

Analysis of Factors Influencing Learning Outcomes in Active Learning and the Process of Outcome Attainment

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Abstract

The primary factors that influence outcomes in active learning and the process of outcome attainment were examined using covariance structure analysis for classes in which active learning was used in a first-year university course on career education. In this study, awareness of the effectiveness and importance of learning at university was positioned as a learning outcome resulting from active learning in the career education course. The analysis is based on a model postulating that the students' attitudes toward classes in which active learning was used influence how successful they are in grasping lesson contents and understanding the related knowledge and also their awareness regarding subsequent learning at university.

The results indicate that the students' attitudes toward classes in which active learning was used had a positive impact on acquisition of lesson contents and their knowledge. In addition, higher levels of content acquisition and understanding also had a positive impact on awareness regarding subsequent learning at university. However, attitudes toward active learning did not have a direct effect on awareness regarding subsequent learning at university. Furthermore, when generic skills, measured through an assessment test, and academic achievement at the end of the academic year were included in the analysis model, neither variable was found to be related.

Therefore, the results show that although students' attitudes toward classes indirectly led to improved learning outcomes through active learning, the influence of improved learning outcomes did not extend to academic achievement.

1 Introduction

Active learning is generally defined as any teaching method that engages students as participants in the learning process (Prince 2004). In Japan, the Central Council for Education (2012) defines it as “a generic term for teaching and learning methods that incorporate the participation of students in active forms of learning, in contrast to teacher-centered, lecture-based modes of instruction.” Bonwell and Eison (1991) identified the following specific characteristics of active learning:

- *Students are involved in more than listening.*
- *Less emphasis is placed on transmitting information and more on developing students' skills.*
- *Students are involved in higher-order thinking (analysis, synthesis, evaluation).*
- *Students are engaged in activities (e.g., reading, discussing, writing).*
- *Greater emphasis is placed on students' exploration of their own attitudes and values.*

In other words, unlike forms of learning in which the teacher imparts knowledge and students listen passively, which is often the case in the conventional lecture-based mode of instruction, students engage in tasks in the classroom, participating in discussions and cooperative activities with other students in the active learning mode of instruction. Most universities have recognized the importance of active learning, which has already evolved from

a trial stage to the stage of widespread adoption.

Learning outputs that can be expected to arise from modes of instruction such as active learning include the development of high-level reasoning, enhancement of critical thinking (Johnson et al. 1991, Cherney 2008), and “learning how to learn” (Fink 2003).

Active learning can also be expected to contribute to the development of “generic skills,” which enable students to not only acquire knowledge but also use it. Such skills include the “basic skills for working adults” (Ministry of Economy, Trade and Industry [METI] 2018), which students need to maintain active roles at each life stage, and “generic skills such as cognitive, ethical, and social skills, educational grounding, knowledge, and experience” (Central Council for Education 2012). In the new paradigm of teaching, universities are required to develop students’ potentials, help them grow into more intelligent, socially responsible individuals, and provide them with added value (Johnson et al. 1991). To this end, it is important to repeatedly implement active learning and equip students with the “ability to pursue lifelong learning” and the “ability to think independently” (Central Council for Education 2012). To examine the learning outcomes of active learning in this context, it is necessary to adopt a long-term perspective that considers how students are active in society—and the ways in which they influence society and other people—after studying at and graduating from university (METI 2018) (Figure 1).

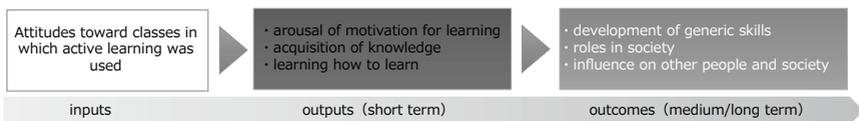


Figure 1: Learning Outcomes Expected from Active Learning

However, it is difficult from a practical standpoint to continue monitoring the roles that students play in society—and their influence on society and other people—in the long term after graduation. Therefore, based on a short-term perspective, a realistic solution is to analyze learning outcomes when active learning is used in a class, whereby outcomes can be measured upon completion of that class subject.

Accordingly, this study positioned outcomes observed in the short term, which were measured upon the completion of a course, as direct learning outcomes of a class where active learning was used. To be even more specific, “outcomes such as knowledge, skills, and attitudes attained by students upon completion of a designated period of study in a class subject, program, or educational course,” as defined by the Japanese Ministry of Education, Culture, Sports, Science and Technology for the Acceleration Program for University Education Rebuilding (AP), were positioned as direct learning outcomes. The development of an awareness that classes with active learning promote “understanding of lesson contents” and “acquisition of knowledge” and that continuing to learn at university in the future will lead to improvements in ability was regarded as an indirect outcome of active learning and referred to as “discovery of the effectiveness and importance of studying at university.” It was assumed that if students can grasp the importance of studying at university, they can continue to improve their “ability to pursue lifelong learning” and “ability to think independently” after graduation, develop their generic skills in the medium to long term, and take on positions and roles from which they can influence society.

With regard to the impact of active learning on learning outcomes, Koyama and Mizokami (2018) have shown that students’ attitudes toward lectures mediated by their attitudes toward active learning has an effect on certain learning outcomes. Tajima and Ohtsu (2020) predict that active learning will bring about favorable learning outcomes, suggesting in particular that a positive attitude to-

ward group work impacts certain benefits. Provision of opportunities for students to talk to other students or hear their opinions as in the case of group work has the effect of enhancing higher-order thinking (Ndebele and Maphosa 2013).

The present study also postulates that attitudes toward active learning are a factor influencing learning outcomes. Accordingly, it is hypothesized that a positive attitude toward classes where active learning is implemented facilitates a better understanding of lesson contents and acquisition of knowledge while influencing awareness regarding learning at university (Figure 2).

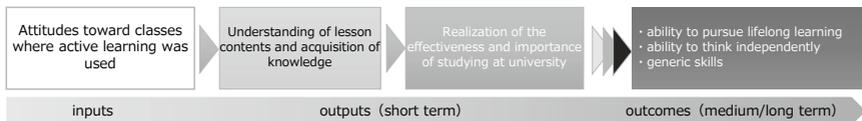


Figure 2: Process of Attaining Learning Outcomes in Active Learning

2 Method of Implementing Active Learning

Active learning was introduced to a class of Multidisciplinary Subject II, a first-year university course in career education. The course aims to develop not only knowledge and ability but also general skills and qualities that students need to survive in society while keeping their minds focused on their potential careers after graduation. Furthermore, it is aimed at helping students discover and acquire their motivation and goals for learning, which are necessary aspects of leading a meaningful university life, through activities such as study, research, and extracurricular activities. In addition, the course provides an opportunity for students to engage in discussion and exchange with a large number of other students with diverse backgrounds, attributes, and values and develop smooth communication skills and the ability to collaborate. Although the subject is not compulsory, around 90% of first-year students take it annually, and the enrol-

ment number for 2019 was 396. The course covers the topics listed in Table 1; these topics are used as the basis for group work.

Table 1: Group Work Topics

1	Impact of the “next industrial revolution” (Effects on food/health/economy/education/leisure)
2	Social change and future skills (Learning at university and skills needed in society)
3	Expectancy theory and motivation (Motivation structure of globally active young people)
4	Principles of decision making ① (Decision making and choices encountered at university and in society)
5	Principles of decision making ② (Positive uncertainty and accidental careers)
6	Teamwork ① (Favorable outcomes brought about by outstanding teamwork)
7	Teamwork ② (Facilitation-based consensus game)
8	Leadership ① (Roles and functions of leaders)
9	Leadership ② (Leadership and followership)
10	Contented and sustainable society ① (Conditions for a happy and contented life)
11	Contented and sustainable society ② (View of the world through SDGs)
12	Career design (Career anchors of seniors)

This class is taught through large group lectures because having more students in the class would encourage active communication and result in the mingling of individuals with a variety of mindsets and values. Therefore, the authors developed a method in which effective active learning can be implemented in a large lecture setting (Tajima and Ohtsu 2018). Active learning for large groups has the following characteristics:

(a) Use of ICT

A cloud-based learning management system (LMS) is used to provide pre- and post-study materials, submit reports, and post lecture materials. The flipped classroom model of active learning was employed, in which students acquire knowledge prior to the classes at home, using digital materials, and

then participate in group work in the classroom based on what they have learned. In order to ensure that group work during class is of a reasonable quality, pre-tasks are given each week via the LMS to prepare students for classes. After each class, a post-task is given via the LMS, which requires students to reflect on the group work.

Cloud-based clickers linked to the LMS were used for tasks such as taking attendance and administering questionnaires during the class. During the class, students used their own smartphones and reported the results of their discussions and responses to various opinion surveys using the clickers. By visualizing and sharing the aggregate questionnaire results and discussion outcomes in real time during the class, it became possible to refer to and compare the prevailing attitudes and opinions from these aggregated results and further increase the vibrancy of discussions and exchanges of opinion.

(b) Use of Small Groups and Allocation of Roles

In classes with a large number of students, vibrant and interactive lessons can be achieved by dividing students into small groups. In this particular class, each group contained approximately five students, and the roles for group work were allocated by group members. Each group assigned a facilitator to moderate the discussion, a timekeeper to manage time, a documenter to record the discussion, and a presenter to report the results of the discussion.

Each lesson included two to three rounds of group work, and the roles were changed each time to ensure that students experience a variety of roles in the group; thus, the students got to experience two to three roles per lesson. In addition, because one of the goals of this class is to engage in discussion and exchange with various other students, new groups were formed after about every two classes to enable students to interact with a variety of classmates.

3 Analysis Method

Based on the hypothesis about the attainment process of learning outcomes in active learning shown in Figure 2, a survey was conducted according to the procedures described in 3.1 and 3.2, focusing on (A) attitudes toward classes in which active learning was used, (B) understanding of lesson contents and acquisition of knowledge, and (C) realizing the effectiveness and importance of studying at university. The data were examined using covariance structure analysis.

3.1 Overview of (A) Attitudes toward Classes in which Active Learning was Used

■ Participants

Participants were 396 first-year students from the Faculty of Commerce at Otaru University of Commerce who were enrolled in the first-year career education course Multidisciplinary Subject II.

■ Survey period

Surveys were administered 12 times during the lessons in which group work was conducted between April 17, 2019 (Wednesday) and July 17, 2019 (Wednesday).

■ Survey method

The surveys were completed online using “respon,” a cloud-based clicker application. Five minutes before the end of each class, at the request of the authors, students answered the survey in the classroom using their own smartphone or computer. Each survey required approximately 5 minutes to complete.

■ Survey questions

To measure their interest in and attitudes toward each class, participants were required to answer the questions shown in Table 2. Responses were

recorded on a five-point scale ranging from 1 to 5.

Table 2: (A) Attitudes toward Classes in which Active Learning was Used

Q1	Were you interested in the topic of today's lesson?
Q2	Were you able to understand today's lesson content?
Q3	Were you able to play an active role in today's group work?

3.2 Overview of (B) Understanding of Lesson Contents and Acquisition of Knowledge and (C) Realizing the Effectiveness and Importance of Studying at University

■ Participants

Participants were 396 first-year students from the Faculty of Commerce at Otaru University of Commerce who were enrolled in Multidisciplinary Subject II, the first-year career education course.

■ Survey period

The survey was administered between July 17, 2019 (Wednesday) and July 24, 2019 (Wednesday).

■ Survey method

The survey was completed online using the questionnaire function of the LMS. Students were requested by the authors to answer the survey within the given period using their own smartphone or computer at the university or at home. Based on the number of questions, it was estimated that the survey would require 10 to 20 minutes to complete.

■ Survey questions

To measure learning effectiveness immediately after completing the course, partic-

ipants were required to answer the questions shown in Table 3 regarding what they gained from the class. Participants were also required to answer the questions in Table 4, about the kinds of effects and changes they expect to experience in the future as a result of the learning they had undertaken or, in other words, awareness regarding learning at university. Responses to the questions in Table 3 and Table 4 were recorded on a five-point scale ranging from 1 to 5. It should also be noted that, drawing on Tajima's study (2012), the survey included 20 questions about the expected benefits of education. However, Table 4 contains only those questions that were used to analyze the two class objectives of "recognizing and securing the motivation for learning and learning goals needed to lead a meaningful university life" and "developing smooth communication skills and the ability to collaborate." The other questions were omitted because they were not used in the present analysis.

Table 3: (B) Understanding of Lesson Contents and Acquisition of Knowledge

-
- | | |
|----|---|
| Q1 | Did taking this course provide you with relevant information for your university life? |
| Q2 | Did taking this course provide you with useful knowledge for your future occupation or life plan? |
-

Table 4: (C) Realizing the Effectiveness and Importance of Studying at University

What kinds of effects and changes do you think you will experience as a result of studying at Otaru University of Commerce?

Please select the number from 1 to 5 that best represents your current thoughts.

-
- | | |
|----|--|
| Q1 | I think it will help me find or change to a job that I want to do. |
| Q2 | I think it will help me acquire specialized knowledge and skills. |
| Q3 | I think the benefits of studying here will outweigh the cost of tuition. |
| Q4 | I think it will help me feel confident. |
| Q5 | I think it will help me expand my social connections. |
| Q6 | I think it will help me find new friends. |
-

4 Analysis

4.1 Survey Results

The survey results for (A) attitudes toward classes in which active learning was used are shown in Table 5. Table 5 presents the mean and standard deviation for each of the 12 classes where group work was used. An average of 373.6 students completed each of the 12 surveys (average valid response rate = 94.3%).

Table 5: Survey Results for (A) Attitudes toward Classes in which Active Learning was Used

	1	2	3	4	5	6	7	8	9	10	11	12	Mean
Q1. Were you interested in the topic of today's lesson?	4.49 (0.59)	4.46 (0.67)	4.31 (0.67)	4.38 (0.59)	4.29 (0.66)	4.36 (0.65)	4.54 (0.61)	4.39 (0.62)	4.52 (0.57)	4.23 (0.64)	4.38 (0.70)	4.35 (0.69)	4.39 (0.64)
Q2. Were you able to understand today's lesson content?	4.41 (0.63)	4.43 (0.62)	4.44 (0.65)	4.60 (0.56)	4.38 (0.63)	4.38 (0.72)	4.53 (0.65)	4.51 (0.61)	4.59 (0.55)	4.35 (0.64)	4.43 (0.69)	4.41 (0.70)	4.46 (0.64)
Q3. Were you able to play an active role in today's group work?	4.48 (0.68)	4.47 (0.68)	4.43 (0.71)	4.58 (0.59)	4.44 (0.72)	4.43 (0.81)	4.50 (0.66)	4.53 (0.62)	4.60 (0.60)	4.47 (0.63)	4.44 (0.73)	4.43 (0.74)	4.48 (0.68)
n	393	343	386	373	371	379	373	375	373	382	371	364	373.58

Note: The value on top is the mean and the value underneath (in parentheses) is the standard deviation.

The survey results for (B) understanding of lesson contents and acquisition of knowledge and (C) realizing the effectiveness and importance of studying at university are shown in Table 6 and Table 7, respectively. A total of 380 students completed these questionnaires (response rate = 96%). A total of 377 valid responses remained after discarding responses from students with very low attendance for the class (valid response rate = 95.2%).

Table 6: Survey Results for (B) Understanding of Lesson Contents and Acquisition of Knowledge

	Mean	SD	n
Q1. Did taking this course provide you with relevant information for your university life?	3.97	0.86	380
Q2. Did taking this course provide you with useful knowledge for your future occupation or life plan?	4.10	0.88	380

Table 7: Survey Results for (C) Realizing the Effectiveness and Importance of Studying at University

	Mean	SD	n
Q1. I think it will help me find or change to a job that I want to do.	4.01	0.92	380
Q2. I think it will help me acquire specialized knowledge and skills.	3.57	1.03	380
Q3. I think the benefits of studying here will outweigh the cost of tuition.	3.70	1.07	380
Q4. I think it will help me feel confident.	3.49	1.08	380
Q5. I think it will help me expand my social connections.	3.77	1.08	380
Q6. I think it will help me find new friends.	4.03	1.04	380

The mean survey results over the 12 sessions for each question in Table 5 were used as the variables for (A) attitudes toward classes in which active learning was used. However, rather than including only students who answered all 12 surveys, data from students who were absent one or two times were also included. The rating value in the survey results shown in Table 6 was used as the variable for (B) understanding of lesson contents and acquisition of knowledge. The variable for (C) realizing the effectiveness and importance of studying at university was derived from two indicators corresponding to the goals of the class subject: “recognizing and securing the motivation for learning and learning goals needed to lead a meaningful university life” and

“developing smooth communication skills and the ability to collaborate.” Questions 1-3 in Table 7 were used to obtain the variable for (C1) benefits that you can expect to acquire after graduation, and questions 4-7 were used to obtain the variable for (C2) connections and communication skills that you can expect to acquire after graduation.

4.2 Validation of the Model

Of the 396 students who took the class in 2019, the covariance structure analysis included the 377 students who attended the course until the end and completed each survey. Based on the hypothesis, the analysis models $A \rightarrow B \rightarrow CI$ and $A \rightarrow B \rightarrow C2$ were constructed in which effects arise sequentially through four latent variables: (A) attitudes toward classes in which active learning was used, (B) understanding of lesson contents and acquisition of knowledge after the class, (C1) benefits that you can expect to acquire after graduation, and (C2) connections and communication skills that you can expect to acquire after graduation. In addition, paths $A \rightarrow CI$ and $A \rightarrow C2$ were included in the above models, assuming that attitudes to active learning have a direct effect on awareness regarding learning at university. The path diagram resulting from the analysis with Amos 25.0 is given in Figure 3. The model fit indices were as follows: $\chi^2 (39) = 171.60$, $p < .01$, GFI = .927, AGFI = .876, and RMSEA = .095. Path coefficients are provided as standardized estimates.

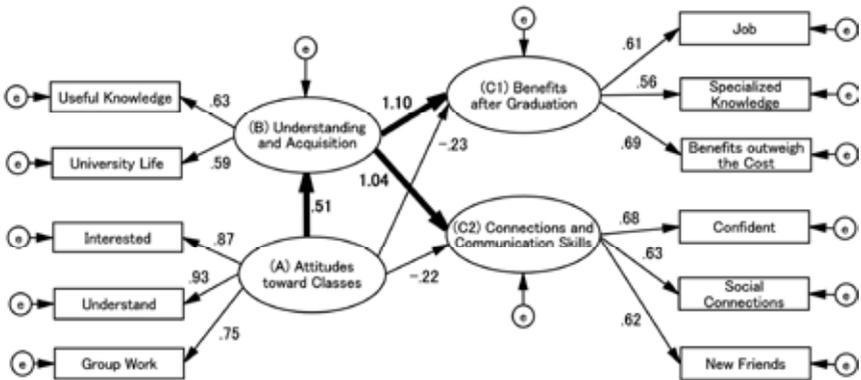


Figure 3: Path Diagram for the Attainment Process of Learning Outcomes in Active Learning

First, the analysis results for sequential models $A \rightarrow B \rightarrow C1$ and $A \rightarrow B \rightarrow C2$ are examined. All paths from the four latent variables to the observed variables were significant ($p < .001$). (A) Attitudes toward classes in which active learning was used had a statistically significant positive effect on (B) understanding of lesson contents and acquisition of knowledge after the class. Moreover, (B) understanding of lesson contents and acquisition of knowledge after the class had a statistically significant positive effect on both (C1) benefits that you can expect to acquire after graduation and (C2) connections and communication skills that you can expect to acquire after graduation. (A) Attitudes toward classes in which active learning was used can be considered to have an effect on (C1) benefits that you can expect to acquire after graduation and (C2) connections and communication skills that you can expect to acquire after graduation through (B) understanding of lesson contents and acquisition of knowledge after the class. This supports the hypothesis that attitudes toward classes in which active learning was used facilitates the understanding of lesson contents and acquisition of knowledge and influences awareness re-

garding learning at university.

Next, in the analysis of direct paths $A \rightarrow C1$ and $A \rightarrow C2$, no effects were observed from (A) attitudes toward classes in which active learning was used to (C1) benefits that you can expect to acquire after graduation or (C2) connections and communication skills that you can expect to acquire after graduation. Thus, attitudes toward active learning do not appear to have a direct effect on awareness regarding learning at university.

These results are broadly consistent with the hypothesis presented in Figure 2. It is reasonable to assert that students who were proactively involved in the active learning that took place in each class were able to understand the lesson contents and acquire knowledge after the class. In addition, it can be said that they can be expected to attain successful learning outcomes in their future studies at university.

5 Generic Skills and Learning Outcomes

One of the long-term learning outcomes of active learning is the development of generic skills. Because it is difficult to measure the development of generic skills over a short period, this study did not attempt to measure the degree of improvement in generic skills. However, it is possible that students who already have strong generic skills might engage in more effective learning, thereby acquiring knowledge and skills. Therefore, students' generic skills were measured immediately after they entered university to examine whether generic skills have an impact on attitudes toward active learning or on students' understanding of lesson contents and acquisition of knowledge.

The GPS-Academic global proficiency skills program, provided by Benesse i-Career Co., Ltd., was used as a measure of generic skills. GPS-Academic is a test designed to measure generic skills through objective assessment, which the students who enroll in the class are required to take. "Comprehensive

thinking ability” (critical thinking, collaborative thinking, and creative thinking) and “attitude and behavior” (resilience, leadership, and collaboration)—measurement categories on the test—were used as measurements for the analysis. In GPS-Academic, “thinking ability” consists of three components: “critical thinking” (extracting and examining information), “collaborative thinking” (understanding similarities and differences with others), and “creative thinking” (connecting information and reasoning by analogy). The “attitude and behavior” measure consists of “resilience” (control of emotions and speed/composure in recovery), “leadership” (taking the lead and persistently exploring the unknown), and “collaboration” (adopting others’ position and actively interacting with them). The survey was conducted as described below.

■ Participants

The sample comprised 396 first-year students from the Faculty of Commerce at Otaru University of Commerce who were enrolled in Multidisciplinary Subject II, the first-year career education course. No rewards were offered, and participants were informed that participation would not affect their grade for the class in any way.

■ Survey period

Test period: The survey was administered between May 22, 2019 (Wednesday) and June 7, 2019 (Friday).

■ Survey method

An online survey consisting of multiple-choice and free-response items was conducted using the GPS-Academic global proficiency skills program by Benesse i-Career Co., Ltd.

Students were instructed to log in to Benesse i-Career’s GPS-Academic test

website from a computer at the university or at home and take the test within the given period. The request to participate was issued in class along with an explanation prior to the GPS-Academic test period. The survey required about 80 minutes to complete.

■ Survey content

There are a total of five components in the survey. As mentioned earlier, the GPS-Academic provides an objective assessment of generic skills, consisting of two components—“comprehensive thinking ability” (critical thinking, collaborative thinking, and creative thinking) and “attitude and behavior” (resilience, leadership, and collaboration). In addition to these, there was a component of “experience” (self-management, interpersonal relations, and planning/execution of plans) in which the students evaluated their own experience and thinking ability. Further, student opinion surveys captured expectations, satisfaction, and sense of growth with regard to university education. Finally, an original questionnaire from the Otaru University of Commerce was also used. Results from the GPS-Academic are shown for each question by rank within the university, evaluation grade (S, A, B, C, D), and score. Scores are shown as deviation values based on a hypothetical parent population of all students in Japan.

■ Survey results

The results on GPS-Academic are shown in Table 8. The values in Table 8 are the scores on the test. A total of 389 students took the test (valid response rate: 98.2%). Survey results other than those for “overall thinking ability” and “attitude and behavior” were omitted because they were not used in the present analysis.

Table 8: Survey Results on GPS-Academic

	Mean	SD	n
critical thinking	47.89	12.16	389
collaborative thinking	46.69	17.03	389
creative thinking	48.52	13.54	389
resilience	47.83	9.07	389
leadership	47.59	8.86	389
collaboration	48.71	8.14	389

Confirmatory factor analysis was performed with Amos 25.0 using the figures in Table 8, the results of which are shown in Figure 4. The model fit indices were as follows: GFI =.994, AGFI =.984, and RMSEA =.000. Coefficients are provided as standardized estimates.

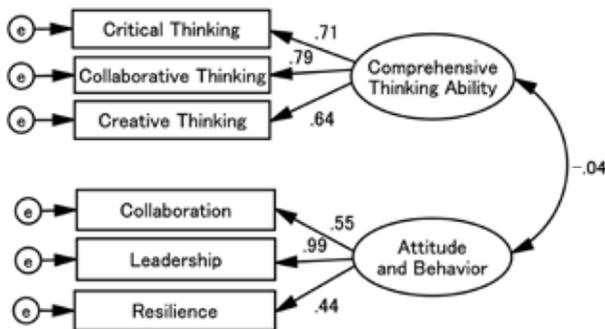


Figure 4: Path Diagram for the Confirmatory Factor Analysis

Thinking ability had significant path coefficients to critical thinking, collaborative thinking, and creative thinking. Attitude and behavior had significant path coefficients to resilience, leadership, and collaboration. However, no correlation was found between thinking ability and attitude and behavior.

With regard to the path diagram given in Figure 4, although paths with the four latent variables in the analysis model shown in Figure 3 were examined, none of these were significant. Therefore, it can be concluded that in the present analysis, generic skills did not affect attitudes toward active learning, understanding of lesson contents/acquisition of knowledge, or the subsequent learning outcomes resulting from these.

6 Academic Achievement and Learning Outcomes

In the model used in the present study, realizing the effectiveness and importance of studying at university was posited as a learning outcome of active learning. It was expected that a strong awareness of the effectiveness and importance of learning at university would lead to increased motivation to learn, prompting students to engage in various forms of learning of their own accord. Accordingly, an analysis was made of the relation between learning outcomes of active learning as measured 6 months after entering university and academic assessment at the end of the academic year, after a further 6 months. The one-year grade point average (GPA) of students who took the class in question was used to measure academic achievement.

When the GPA variable was entered into the analysis model shown in Figure 3, no relations were found with the four latent variables of (A) attitudes toward classes in which active learning was used, (B) understanding of lesson contents and acquisition of knowledge after the class, (C1) benefits that you can expect to acquire after graduation, and (C2) connections and communication skills that you can expect to acquire after graduation. In other words, in the present study, no correlation was observed between learning outcomes of a class in which active learning was used and academic achievement for the first year of study.

Nevertheless, when the GPA for the 396 students who took the class where

active learning was used was compared with the GPA for the 78 students who did not take the class, GPA for students who took the class was significantly higher ($t(472) = 3.14, p < .01, \text{Cohen's } d = 0.39$, effect size: small). While this difference could be perceived as an outcome of taking the class, it is more likely the case that the minority of new students who did not take the class—or did not want to take the class—were affected by some form of bias to begin with. It is also possible that students who enrolled in the class were already motivated to study, considering that the main goals of the class were to “recognize and secure the motivation for learning and learning goals needed to lead a meaningful university life” and “develop smooth communication skills and the ability to collaborate.”

Table 9: GPA for Students Who Did and Did Not Take the Active Learning Class

	Mean	SD	n
took the AL class	2.69	0.55	396
did not take the AL class	2.47	0.65	78

$t(472) = 3.14, p < .01, \text{Cohen's } d = 0.39$

7 Conclusion

This study examined direct learning outcomes of a class in which active learning was used by employing variables observed in the short term, which could be measured immediately after students had taken the class.

The results of the analysis model used in the study showed that students' attitudes toward active learning in a career education course provided upon entering university helped them to acquire an understanding and knowledge of lesson contents and to recognize the effectiveness and importance of learning at university about 6 months later. The results indicate that students develop the expectation that by continuing to learn at university, they can ac-

quire benefits in the future and improve their connections and communication skills. Further, the results of the present study support that of many previous studies, which have shown that active learning can bring about a variety of learning effectiveness.

A challenge that remains for the future is to measure learning outcomes from active learning through long-term, continuous study, as far as realistically possible. In particular, the authors intend to continue studying generic skills as a learning effect of active learning in the future, which might include, for example, reexamining the generic skills of the first-year participants as they enter their fourth year of study.

It is also necessary to continue to examine the relation between academic performance and learning outcomes. In the present analysis, no significant correlation was found when academic performance was entered into the model. However, the fact remains that the small handful of students who did not take this class had lower academic performance than those who did, suggesting that some form of bias may have been generated at the point when students selected the class. Going forward, the authors intend to analyze the process by which active learning impacts academic performance to consider the nature of the relation between active learning outcomes and academic performance in greater depth.

Notes

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