

*A Study on the Effectiveness of Active Learning in Different Learning Environments:
Active Learning Method in the Field of Business Management*

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Abstract

With the spread of active learning (AL), various teaching methods have been proposed in business management education. However, it is difficult to understand a pragmatic science like business management for undergraduate students who do not have business experience. In this situation, we proposed an active learning method based on the PDCA cycle to draw out the dynamic nature of the participants and obtain learning effects through “dialogue”. However, in the situation with COVID-19, where it is not easy to implement face-to-face group work with a large number of participants, it would be desirable to conduct such an active learning method in an “online learning environment” or a “hybrid learning environment” with a mixture of online and offline participants using ICT tools (e.g., Google Meet, Zoom). But there is no clear way to effectively implement such active learning methods in different learning environments. So, to clarify the way to implement our proposed method in different learning environments, we conducted group work in three different learning environments (face-to-face, online, and hybrid) and evaluated the effects. The results of these group works revealed that although there are differences in participants’ satisfaction and the effectiveness of our method, it is possible to achieve specific results in an “online learning environment” and a “hybrid learning environment”. Furthermore, this paper discussed the points to be considered when implementing this learning in different learning environments.

Keywords: Learning Environment, Active Learning, Business Management Education, COVID-19, PDCA Cycle

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Introduction

Currently, educational methods called "active learning (AL)" have been attracting attention. In the field of management, where students need to learn the process of applying theory experientially, AL methods have been proposed [1, 2, 3, 4].

To understand a pragmatic science like business management, students need to learn it through three sequential steps: (1) acquiring knowledge, (2) structuralizing acquired knowledge, and (3) generalizing structuralized knowledge.

Otherwise, in the situation with COVID-19, where it is not easy to implement face-to-face group work with a large number of participants, it would be desirable to conduct such an active learning method in an "online learning environment" or a "hybrid learning environment" with a mixture of online and offline participants using ICT tools (e.g., google meet, zoom). Nevertheless, there is no established method for effectively implementing active learning methods in different learning environments. Although the COVID-19 pandemic and the disruption caused by it have subsided worldwide, AL using ICT tools will continue to be an essential form of university education. For example, it has the potential to facilitate the realization of learning across countries and regions.

Therefore, this research attempted to clarify how to implement our proposed method in different learning environments. In this research, we conducted face-to-face, online, and hybrid group work and evaluated the effects of the environmental type of group work on the effectiveness of group work.

Theoretical Framework

This research is based on the concept of "transfer of learning" in the situated cognition perspective [5] (Figure 1). In this concept, knowledge of any action is seen as being embedded in the context. Thus, people learn to do something through interplays with other actors in the context.

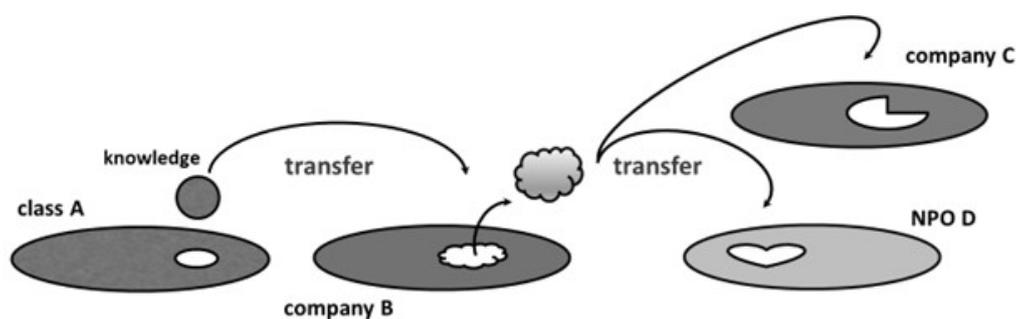


Figure 1: Situated learning as our theoretical framework

Based on this perspective, to understand a pragmatic science like business management, students need to learn it by following three sequential steps [6, 7].

- Step 1: Acquiring knowledge.

Students acquire knowledge by taking traditional-style classes, such as one-way lectures by instructors or reading books themselves.

- Step 2: Structuralizing acquired knowledge.

Students structuralize acquired knowledge by using the acquired knowledge in a specific situation through role-playing. However, they cannot apply it in other different settings. They just acquired contextualized knowledge in this step.

- Step 3: Generalizing structuralized knowledge.

Students generalize structuralized knowledge based on similarity. Therefore, using metaphors that imply how to use the knowledge in different situations is one of the effective ways to implement the last step. Students can apply knowledge in any case through this step.

However, it is difficult for undergraduate students who do not have business experience to learn and practice steps 2 and 3.

Active Learning Methods in Business Management Education

It is challenging for undergraduate students with no business experience to learn and practice steps 2 (Structuralizing acquired knowledge) and 3 (Generalizing structuralized knowledge) of the whole process.

This research used an “active learning” method in group work to draw out the active nature of the participants and obtain learning effects through "dialogue". Also, this research designed the group work based on the PDCA (Plan-Do-Check-Act) cycle.

Teaching Method Based on the PDCA Cycle

The PDCA (plan-do-check-act, sometimes seen as plan-do-check-adjust) cycle is a repetitive four-stage model for continuous improvement in business process management. It is also a historic concept which was invented by management process school. The PDCA cycle is implemented to improve the quality and effectiveness of processes within product lifecycle management, project management, human resource management (HRM), supply chain management (SCM), organizational performance evaluation, and many other business areas.

The PDCA cycle has the following four steps. The first step is “Plan”. It involves defining the problem to be addressed, collecting relevant data, and ascertaining the problem's root cause. Then, we progress to the “Do” step. This step involves developing and implementing a solution; deciding upon a measurement to gauge its effectiveness. “Check” is the next step after “Do”. We confirm the results through a comparison of planned and actual results. Finally, we document the results, inform others about process changes, and recommend addressing the problem in the next PDCA cycle. This last step is named “Act”.

In this paper, we designed the group work based on the PDCA cycle (Figure 2) [8].

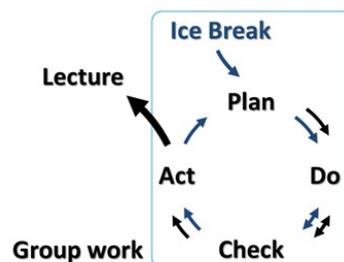


Figure 2: Teaching method based on the PDCA cycle

In this group work, aspects of communication with each group member are essential for enhancing learning effects. Since group work is conducted in a short period, an icebreaker plays a vital role in improving the group work's quality. So we decided to run an icebreaker before the group work. After the group work, we decided to give a lecture to explain what we learned in the group work.

Implementation Method

In this study, we conduct a trial of group work in the field of business administration in a face-to-face environment, hybrid environment, and online environment, targeting "synchronisation and empathy" that occur in organizational and group decision-making. These group works also aim for students to experience the importance of "dialogue" in organizing [9, 10]. Communication with each member is necessary for these group works to increase learning effectiveness.

The implementation method of our proposal is as follows:

- Step 1: Icebreaker
- Step 2: Explanation and planning
- Step 3: Pre-Group work
- Step 4: Mutual inspection
- Step 5: Explanation and planning
- Step 6: Group work
- Step 7: Mutual inspection
- Step 8: Lecture

First, we set a time for self-introduction (Icebreaker) to understand each other better about the members (Step 1). Second, we conduct pre-group work to get the participants to relax (icebreaker game: Steps 2 to 4). Third, students work on group work (Steps 5 to 7) (see next chapter for details). After finishing their work, every participating student evaluates the work of other teams.

The procedure of group work is as follows:

- Step 1: Each group watches a video explaining the contents of the work and the conditions of the group work (consensus game).
- Step 2: Each student rank options according to the level of necessity (personal work).
- Step 3: Review individual responses to each other and rank the options as a group (group discussion).
- Step 4: The results of each group's discussion are written on a form and collected by the instructor.
- Step 5: The results are scored, and the ranking of all teams is determined according to that score.
- Step 6: After group work, we analyze the (1) communication between students, (2) understanding, (3) interest, and (4) ability by using a questionnaire survey.

After the group work, instructors explain fundamental management organisation theory. Instructors also present the importance of understanding the environment around their organisation and creating good collaboration (enhancing psychological safety) (Step 8).

Types of Learning Environments

In this research, we conducted group work in an online, hybrid, and face-to-face environment. An overview of experimental classes is shown in Table 1. We opted for different consensus games because several students overlapped over the two years.

Year	Environmental Type	Number of students	Number of teams	Contents of Consensus Game
2020	Online	44	11	Moon landing exercise
2021	Hybrid	70: face to face 16: online	18	Accident in snowy mountains
2022	Face-to-face	87	18	Captain's Decision

Table 1: Overview of experimental classes

Online Environment

We conducted an experimental class in a face-to-face environment in 2020. In the experimental class, we used “Moon landing exercise: Ranking survival objects for the moon” as the subject of group work. This team-building game aims to reinforce the concept of using critical thinking in prioritisation activities. We used “spatial. Chat (<https://spatial.chat/>)” as a meeting tool. This meeting tool is a VR chatroom. Forty-eight university students (4 students x 12 groups, 3rd-year and 4th-year students) conducted the group work in an online learning environment (Figure 3).

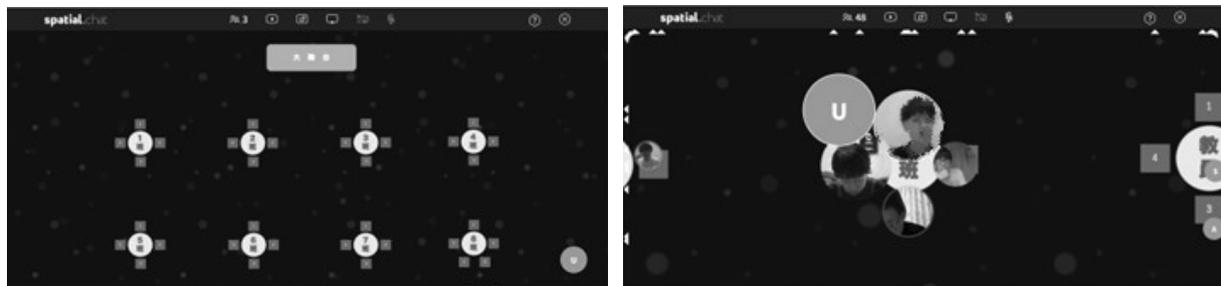


Figure 3: Online environment

Hybrid Environment

We conducted an experimental class in a hybrid environment in 2021. In the experimental class, we used a consensus game, “Accident in snowy mountains exercise: ranking survival objects for the snowy mountains”, as a subject of the group work. As an online meeting tool, we used “google meet”. Eighty-six university students (4-5 students x 18 groups, offline: 70 students, online: 16 students, 3rd-year and 4th-year students) conducted the group work in a hybrid learning environment (Figure 4).



Figure 4: Hybrid environment

Face-to-Face Environment

We conducted an experimental class in a face-to-face environment in 2022. In the experimental class, we used a consensus game, “The Captain’s Decision: ranking the actions on a sinking ship as a captain”, as a subject of the group work. Eighty-seven university students (4-5 students x 18 groups, 3rd-year and 4th-year students) conducted the group work in a hybrid learning environment (Figure 5).



Figure 5 Face-to-face environment

Results

Using a questionnaire survey, we analysed the students’ understanding, interest, needs for knowledge in management, and ability to apply.

Questionnaire Survey

The questionnaire survey included the following items, which were developed to assess the effectiveness of communication and the formation of group opinions. These items are detailed in Table 2.. Each questionnaire item was variable and measured on a 5-point Likert scale with 1 “Low” and 5 “High” answers. In addition, this questionnaire survey was conducted before and after the group work to analyse the effects of the group work.

No	Items
Q.1	When there was a conflict of opinion within the group, it was resolved by bringing cooperation or direct confrontation to the surface and bumping into each other.
Q.2	We listened carefully to each other's opinions.
Q.3	We respected each other's sentiments and feelings.
Q.4	When ideas and arguments conflicted, we could discuss them objectively without getting emotional.
Q.5	I was free to speak up if I came up with an idea different from the others.
Q.6	All group members were encouraged to participate.
Q.7	The group's mission was a priority.
Q.8	Act suspiciously even if this is what you want to do.
Q.9	Be prepared to admit that you are ignorant and ready to take risks.
Q.10	Withhold judgment until all data is collected.
Q.11	Think pragmatically and ingeniously search for data to prove your point.
Q.12	Use frameworks and methods that help in logical thinking and analysis to reach conclusions.
Q.13	We are divergent thinkers pursuing possibilities.
Q.14	We have the discipline to prove or dismiss them one by one.
Q.15	We were flexible on issues of unclear structure.

Table 2: Items of the Questionnaire Survey

Table 3 shows the basic statistics of the questionnaire items. The online environment had particularly high mean values for the questions about listening carefully to each other's opinions (Q.2) and encouragement to participate (Q.6). The hybrid environment also had particularly high mean values for the questions about listening carefully to each other's opinions (Q.2) and encouragement to participate (Q.6). Otherwise, the points about whether they behaved suspiciously (Q.8) were low. The face-to-face environment had particularly high mean values for the questions about listening carefully to each other's opinions (Q.2), objective discussion when there is disagreement, and encouragement to participate (Q.6).

Question items	Online		Hybrid		Face-to-face	
	mean	S.D.	mean	S.D.	mean	S.D.
Q.1	3.9	1.514	4.7	0.594	4.5	0.597
Q.2	4.9	0.302	4.9	0.236	4.8	0.380
Q.3	4.6	0.688	4.8	0.428	4.3	0.893
Q.4	4.7	0.467	4.8	0.428	4.9	0.471
Q.5	4.7	0.467	4.7	0.594	4.6	0.584
Q.6	4.8	0.405	4.9	0.236	4.9	0.257
Q.7	4.6	0.688	4.6	0.698	4.7	0.567
Q.8	2.2	1.401	1.6	0.922	2.9	1.580
Q.9	4.1	0.831	4.1	0.938	4.6	0.778
Q.10	3.6	1.293	4.1	0.873	4.4	0.758
Q.11	3.8	1.250	4.1	1.162	4.2	0.664
Q.12	4.2	1.168	4.2	0.924	4.5	0.763
Q.13	3.9	0.701	4.3	0.594	4.5	0.652
Q.14	3.7	0.905	4.4	0.608	4.6	0.586
Q.15	4.2	0.874	4.5	0.618	4.7	0.451

Table 3: Basic statistics

Analysis of Mean Scores

Table 4 shows the characteristics of groups whose outcome scores improved after group discussions in a face-to-face environment.

Item	Q.3:Respected each other's sentiments and feelings	Q.5:If I came up with an idea different from the others, I was free to speak up.	Q.8:Act suspiciously if this is what you want to do.	Q.13:We are divergent thinkers, pursuing possibilities.	Q.15:We are flexible on issues of unclear structure.
Good four teams (Well improved)	4.3	4.3	3.3	4.8	4.3
Bad four teams (Little improvement or worse)	5.0	5.0	2.4	4.3	4.9
Difference	-0.7	-0.7	0.9	0.5	-0.6

Table 4: The analysis of mean scores (1)

Table 5 shows the characteristics of groups whose outcome scores improved after group discussions in a hybrid environment.

Item	Q.3:Respected each other's sentiments and feelings	Q.10: Withhold judgment until all data is collected.	Q.15:We are flexible on issues of unclear structure.
Good four teams (Well improved)	5.0	3.8	4.0
Bad four teams (Little improvement or worse)	4.5	4.3	4.5
Difference	0.5	-0.5	-0.5

Table 5: The Analysis of Mean Scores (2)

The above results reveal the following points.

- The mean score of items suggests that the characteristics of teams with improved scores are different depending on group work environments.
- Regarding the face-to-face environment, “respect for other members” and “being flexible” do not yield good results. “Act suspiciously” and “divergent thinking” would be beneficial.
- Regarding hybrid environments, “respecting other members” would lead to good results. Otherwise, “withholding judgment” and “being flexible” would not produce good results.
- “Respect for other members” produced different results for hybrid and online. There is a possibility that the existence of psychological safety (face-to-face) and the effects of icebreakers have the opposite impact.

We also analysed the free text sections. Table 6 shows the characteristics of groups with improved scores after group discussions.

Environmental type	Online	Hybrid	Face-to-face
Characteristics of the discussion of the good teams	<ul style="list-style-type: none"> ● There's not so much discipline within the group. ● Not overly concerned with logical arguments and data. ● Members' interest in business administration is not too strong. 	<ul style="list-style-type: none"> ● Team members are under the impression that business administration is not easy. 	<ul style="list-style-type: none"> ● Team members are interested in business administration. ● Once a result is obtained, they act suspiciously as if this is the right thing to do.
Factors hindering improved results	<ul style="list-style-type: none"> ● Bouncing their opinions off each other with great intensity. 	<ul style="list-style-type: none"> ● Excessive respect for each other's views. ● Feel free to say any idea that comes to mind. 	

Table 6: Analysis of free text sections (1)

Analysis of the Characteristics of Results in a Hybrid Environment

Table 7 shows the characteristics of results in a hybrid environment, and Table 8 shows the result of the unpaired t-test for differences between means.

The unpaired t-test for differences between means shows the following.

- Respect for sentiments and feelings (Q3) and expressing ideas freely (Q4) differ statistically significantly.
- Mutual respect is essential, but not too much respect.
- It is crucial to say ideas freely, but it is not good to say too much.

Variables	Category	n	mean	Standard deviation	Standard error of the difference
Q.3	good	10	4.6	0.516	0.163
	bad	7	5.0	0.000	0.000
Q.4	good	10	4.6	0.516	0.163
	bad	7	5.0	0.000	0.000

Table 7: Characteristics of results in a hybrid environment

variables		Levene's test for		Unpaired t-test for differences between means						
		F score	Significance	t score	Degree of freedom	Significance	Differences between means	Standard error of the difference	95%	
						(2 sides)			Lower limit	Upper limit
Q.3	σ Assumed to be equal	148.325	.000							
	σ Not Assumed to be equal.			-2.499	9.000	.037	-.400	.163	-.769	-.031
Q.4	σ Assumed to be equal	148.235	.000							
	σ Not Assumed to be equal.			-2.449	9.000	.037	-.400	.163	-.769	-.031

Table 8: Result of unpaired t-test for differences between means

We also analysed the free text sections. Table 9 shows the characteristics of groups with good final scores.

The analysis of the free text section suggests that the characteristics of teams with good final scores and teams with improved scores are different depending on the environment.

As to online, highly disciplined groups are less likely to produce good results because of the limitation of communication.

As to hybrid, it seems complicated to produce good results if members are overly concerned about online participants or if they are telling people what they think of their ideas. Offline members need to support online members who could better participate in group discussions.

As to face-to-face, good results are produced without having to accept opinions as they are. A reserved and modest attitude might not lead to good results.

Environment type	Online	Hybrid	Face-to-face
Characteristics of the discussion of the good teams	<ul style="list-style-type: none"> ● Team members do not speak too freely. ● Not forcing everyone to communicate. ● Do not overemphasise planning. ● Not too much priority is given to the group. 	<ul style="list-style-type: none"> ● Many team members feel the need to study business administration. ● Understands well the post-lecture given by the instructor. 	<ul style="list-style-type: none"> ● Team members are interested in business administration. ● Team members believe that face-to-face communication is more accessible.
Factors hindering improved results		<ul style="list-style-type: none"> ● Excessive respect for each other's opinions 	

Table 9: Analysis of free text sections (2)

Conclusions

This paper focused on the active learning method, conducted in three different learning environments (online, hybrid, and face-to-face) for undergraduate students to understand management theory. To clarify how to implement our proposed method in different learning environments, we conducted group work in different learning environments and evaluated the effects.

The results of these group works revealed that although there are differences in participants' satisfaction and the effectiveness of our method, it is possible to achieve specific results in an "online learning environment" and a "hybrid learning environment". Furthermore, this paper discussed the points to be considered when implementing this learning in different learning environments.

However, we have some issues that need to be overcome. It would be necessary to refine the content of group learning and present an evaluation method in future studies.

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Acknowledgments

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