow someone's order.</i> <i>I don't take action by myself.</i> <i>I'm stressed easily.</i> 	<ul style="list-style-type: none"> <i>I'm not good at taking action by myself.</i> <i>I'm lacking in independence.</i> <i>I'm stressed easily.</i>

In Research phase 2, to clarify the individual differences in the process of learning, we analyzed by dividing students into two groups of “higher than average” and “lower than average” at the point of post test. The average score was 42.1 ($SD = 6.75$) out of 60.0 (12 items \times 5-point scale). The number of students who were in the “higher than average” group is 26 and that in the “lower than average” group is 13. We compared the answers of these students at pre- and post-test. We presented some representative answers in Table III.

V. COMPARISON IN TWO YEARS AND FUTURE TASK

The summary of the two-year studies is as follows.

- Basic skills:** These results show that the repetition framework functions is appropriate for the elements overall. As for the opportunities of practices as mentioned in the hypothesis, the tendency of each category differs according to the property of the category, individual, or interactive ability. The scores for action and thinking differed, but that for teamwork increased in two years, which indicated that this framework is effective to foster teamwork regardless of year. The comparison between Research phases 1 and 2 clarifies that more practices in a short time are not necessarily effective for students. One group project which continued for nearly six weeks can roughly indicate sophomores' reflection and self-evaluation for improvement. The additional point of the second presentation in Research phase 2 can be an opportunity for students to evaluate their skills, but this does not imply that it is an opportunity to increase the score. Multiple opportunities of practice and reflection are needed for students to improve themselves. At the pre-test, each average score of basic skills in 2011 and 2012 considerably differed, which indicates that there are individual differences in how they evaluate themselves based on their experiences. Moreover, to assess the students' profiles, we need to know the reasons of their scores. Some students might refer to the experience in high school as not a recent one.
- Motivation to learn:** The results in both years showed a significant difference between pre- and post-test in all the questions. Students seemed satisfied with the classes on the whole. The scores of the pre-tests in both year differed, but the ones at the post-test reached the same level. This implies that students changed the motivation preceding the tasks in the design, regardless of the initial motivation. In Research phase 2, even those students who lacked the confidence to learn presentation skills developed positive recognition.
- Learning process:** In Research phase 1, the result shows qualitative change in the self-evaluation process from the not reasonable notion to principle over the pre-, mid-, and post-test periods. This implies that the repetitive design of inner

reflection is effective. On the other hand, by examining the individual differences among higher and lower groups, it was observed that students in the higher group took progressive steps in understanding what they learnt during the practice. However, the students of the lower group seemed to remain at the same stage even after their experiences. Although the lower achieving students are the minority in the class, teachers need to pay attention to those students. Otherwise, they will not improve, even after two presentations.

To sum up the three results in two years, the program works well overall, but we found that the students can be categorized into two groups. One group is those who can identify their problems by evaluating themselves after the practices. The other is those who have consistent problems, regardless of practice and reflection. This suggests that their self-development efforts have certain limitations and require assistance or guidance. The former students are open to their experiences, and if they experience more, they will learn more. On the other hand, the latter students are closed to their experiences and are unchanged even after they repeat the experience. For the next class, these evaluations of “how I grow by experience” according to the two groups will be necessary in addition to answering questionnaires.

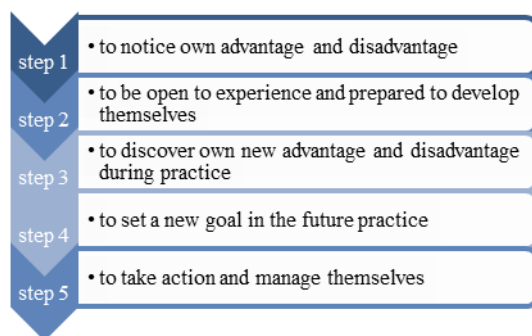


Figure 7. Learning steps in the course

To summarize the learning process of this design, five steps are established, as shown in Fig. 7. Step 1 is to notice one's own advantage and disadvantage. Step 2 is to be open to experiences and prepared to develop them. Step 3 is to discover one's own new advantage and disadvantage during practice. Step 4 is to set a new goal in the future practice. Finally, step 5 is to take action and manage oneself. Each student has his own hurdle when preparing a presentation with peers. These steps can be evaluation criteria which foster their confidence in the learning process. According to Research phase I results, most of the students set their goals to foster the skill of action. For the future task, the essence for developing action skills needs to be included in the learning process. Even after the course's completion, we need to help them set a goal for the next practice outside the class.

VI. CONCLUSION

The present study aimed to (1) introduce the parallel-repeated learning design of argumentation and management, and (2) examine the effect of the course by comparing two studies conducted in 2011 and 2012. Considering the two-year results, the future task of communication education was examined. The results showed that the design was effective overall and self-monitoring was improved. The result of the students' perception showed that the learning environment was suitable for Japanese students. The framework of (A), (B), and (C) can be applied to other subjects. The common frames can help students acquire deep knowledge and practical skills utilizing inter-curricula learning. The application in other subjects will be themes of the next research.

ACKNOWLEDGMENT

The authors wish to thank the students who cooperated in compiling the research for this study. This work was supported by the Grants from Electronics Research laboratory, Fukuoka Institute of Technology, and JSPS KAKENHI Grant Number 25750094.

REFERENCES

- [1] R. Anderson, K. Nguyen-Jahiel, B. McNurlen, A. Archodidou, S. Kim, and A. Reznitskaya, "The Snowball Phenomenon: Spread of Ways of Talking and Ways of Thinking Across Groups of Children," *Cognition and instruction*, vol. 19, pp. 1-46, 2001.
- [2] J. Barron, "Beliefs about Thinking about Abortion," in *Informal reasoning and education*, J. F. Voss, D. N. Perkins, and J. W. Segal, Eds. Hillsdale, NJ: Lawrence Erlbaum Associates, 1991, pp. 169-186.
- [3] P. Bell, and M. Linn, "Scientific Arguments as Learning Artifacts: Designing for Learning on the Web in KIE," *International Journal of Science Education*, vol. 22, pp. 797-817, 2000.
- [4] N. Inoue, and M. Nakano, "The Costs and Benefits of Participating in Competitive Debate Activities: Differences between Japanese and American College Students," in *Contemporary Perspectives on Argumentation: Views from the Venice Argumentation Conference*, F. H. van Eemeren, M. D. Hazen, P. Houtlosser, and D. C. Williams, Eds. Amsterdam: Sic Sat, 2006, pp. 167-184.
- [5] M. Nakano, "The Design of Presentation Education based on Basic Skills: Parallel-repeated Learning of Communication and Management," *IEEE Journal A*, vol. 132, no. 12, pp.1106-1111, 2012a. (in Japanese)
- [6] M. Nakano, "How College Students Acquire Argumentative Skills in a Community of Practice," *Cognitive Studies*, vol. 14, no. 3, pp. 398-408, 2007. (in Japanese)
- [7] M. Nakano, *Introductory Communication for College Freshmen*, Kyoto: Nakanishiya, 2010. (in Japanese)
- [8] M. Nakano, *Introductory Presentation for College Students*, Kyoto: Nakanishiya, 2012. (in Japanese)
- [9] M. Nakano, "The Parallel-repeated Design of Argumentation and Management for Inter-curricula Learning," presented at the European Association for Research on Learning and Instruction: SIG 4 Higher Education Conference, Tallin University, Estonia, August, 2012b.
- [10] M. Nakano, "The Framework of Argument Education for Inter-curricula Learning and its Effect," presented at the 15th Biennial European Association for Research on Learning and Instruction, Technische Universität München, Germany, August, 2013.
- [11] K. Fujii, "The Change of Recognition in the Process of Learning 'Presentation'," B.A. Thesis, Dept. Elect. Eng., Fukuoka Institute of Technology, 2012. (in Japanese)
- [12] R. Murakami, "The Study on the Educational Support in the Process of Learning 'Presentation' for Basic Skills," B.A. Thesis,

Dept. Elect. Eng., Fukuoka Institute of Technology, 2013. (in Japanese)

- [13] R. Araki, "The Change of Recognition and Action in the Process of Learning 'Presentation'." B.A. Thesis, Dept. Elect. Eng., Fukuoka Institute of Technology, 2013. (in Japanese)
- [14] G. Bayramoğlu, and M. Şahin, "Positive Psychological Capacity and its Impacts on Success," *Journal of Advanced Management Science*, vol. 3, no. 2, June 2015.
- [15] F. Luthans, S. M. Norman, B. J. Avolio, and J. B. Avey, "The Mediating Role of Psychological Capital in the Supportive Organizational Climate—Employee Performance Relationship," *Journal of Organizational Behavior*, vol. 29, pp. 219-238, 2008.
- [16] The Ministry of Economy, Trade and Industry, "Fundamental Competencies for Working Persons." Available: <http://www.meti.go.jp/policy/kisoryoku/> (2014, December, 5)



Mika Nakano was born in Japan. She received her master's degree (2004) and Ph.D. (2007) in International Society and Culture at Kyushu University, Fukuoka, Japan. She is now an Associate Professor in the department of Electrical Engineering, Fukuoka Institute of Technology, Japan. Her research fields are educational psychology, educational engineering, cognitive science, and communication studies,

with a focus on cultivating argument in higher education. She is a member of IEEE, the European Association for Research on Learning and Instruction, Japanese Society of Educational Psychology, Japanese Cognitive Science Society.