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# The More You Know, the Easier It Is to Learn: Requirements for a Support System to Facilitate Case Method Learning

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**Abstract** We discuss how a system to support the facilitation efforts of inexperienced case leaders can be brought close to reality. We begin by considering methods to support facilitation efforts directed at novices. For this purpose, we conduct two tests. Using the test results, we propose that as one capability of a support system, the system should include some mechanism for recommending participants found by pretesting to already have a high level of knowledge, and that such recommended participants be given particular encouragement by the facilitator to externalize their discoveries. Also, the system should include some mechanism for recommending how to split up group members based on pretest results. By this mechanism, we can provide each group with a good balance of participant skill levels, including participants with a high skill level, and such an arrangement should encourage the groups in learning occurrence by letting them discover a new viewpoint.

**Keywords:** manga case method, case method, case leader, facilitation support system

## 1. Introduction

### 1.1 Case Method Learning

In recent years, learning researchers have witnessed a shift in teaching methods, with those emphasizing a simple impartation of knowledge giving way to those demonstrating how to use and incorporate knowledge. For example, under ATC21S (Assessment & Teaching of 21st Century Skills), much weight is placed on the application of IT to the development of problem solving abilities, and this approach is being studied by a variety of researchers and at various governmental levels<sup>(1)</sup>.

Another approach along these lines is the case method<sup>(2)</sup>. This method, already in extensive use throughout the world, begins by assigning students with a “case,” which is a situational setup entailing one issue

or another. For its resolution, students are required to give considerable thought to such matters as the decision-making process/approach for the given situation. Sometimes, the participants are asked to take on the role of the protagonist or the lead actor, and to make decisions. Other times, they are asked to take the position of third-parties and, from that standpoint, consider how the situation should be addressed. The learners are thus compelled to apply recently learned knowledge/skills to analyze the situation, identify problems presented by it, and arrive at a method to resolve them. By this flow, students exercise their ability to identify and resolve issues.

As a new type of case method, the visual case method, which visualizes different cases, has started to earn wide attention<sup>(3–7)</sup> (Figure 1).

Under the case method, the learning process is facilitated by a “case leader,” the ability of whom has much bearing on the quality of learning under it. Yet, as this method becomes increasingly widespread, administrators are finding it necessary to secure a proportionate number of qualified case leaders, but the fostering of such leaders is not something that can be achieved instantly. The case method is not some methodology for leading students to a predetermined correct answer, but rather aims, by making the students speak about a specified educational subject, to encourage the students to arrange their knowledge in some usable format and to

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**Figure 1.** Example of Frames from a Manga Case Method.

supplement that store with the knowledge of other people. Thus, a case leader is required to not only know quite a bit about the topic being taught, but also to have the skills to discern the students' comparative proficiencies and facilitate their improvement.

Within this context, administrators face an urgent need to construct learning environments in which students can learn effectively without the assistance of such highly trained facilitators.

One conceivable approach here is to provide some sort of system. The system supports the facilitation efforts of inexperienced case leaders. In this paper, we discuss how such a system can be brought close to reality. We focus particularly on facilitation with respect to novice students in the case method learning. The reason for the focus on novice learners is that the low level of learning achievement in novice learners is seen as a special problem. For example, Benbow and McMahon<sup>(8)</sup> pointed out that there are essential variations in the maturity level of students in case method instruction at universities, and these variations result in obstacles to learning in the students with a low level of proficiency. In addition, Linn and Clancy<sup>(9)</sup> pointed out that the use of the case method with novice students tends to result in failure. In contrast, Linn and Clancy reported that receiving advice from experts during discussions can dramatically improve learning effectiveness. This type of failure on the part of novice learners cannot be left as is, because it may lead to an accelerated delay in learning that is impossible to resolve. However, as pointed out by Linn and Clancy, appropriate facilitation can be expected to dramatically improve learning effectiveness.

## 1.2 Case Method Learning Support System

Various types of support systems have been developed for the case method. For example, Rosatelli et

al.<sup>(10)</sup> focused on the inefficiency of gathering students together in a classroom and providing instruction using the case method, and proposed that case method instruction should be provided online. Rosatelli et al. developed LeCS (Learning from Case Studies) as an online case study learning environment. LeCS includes features for students to hold discussions with one another and to enter decisions they have made themselves. These features enable the instructor to know when students are on the wrong track and how they participate in discussions and so on. There are also features to provide information about the case materials in accordance with the status of student activities and to provide advice. Such features are aimed at achieving effective online case learning.

Furthermore, Webb et al.<sup>(11)</sup> proposed development of a hybrid case method that integrates the advantages of both online and offline learning. In their method, discussions in the classroom are first held in an offline environment. Subsequently, an Internet BBS is set up as an online environment, and asynchronous discussions are conducted. This creates a hybrid learning mode that is a mixture of online and offline learning. Tests showed that this method offers high learning effectiveness, as the enthusiasm of the students is brought out in the online learning environment. Since the discussions are asynchronous, the students are able to prepare what they want to say in the middle of the discussion. In addition, they can express themselves without having to wait for pauses during the discussion. The result is that even students who were not able to actively join in the offline discussions are able to participate in the online discussions. On the other hand, Webb et al. also showed that, when only online learning is conducted, the feeling exists that the students are not gaining the kind of learning that can be put into practice in the real world.

In contrast, Harry et al.<sup>(12)</sup> focused on the efficiency of group discussions, and attempted to increase that efficiency through the introduction of a support system. Harry et al. developed Tin Can, an application for tablet use. During group discussions, each student has a tablet onto which Tin Can has been installed. The students enter their own ideas regarding the discussion in Tin Can. The ideas that have been entered are displayed and shared with other groups of students. The input and sharing of ideas are conducted simultaneously as the physical group discussion proceeds. With this feature, the students are made aware of ideas that they may not

have noticed. They are also made aware of connections between ideas that they might never have realized on their own. Harry et al. reported that this made it possible to increase the diversity of opinions and the connections between students during physical discussions.

Support systems have been developed for learning using the visual case method as well. In visual case learning, it is known that learning is highly effective if the students have diverse knowledge and experience<sup>(13)</sup>. However, it is difficult to gather a diverse group of students together at one time. For this reason, Hotta et al.<sup>(14)</sup> proposed development of a learning system that can be used for individual study. Hotta et al. gathered data for various individual frames in the teaching materials that had been selected by students and compiled a database. They proposed a system based on this database that recommends frames that the individual students would perceive as unexpected. This system makes it possible for even students studying alone to be made aware of unexpected perspectives.

Takahashi et al.<sup>(15)</sup> focused on the differences in learning effectiveness due to the combination of students and proposed a system for recommending combinations of students that makes it easy for them to become aware of unexpected perspectives. Takahashi et al. used frames identified by students in the same manner as Hotta et al. Takahashi et al. also defined a method for evaluating the degree of difference between the identified frames. Using this evaluation method, they discovered students who focused on very different points from other students and they proposed that learning effectiveness could be increased by having such students discuss the points with one another.

Furthermore, Takahashi et al.<sup>(16)</sup> also developed a method for effectively conducting group discussions. Their method expresses student ideas in a manner that is suited to the teaching materials used in the visual case method. Takahashi et al. have the students hierarchically categorize frames from a manga story in order to get the students to express their perspectives. Then the students show the resulting expression of their perspectives to one another and discuss them. This enables the students to gain a deeper understanding of one another's ideas and results in discussions with greater learning effectiveness.

All of these systems focus on the issue of learning effectiveness with respect to ordinary students. The systems are designed for ordinary students and their goal is

to achieve efficient and effective instruction.

This study addresses the issue of learning difficulties experienced by novice students who have a low level of proficiency. As pointed out by Benbow and McMahon<sup>(8)</sup> and Linn and Clancy<sup>(9)</sup>, the presence of novice students with a low level of proficiency causes a problem in which the novice students are unable to keep up with the rest of the class. Moreover, once they fall behind, there is a danger that this lag will accelerate and will soon become impossible to resolve. For this reason, it is crucial to identify the learning difficulties that are specific to novice students and to design a system to eliminate these difficulties.

### 1.3 Purpose

We discuss a system to support novices can be brought close to reality. We identify factors which impede the learning of novice students and explore methods to resolve them, in order to make a consideration of methods to support facilitation efforts directed at these novices. We then identify factors which impede the learning of such students and explore methods to resolve them.

Our paper is structured as follows. In Section 2, we refer to test results to analyze differences in case method learning between novices and experts. These results confirm the learning difficulties experienced by novices in contrast to experts in the same learning environment. In the first test utilized, individual learning was conducted in order to ensure that the learning environment would be identical. We refer to other test results in Section 3, this time to reveal factors that impede the learning of novices, and then, based on our results, follow with a discussion of the capabilities to be provided by a facilitation support system. The purpose of the second test utilized was to gain knowledge of "the areas in which novices experienced learning difficulties" and "how a system should provide support for novices" in the actual case method teaching environment. To this end, the second test was conducted using a group learning format that is close to that of the actual case method learning environment. Also, as Section 3 is intended to replicate the effectiveness of training under extremely inexperienced case leaders, we purposely assigned the case leaders as having no particular role other than that of a timekeeper. Finally, in Section 4, we present our conclusions.

## 2. Characteristics of Learning Differences between Novices and Experts: The First Test

As described in this section, we conducted the first test with case method training utilizing the manga case instructional materials of Yoshikawa et al.<sup>(13)</sup>. We utilized such materials because manga, which tell a story by means of individual frames, lend themselves to analysis (each frame can be extracted and separately analyzed for the information embedded within it).

The topic of these particular manga-based materials was the evaluation of business leadership. We selected the manga “Website Flaming!” for the exercise. The story explores the case of an IT startup. The venture has two business lines. One is a server management business, which is notable for its earnings stability. The other is a website operational service business, which is notable for its future promise. One day, the server management side fields an inquiry for its services from a major website owner. Unfortunately, during contract negotiations, a website under the operational service side is found to be at an immediate risk of “going up in flames.” Employees do what they can, but to no avail. The website eventually catches fire and takes down the venture company’s servers. The instructional aspect of this manga was targeted at the students’ evaluation of the leadership skills of the venture president as apparent through this series of events.

In our test, we examined how the teaching of a typical set of leadership evaluation items to students sways their ability to identify frames of relevance to this evaluation (i.e., to detect frame embedded information). In other words, we sought to examine the extent to which they had become able to draw out relevant information as a result of such teaching.

### 2.1 Participants

The participants in our study belonged to a novice group, comprised of four university students with a low level of business leadership experience, and an expert group, comprised of four working adults with a high level of experience. In consideration of the so-called 10-year rule, all four experts were selected from among adults having at least 10 years of working experience<sup>(17)</sup>.

### 2.2 Assignments in the First Test

Table 1 shows the assignments and their duration in the first test. The participants began by selecting frames (scenes) from the manga story having some relevance to an evaluation of the venture president’s leadership skills (pretesting; Assignment 1 of Table 1). The participants used a red pen to draw a circle in the selected frames in the manga story teaching text. Next, they were asked to assess the president’s leadership skills using a typical set of leadership evaluation items (learning; Assignment 2). Finally, the participants were asked to look at the frames again and select relevant frames that they had previously overlooked in Assignment 1 (post-testing; Assignment 3). The participants noted their selection by using a blue pen to draw a circle in the newly selected frame in the manga story teaching text. In Assignment 3, participants were cautioned not to

**Table 1.** Assignments in the First Test.

Assignment	Duration (minutes)	Description
1	30	Pretesting Choose 20 or more frames that are relevant to evaluating the president’s leadership.
2	20	Learning Use the provided leadership evaluation items to assess the president’s leadership.
3	30	Post-testing Based on your evaluation in assignment 2, select additional frames to those you chose in assignment 1 that are relevant to your evaluation.

**Table 2.** Three Examples of Performance-Maintenance Leadership Evaluation Items.

No.	Evaluation item
1	Requires the accomplishment of priority objectives
2	Requires that decision-making has an objective and quantitative basis.
3	Requires that once an objective has been set, it is pursued, even when difficulties are encountered.

delete or edit their responses or perform any other tasks other than selecting relevant frames that had previously been overlooked. After they had completed Assignment 3, the participants were interviewed and asked why they had selected the frames in Assignment 1 and Assignment 3.

In Assignment 3, students were asked to select frames that had previously been overlooked. As a result, they identified what perspectives they had learned in Assignment 2. To that end, in Assignment 3, we did not use the ordinary post-testing method of applying the same content as in pretesting and comparing the results. In other words, we did not use the method of having the students select frames from the beginning and compare their selection with that in Assignment 1. This is because they had already made selections in Assignment 1, and we were concerned that they would not make the selections again in Assignment 3. Moreover, in Assignment 3, the objective was for them to identify new frames that had previously been overlooked. Accordingly, having the students clearly show the frames that they had originally noticed made them more clearly cognizant of the newly selected frames. Moreover, in Assignment 3, they were not permitted to delete or edit their responses. In the interviews, this point was confirmed by asking them what changes there had been in comparison to the results of Assignment 1.

Assignment 2 utilized the Performance-Maintenance Leadership Scale, a standard leadership evaluation items based on performance and maintenance items<sup>(18)</sup>. Among several versions of this scale, we used one designed for the evaluation of top management leadership<sup>(19)</sup>. This scale has 77 evaluation items, three of which are shown in Table 2. For each evaluation item, the participants were asked to choose one of four ratings: “good,” “bad,” “seen in some frames but no judgment is possible for the whole story,” and “not seen in any frame.” By rating the president on these 77 items, the participants were to gain some learning experience with the items on which such evaluations are made.

### 2.3 Results and Analysis

We conducted a comparative analysis of (a) the frames selected by the novice group and by the expert group, and (b) their stated rationale behind such selections. Figure 2 shows the number of frames selected by each group, either before the learning assignment

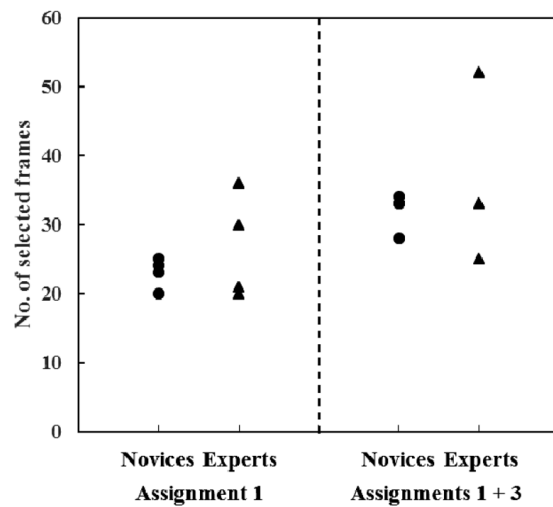


Figure 2. Number of Frames Selected by Participants.

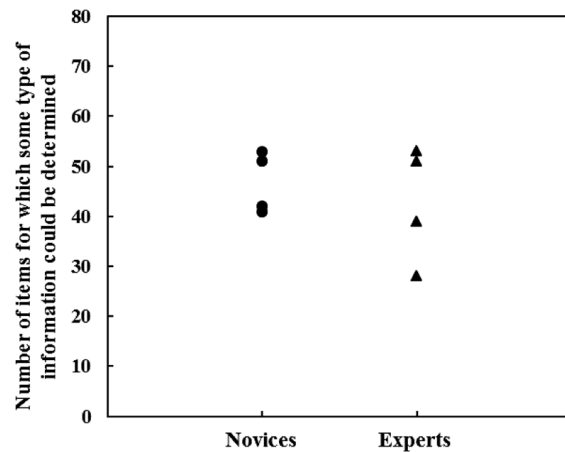


Figure 3. Number of Items for Which Some Type of Information Could be Determined.

Note) “Good”+“bad”+“seen in some frames but no judgment is possible for the whole story.”

(Assignment 1; left) or after (Assignments 1+3; right). We did not observe any clear difference between the results obtained from the novice and expert groups, nor did we detect a statistically significance difference between them with the Mann–Whitney *U* test.

In addition, Figure 3 shows the number of evaluation items for which some type of information could be determined (“good” + “bad” + “seen in some frames but no judgment is possible for the whole story”). A comparison of these results also showed no clear difference

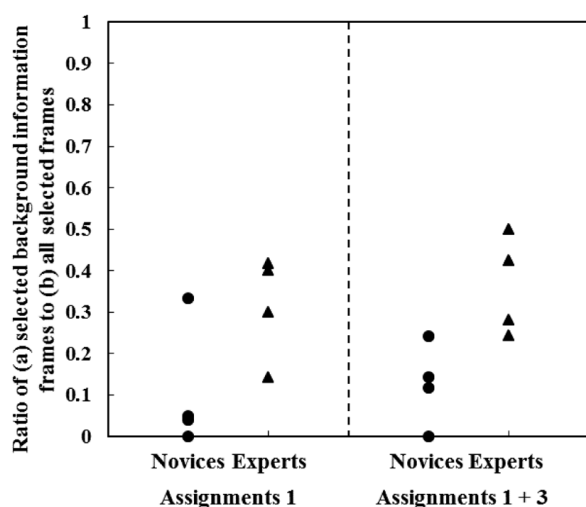


Figure 4. Ratio of Background Information Frame Selected by Participants.

between the novice and expert groups. When the Mann-Whitney *U* test was performed, no significant difference was determined.

In the interviews, we asked whether there was some change as compared to the results for Assignment 1. The response from all four students was the same, to the effect that there were no particular changes but more importantly that they had become aware of new things.

However, we did note a different tendency with regards to the types of frames selected. Figure 4 presents a comparison by ratio of frames in which the president is not directly depicted (we refer to these as “background information frames”) relative to all relevant frames cited by individual participants in each group. For example, the left frame of Figure 5 shows the president saying something that many interpreted to mean that the company meetings are conducted under a brisk tempo. Novices tended to focus on this and similar frames with some direct bearing on the president’s style or personality, and indeed many of their comments related to this. On the other hand, experts tended to focus on the right frame of Figure 5, on Figure 6, and on other frames in which the president is not directly depicted. Also, many of their comments were concerning such frames.

The right frame of Figure 5 is a scene of a staff member having dinner with a client, to whom he is expressing his dissatisfaction with the president’s response to the situation. One expert interpreted this



Figure 5. President Speaking at a Meeting (left); a Lack of Trust from Staff (right).

Note) President (l): “I know, I know. Let’s hear your sales reports first.”

Staff member (r): “He should push the word-of-mouth side as we do that. Do they want us to simply do subcontract work?”



Figure 6. A Conversation between Staff Members.

Note) Second-in-command: “Weren’t you listening?”

scene to suggest that “company employees did not get their act together internally before going out for external meetings.” Expressed more completely, he meant that “before going out to meet some external client, the company should internally figure out who is going to do what and, in general, come up with a single, coherent explanation to present to the client. The president does not seem to have done this, maybe because he doesn’t trust his subordinates.”

Figure 6 covers a situation in which two subordinates are discussing a failure of communication. Experts took this scene to suggest that “staff members are not on the same page,” implying that the president has been neglectful in his duty to facilitate communication among subordinates.

Accordingly, we divided the selected frames into two categories: “frames in which the president appears” and “frames in which the president does not appear.” We referred to these categories as “frames in which the president appears” and “background information frames.” Returning to Figure 4, we examined the ratio of (a) background information frames selected as relevant to (b) all frames selected (“frames in which the

president appears” and “background information frames.”) as relevant. This time we noted that experts tended to select a higher proportion of background frames. We also noted that this tendency was more pronounced after Assignments 1+3 (i.e., after the learning assignment) than after Assignment 1 (before the learning assignment). We did not observe any statistical difference between the novice and expert groups with regards to Assignment 1 with the Mann–Whitney  $U$  test; but with regards to Assignments 1+3, we did observe such a difference ( $p < .05$ ). One interpretation of this result—that it requires a degree of expertise to realize that an evaluation of a person’s leadership skills should go beyond the direct actions of that person to include the peripheral results of those actions—concur with the general experiences of working adults. In other words, to the degree that an expert has acquired relevant knowledge through on-site work experience, he or she finds it easier to acquire further knowledge.

Based on these results, there was no difference between the number of new frames that had previously been overlooked (Figure 2) and the number of evaluation items that the participant became aware of during the evaluation process (Figure 3). However, there was a difference in the ratio of background information frames that were selected (Figure 4). In other words, on the surface, no difference could be discovered with regard to the quantity of information that had been learned. However, it was possible to discover a difference in the quality of the information that had been learned.

### 3. The Learning Characteristics of Novices: The Second Test

In Section 2, we saw how experts learned more than novices from the same lesson. Remarkably, we discovered a difference in the quality of the information that had been learned. However, despite the fact that the novices appeared to have room for learning, the results indicated that they learned less. From this, it was clear that novices need some sort of support in order for them to learn effectively.

For this reason, in Section 3 we focused on novices. Our objective was to gain knowledge of “the areas in which novices experienced learning difficulties” and “how a system should provide support for novices” in the actual case method teaching environment. To this end, our second test was conducted using a group learn-

ing format that was close to that of the actual case method learning environment. Then, we carried out a qualitative analysis of their learning outcomes.

As case material for this test, we utilized the manga, “Yamato Aoi,” which deals with the advantages and disadvantages presented to an IT company by the use of social media. It touches, for example, on such topics as measures to take to prevent trouble, and how to deal with trouble and follow up if it does occur; and it serves as a teaching material for the purpose of learning about tactical-level decision making.

In this material, several problems specific to social media are embedded. For example, the protagonist in “Yamato Aoi” is a sales manager who goes by the same name as the manga, Yamato Aoi. The gender of this person is not clear from the name on social media; indeed, it is not even sure which is the given name and which is the family name because both names are possible given names and family names. Yamato is a given name that especially a lot of men have. So people who suppose Yamato is a given name think Yamato Aoi is a man. On the other hand, Aoi is a given name that especially a lot of women have. So people who suppose Aoi is a given name think Yamato Aoi is a woman.

#### 3.1 Participants

Nine people were selected to participate in this test: eight fourth-year undergraduate students majoring in management engineering, and one first-year graduate student. These nine students were randomly assigned characters A-I. They were placed into three equally sized groups based on assigned alphabetical order.

#### 3.2 Assigned Questions in the Second Test

A group learning format was used that was close to that of the actual case method learning environment. Our second test used the assigned questions listed in Table 3. Table 4 gives the timetable for the test. The test day schedule began at 10:00 and extended to 15:30. A workshop was held afterwards, and at that time participants were asked to fill out a free-form survey.

Questions 1 through 4 were intended to give the participants an opportunity to organize their thoughts about the case material. (Also, Questions 1 and 2 were utilized as topics for preliminary discussions to reinforce participant interest in the case). Questions 5

**Table 3.** Assigned Questions of the Second Test.

No.	Question
Q1	What kinds of social media are used by Yamato Aoi?
Q2	Who are the characters, what are their roles and functions, and what are their respective stances on net utilization?
Q3, 4	From the viewpoint of Yamato Aoi, what are the merits (Q3) and demerits (Q4) of using social media? Which frames support your answers? Why? To whom is some capability a merit (e.g., to Yamato Aoi, to the company, to the client)? Please list 5 to 10 instances to back up your assertion.
Q5	The manga ends with the protagonist saying “that wasn’t me.” This can be interpreted in three ways. Which do you think is correct? 1. Somebody intentionally spoofed Yamato Aoi and wrote the blog entries. 2. Somebody with the same name or similar nickname has gotten mixed up in all this. 3. Yamato Aoi wrote something that she meant to keep private and is lying in an attempt to keep it hidden. What kind of additional information would help you discern the truth?
Q6	Should Yamato Aoi continue to use social media, or should she stop? Role-playing assignment: Discuss this issue, with one person playing the role of Yamato Aoi and another playing Mori.

through 6 were intended to provide an opportunity to apply that information to a discussion of the decision-making process. In the interest of time, the case material (manga) and Questions 1 and 2 were distributed to the participants one week ahead of the test. The participants were asked to consider responses to those questions ahead of time but were nonetheless free to change them on the test day. Table 4 refers to this independent work as Session 1.

On the day of the test, to break the ice, we began with Session 2 which featured self-introductions and deciding on team names. In Session 3 and Session 4, in-group discussions and discussions between groups were held regarding Q1 and Q2. In these sessions, students were asked to recall the content of the manga case teaching materials, with the aim of preventing simple misreading and misperceptions. In Session 5, students were asked to individually answer Q3 and Q4 as pretest-

**Table 4.** Timetable for the Test.

Session No.	Duration (minutes)	Description
1	Preparation	Individually respond to Q1 and Q2. This is done before the test day by the participants at their convenience.
2	10	Icebreaking.
3	30	Discuss Q1 and Q2 within your group.
4	15	Discuss Q1 and Q2 with other groups.
5	30	Individually respond to Q3 and Q4 (pre-test).
6	30	Discuss Q3 and Q4 within your group.
7	15	Discuss Q3 and Q4 with other groups.
8	-	Lunch break.
9	20	Discuss Q5 within your group.
10	15	Discuss Q5 with other groups.
11	20	Discuss Q6 within your group.
12	20	Role-play Q6 with other groups (three times, each with different role players).
13	30	Individually respond to Q3 and Q4 (post-test).
14	-	Closing followed by the workshop. Filling out a free-form survey.

ing. In Session 6 and Session 7, in-group discussions and discussions between groups were held regarding Q3 and Q4. In Session 9 and Session 10, in-group discussions and discussions between groups were held regarding Q5. In Session 11, in-group discussions were held regarding Q6 to get students to think about what responses to provide during the role-playing game (RPG) in Session 12. In Session 12, students in different groups assumed the role of Yamato and the role of Mori, who is a superior of Yamato, and conducted the RPG. The RPG was performed three times with different combinations of groups each time, in order to get all of the students to assume the roles of Yamato and Mori. In Session 13, the students were asked to write down everything from the beginning regardless of their responses in Session 5. Moreover, in the discussions between groups in Sessions 4, 7 and 10, a representative from each group gave a presentation, and the students in the other groups asked questions.

Questions 3 and 4 were assigned twice, once as a pretest (Session 5) and again as a post-test (Session 13). This was done to examine how the focus points of the participants changed during the process of group learning.

### 3.3 Analysis

We compared the results of pretesting and post-testing. We particularly focused on what we named “learned frames”; that is, frames that were overlooked within pretesting yet selected within post-testing. Following on the constructive interaction learning process of Miyake<sup>(20)</sup>, we classify learned effects into three learning categories. More concretely, we classify the reason/rationale behind a “learned frame” designation as:

- i) A reason/rationale originally held by the participant
- ii) A reason/rationale just learned from another person
- iii) A new reason/rationale

Also, to identify the “other person” from whom this reason/rationale was learned, we compared the new reason/rationale to what was cited for the frame in the pretesting stage.

From here, we proceeded by referring to the “i” category as Learning Class (1), Learning by deepening one’s understanding from a previously held viewpoint; the “ii” category, as Learning Class (2), Learning by broadening one’s understanding of another person’s viewpoint; and the “iii” category, as Learning Class (3), Learning by discovering a new viewpoint.

We note that the “ii” category includes not only what was directly learned from another person, but also what was learned by applying the viewpoint of another person, even though that other person might not have noticed the particular point (here, relevancy of a frame) on his or her own.

We take a closer look at these learning classes below. First, as for Learning Class (1), Learning by deepening one’s understanding from a previously held viewpoint, learners deepen their understanding of a previously held view, by which that view becomes abstracted and thereby more readily applicable to frames. It is through this process that the participants come to select a set of “learned frames.” Next, as for Learning Class (2), Learning by broadening one’s understanding of another person’s viewpoint, the learners come to select

**Table 5.** Classification Codes.

Code No.	Code name
1	Invigoration of internal/external communication
2	Lowering of costs of customer interaction
3	Raising of employee motivation, retention
4	Accumulating internal knowledge
5	Inculcating a positive company culture
6	Raising productivity
7	Information leakage
8	Distinguishing between public and private statements
9	Difficulty of checking, control
10	Friending and unfriending coworkers
11	Deterioration of company morale
12	Deterioration of productivity
13	Friends and acquaintances
14	Hobbies and interests
15	Volunteer and social activities
16	Sharing and renting
17	Leakage of personal information
18	Intermingling of professional and personal life
19	Convenience
20	Work feedback
21	Collecting information

“learned frames” by applying a new/broadened understanding acquired from another (even though, as above, that another person might not have noticed the relevancy by his or herself). And finally, as for Learning Class (3), Learning by discovering a new viewpoint, the learners arrive at (or create) a new viewpoint through a process of reversal between the role of an actor (executor) and the role of a monitor.

We classified the reasons for focusing on some given frame with the classification codes of Table 5 in accordance with participants’ free-form responses. More specifically, we can determine who learned what from whom by examining the matches and mismatches of classification codes within a group.

The classification codes were preselected to cover

social media related issues thought likely to be associated with “Yamato Aoi.” Codes 1 through 12 pertain to the use of social media within a workplace or business scene and to potential problems<sup>(21)</sup>. That is, they can be considered to cover the merits and demerits of corporate social media utilization. Codes 13 through 17 cover the merits and demerits of personal social media utilization as outlined within the “White Paper on Telecommunications” prepared by the Ministry of Internal Affairs and Communications, Japan<sup>(22)</sup>. These codes alone turned out to be insufficient to adequately categorize all of the reasons given, and thus we added four more—Codes 18 through 21—to provide adequate coverage for our analysis.

Presented below are several examples to illustrate how this classification system works.

**(1) Learning Class (1): Learning by deepening one’s understanding from a previously held viewpoint**

Example: In pretesting, Participant A notes a frame pertaining to the leakage of personal information. He comments, “anybody could be looking at this.” Then, in post-testing, he takes note of another, earlier frame, this time commenting “there is a risk here of a leakage of personal information.” In pretesting, Participant A did not select this frame. We classify both comments under Code 17, leakage of personal information, even though they pertain to different frames.

**(2) Learning Class (2): Learning by broadening one’s understanding of another person’s viewpoint**

Example: In pretesting, Participant D notes a frame that, he comments, shows “people are always worried about work, even outside of working hours.” In post-testing, Participant E, who is in the same group as Participant D, comments on this same frame, saying “these people seem to have lost the distinction between their work and their hobbies.” In pretesting, Participant E selected this frame for a different reason. We classify both comments under Code 18, intermingling of professional and personal life.

**(3) Learning Class (3): Learning by discovering a new viewpoint**

Example: In pretesting, Participant H, together with all other participants, does not take any note of a particular frame. Then, in post-testing, Participant H cites this frame, commenting “internal conflicts over

security issues could act to the detriment of inter-employee relations.” We classify this comment under Code 10, friending and unfriending coworkers.

**3.3.1 Classification of Learning Effect**

Table 6 presents a classification of results for learning classes. Each number in a table box refers to the number of frames the participant selected for the pretest, post-test and three learning classes. Likewise, Table 7 shows statistical correlations between the number of pretest frame selections and the number of post-test frame selections, post-test results broken down by learning class. From Table 6, we found that Learning Class 1 occurred most frequently among the types of participant learning, followed in descending order by Learning Class 2 and Learning Class 3. And, from Table 7, we noted a strong positive correlation between the number of pretest frame selections and the number of post-test frame selections (0.84 correlation coefficient,  $p < .01$ ). We also noted a positive correlation (0.68 correlation coefficient,  $p < .05$ ) between the number of pretest frame selections and the number of Learning Class 3 designations.

**Table 6.** Classification of Results by Learning Class (LC).

	Pre	Post	LC (1)	LC (2)	LC (3)
Participant A	13	18	13	3	2
Participant B	15	15	15	0	0
Participant C	10	12	8	4	0
Participant D	17	22	13	6	3
Participant E	11	11	9	2	0
Participant F	13	14	14	0	0
Participant G	20	17	9	3	5
Participant H	18	19	12	6	1
Participant I	4	8	8	0	0

**Table 7.** Classification of Learning Effects.

	Post	(1)	(2)	(3)
Pre	0.84**	0.44	0.52	0.68*

\* $p < .05$ , \*\* $p < .01$

### 3.3.2 Discussion

In reference to an effective learning environment in which constructive interaction takes place, Miyake<sup>(20)</sup> states that a conceptual model acceptable to those having differing views/opinions is created and that learning takes place through changes to this model. From our test results, however, we found that in practice, it could be quite difficult for a novice to learn through changes in a conceptual model (Learning Class 3). We found instead that learning tended to be limited to extensions of concepts already held (Learning Class 1) or by acceptances of the acceptable views/opinions of others (Learning Class 2).

On the other hand, correlation analysis showed that a learner (participant) who already holds a variety of viewpoints can, through the process of discussion, readily learn even more. Furthermore, this variety of viewpoints leads to Learning Class 3 knowledge acquisition. These results, along with those of the results of Section 2, characteristics of learning differences between novices and experts, showed that a certain level of learning was necessary to facilitate further learning.

### 3.3.3 Consideration of Support System Capabilities

We followed on the above by considering desirable capabilities/characteristics for a support system to facilitate learning. At first, from Table 6, we saw multiple instances in which a new viewpoint, although noticed by some participants within a group (Learning Class 3), was not shared with others within that group. For instance, Participant A noticed new points that were not shared with Participant B or Participant C, the two other members of his group. Here, we can facilitate Learning Class 3 discovery, even within a group of novices, by encouraging participants who notice something to externalize this through discussion with the other participants. With this in mind, we considered it effective for the support system to include some mechanism for recommending participants found by pretesting to already have a high level of knowledge (and, by that, to hold out the most promise for reaching Learning Class 3), and for such recommended/promoted participants to be given particular encouragement by the facilitator to externalize their discoveries.

Also, we thought assignment of group members

based on pretest results was likely to be effective. By this, each group can be provided with a good balance of participant skill levels, including participants with a high skill level, and such an arrangement should act to encourage Learning Class 3 discovery in many groups. (We note that Takahashi et al.<sup>(15)</sup> have proposed a method of organizing groups for case method exercises. This approach, however, focuses on Learning Class 2 acquisition and thus does not accord with our purposes here.)

## 4. Conclusions, Issues for Further Attention

In this paper, we aimed to discuss how a system to support the facilitation efforts of inexperienced case leaders can be realized. We began by considering methods to support facilitation efforts directed at novices, presumably the most numerous category of students. We attempted to identify factors which impede the learning of such students and we explored methods to remove those obstructions.

In Section 2, we referred to test results to analyze differences in case method learning between novices and experts. This enabled us to confirm learning difficulties experienced by novices in comparison to experts in the same learning environment. In the first test, individual learning was conducted in order to ensure that the learning environment would be identical. We carried out a second test in Section 3 to reveal factors that impede the learning of novices. Then, based on the results, followed with a discussion of the capabilities to be provided by a facilitation support system. The purpose of this test was to gain knowledge of “the areas in which novices experienced learning difficulties” and “how a system should provide support for novices” in the actual case method teaching environment. To this end, the test was conducted using a group learning format that was close to that of the actual case method learning environment.

With regards to Section 2, we found that in making use of case method materials, expert participants—those who had learned much through previous front-line experience—were, to the extent of that expertise, able to learn proportionally more. Notably, we discovered a difference in the quality that had been learned between novices and experts. This concurs with the general experiences of working adults; it requires a degree of expertise to realize that an evaluation of a person’s leadership

skills should go beyond the direct actions of that person to include the peripheral results of those actions.

With regards to Section 3, we carried out qualitative analysis of novices' learning outcomes. We found that in a group learning exercise by novices, acquisition was most common under Learning Class 1, followed in decreasing order by Learning Class 2 and Learning Class 3. We also found that we could, to some degree, predict the degree of learning and the learning class attainment of participants based on their pretest results.

Following on these results, we proposed that as one capability of a support system to facilitate such learning, the system should include some mechanism for recommending/promoting participants found by pretesting to already have a high level of knowledge (and, by that, be considered most likely to attain Learning Class 3), and for such recommended/promoted participants to be given particular encouragement by the facilitator to externalize their discoveries. Under this system, the facilitators would focus on the recommended students and it would become possible to encourage the externalization of the discoveries made from this new perspective. Also, we thought splitting up of group members based on pretest results would be effective. By referring to the pretest results when splitting up the groups, each group could be provided with a good balance of participant skill levels, including participants with a high skill level, and such an arrangement should act to encourage the number of participants engaged in Learning Class 3.

Our system assumes that it is possible to extract and compare with a certain degree of detail the information that students identified in pretesting. In particular, our tests used manga as the case teaching materials. For this reason, information is made up of individual manga frames (scenes), making it easy to measure the information identified by students. Even with ordinary case method teaching materials, however, it is possible that a method of measuring information identified by students in terms of the number of paragraphs or the number of figures and tables and so on can be used. We think our system can be applied if such methods are used.

This paper was only concerned with case method learning under the guidance of inexperienced case leaders. This said, in order to create a support system for such learning, we also need to examine both its effectiveness under the guidance of skilled case leaders and the processes behind that effectiveness; the reason for this is that through observations of skilled case leaders

in action, we can determine just what kinds of support measures are needed to promote Learning Class 3 discovery. And, by systemizing such measures, we should become able to further increase the effectiveness of the support system. Furthermore, by identifying situations in which even experienced case leaders can stumble and by developing and incorporating support measures to deal with such situations, we should be able to increase the value of these learning activities. We plan to continue our inquiries into the effectiveness of case studies under experienced case leaders.

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