

## **Development and Implementation of Online Group Work Exercise Combined with Project-Based Learning and Active Learning Methods**

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### **ABSTRACT**

As an ongoing research activity of “Educational Programs for Business Producers” for new human resources development in the AOYAMA BUSINESS REVIEW in 2021 [1], this research targeted the subject of "Global Product Service Strategy II" in the fall course. The educational programs were demonstrated in the School of Business at Aoyama Gakuin University, led by Professor Tamaki, during classes from fiscal year 2015 to fiscal year 2021. Due to the influence of COVID-19, online classes

were introduced into many university courses in 2020. Therefore, the purpose of this research was to research and develop new educational methods for "online group work exercises" that combine both project-based learning (PBL) and active learning (AL) so that the methods can flexibly respond to the new normal era as a countermeasure against COVID-19. The new educational methods will explore the research and development of educational organizations, learning support management methods, and learning environment systems. The active learning for "Global Product Service Strategy II" includes four different types of business roles, namely multi-sided platform (MPS) business modeling, new products/services, smart product strategy and application software design, and MPS service systems.

**Key words:**

Educational program, business producer, project-based learning (PBL), active learning (AL), online group work exercise, multi-sided platform (MPS)

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## **Contents**

- 1. Introduction**
- 2. Curriculum Design for "Online Group Work Exercises" Combined with PBL and AL**
- 3. Comparison of Learning Environment Systems between Face-to-Face Classes and Online Classes**
- 4. Team / Group Formation and Educational Organization for Online Group Work Exercises**
- 5. Operational Management Problems and Causes in Implementation of Online Group Work Exercises**
- 6. Items in a Business Concept Plan as Final Deliverables for Each Team**
- 7. Comparison of Overall Grade Evaluation between Different Teams / Groups and Questionnaire Results of Course Evaluation**
- 8. Conclusion**

## **Acknowledgment**

## **References**

## 1. Introduction

Our Japanese industry-university project group of Aoyama Gakuin University investigated and studied new educational programs for cultivating “business producers in future-oriented business strategy design” for human resources over several years [2, 3,4]. To develop such new human resources, the research team has been engaged in developing new educational methods for group work exercises that combine both "Project Based Learning (PBL)" and "Active Learning (AL)" as industry-academia joint research. As one of the concrete results of the above-mentioned industry-academia joint research, we co-authored a textbook "Business Producers in Future-oriented Business Strategy Design: Smart Product Services and Platform Services" [5].

The Ministry of Education, Culture, Sports, Science and Technology recommends PBL as one of the best learning methods for students to independently discover problems and find problem solutions. Ozaki et al. [6] reviewed academic papers on PBL with a view to continuously improving the educational contents, and for the purpose of acquiring the basic necessary skills for working people. They identified effective factors for improving learning outcomes, and developed strategies for class improvement. The factors that led to PBL lessons and learning outcomes were structured, and their interrelationships were visualized through multiple regression analysis.

AL is based on the theory of collaborative learning that enhances group-based learning effectiveness. Collaborative learning is referred to as a small group-based learning method in which learners work together on tasks to maximize their own learning and the learning of their peers. Yamauchi [7]

analyzed and considered academic papers on the processes that AL had accepted as new teaching methods in Japanese higher education. He reviewed the research trends on AL that had been published over the past ten years in the Japan *Journal of Educational Technology*. This analysis of historical academic papers established that research had been conducted in four significant areas: class design, class evaluation, learning environment, and learning support.

Based on the above research background and results, the principal of the research team (Professor Tamaki) has been engaged in specialized courses (for 2<sup>nd</sup> and 3<sup>rd</sup> year undergraduate students) of the School of Business of Aoyama Gakuin University from FY2015 until now. He has been in charge of "Global Product Service Strategy I (Spring Course) and "Global Product Service Strategy II (Fall Course)".

In the former "Global Product Service Strategy I", face-to-face lecture-type classes are carried out to teach specialized knowledge and various techniques that should be acquired in advance as preparations for the fall semester course, using the textbook "Business Producer in Future-oriented Business Strategy Design" mentioned at the beginning.

As an ongoing activity of "Educational Programs for Business Producer" in AOYAMA BUSINESS REVIEW in 2021 [1], this research targeted the subject of "Global Product Service Strategy II" in the fall course. Therefore, the purpose of this research is to research and develop new educational methods of "online group work exercise" that combines both PBL and AL so the methods can flexibly respond to the new normal era as a countermeasure

against COVID-19. The new educational methods will explore the research and development of educational organizations, learning support management methods, and learning environment systems. The AL of "Global Product Service Strategy II" includes four different types of business roles, namely multi-sided platform (MPS) business modeling, new products/services, smart product strategy and application software design, and MPS service systems.

## **2. Curriculum Design for "Online Group Work Exercises" Combined with PBL and AL**

Considering the characteristics of the education methods, a curriculum of the "online group work exercises" that consists of PBL and AL methods is proposed as shown in **Table 2.1**.

### **2.1 PBL theme of "Multi-Sided Platform (MSP)" business model**

In the first to fourth lessons in **Table 2.1**, each team formulates a "business concept plan for future strategic design" with "collaborative learning with all team members" by applying the PBL method. The theme of PBL for future strategic design adopted the following business model utilizing information and communication technology (ICT).

The PBL theme includes a virtual product service business planning, which proposes next-generation application software using smartphones and/or smart movable devices connected with

**Table 2.1:** Curriculum combining PBL and AL methods for business producers [1]

| No. | New educational methods                                      | G1: business model                                                                                       | G2: new product/service planning                                                                       | G3: smart product design                                                                                | G4: platform service management                                                          |
|-----|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1   | <b>PBL :</b><br>Collaborative learning with all team members | Introduction: team and groups building, learning goals for educational program of the business producers |                                                                                                        |                                                                                                         |                                                                                          |
| 2   |                                                              | Survey of advanced cases of platform services and application software                                   |                                                                                                        |                                                                                                         |                                                                                          |
| 3   |                                                              | Determining the theme of new product/service planning of “application software” for each team            |                                                                                                        |                                                                                                         |                                                                                          |
| 4   |                                                              | Creating the business concept plan for platform service management for each team (1),(2)                 |                                                                                                        |                                                                                                         |                                                                                          |
| 5   |                                                              |                                                                                                          |                                                                                                        |                                                                                                         |                                                                                          |
| 6   | <b>AL:</b><br>Collaborative learning within the same group   | Own required management resources and business partners                                                  | Customer purchasing decision process                                                                   | Image of service utilization of smartphones and mobile products                                         | Required functions and specifications of platform service                                |
| 7   |                                                              | [G1⇔G4]<br>Business and service process model for platform services and application software             | New application software planning                                                                      | Product architecture of smartphones and mobile products                                                 | [G1⇔ G4]<br>Platform services and application software                                   |
| 8   | and/or<br>Collaborative learning between different groups    |                                                                                                          | [G2⇔G3⇔G4]<br>Application software content flowchart                                                   | [G2⇔G3⇔G4]<br>Application software                                                                      | [G2⇔G3⇔G4]<br>Application software                                                       |
| 9   |                                                              | Improved business model Canvas with Customer Behavior and Service Processes                              | [G2⇔G3⇔G4]<br>Design of each screen content transition when the customers use the application software | [G2⇔G3⇔G4]<br>Processing algorithm for application software linked with smartphones and mobile products | [G2⇔G3⇔G4]<br>Processing algorithm for application software linked with platform systems |
| 10  |                                                              | Revenue business model                                                                                   |                                                                                                        | Usability of application software linked with smartphones and mobile products                           | Algorithm of collection/ accumulation/ analysis of customer usage data and behavior data |
| 11  |                                                              |                                                                                                          |                                                                                                        |                                                                                                         |                                                                                          |
| 12  |                                                              |                                                                                                          |                                                                                                        |                                                                                                         |                                                                                          |
| 13  | <b>PBL :</b>                                                 | Submission of final business scheme planning                                                             |                                                                                                        |                                                                                                         |                                                                                          |
| 14  |                                                              | ⇒ Learner's grade evaluation [evaluated from the point of team, group, personal contribution]            |                                                                                                        |                                                                                                         |                                                                                          |
| 15  |                                                              |                                                                                                          |                                                                                                        |                                                                                                         |                                                                                          |

a platform service. The main feature of this platform service is that it deals with the MSP business model. This MSP business model operates a platform and application software that mediates between the "supply side" that provides products/services, and the "demand side (customer)" who wants them. In other words, the MSP builds a new business model by acting as an intermediary between the providers of products/services and the customers.

## **2.2 Four different types of group roles for AL**

In team building exercises for the AL method, learners were separated into four project groups (Group 1, Group 2, Group 3, and Group 4 with the following different business roles), and each individual group worked on virtual project management. In the sixth to 13th classes shown in **Table 2.1** above, the group work exercises shown below were performed with different roles for each group [1].

### **(1) Group 1 business model:**

- own management resources and partners,
- business and service model, improved business model canvas with customer behavior and service processes, and
- business model by revenue type.

### **(2) Group 2 new product/service planning:**

- customer purchasing decision process,
- new application software planning,
- design of screen content transition when the customers use the application software in smartphones and mobile products, and
- promotion strategy of platform services and application software.



(3) **Group 3** smart product design and usability:

- image of service utilization of smartphones and mobile products,
- product architecture of smartphones and mobile products,
- processing algorithm for application software linked with smartphones and mobile products, and
- usability of application software linked with smartphones and mobile products.

(4) **Group 4** platform service management:

- required functions and specifications of platform service,
- business and service process model for platform services and application software,
- processing algorithm for application software linked with platform systems,
- algorithm for collection/ accumulation/ analysis of customer usage data and consumption behavior data.

There are two types of collaborative learning for AL group work. One way involves carrying out “collaborative learning within the same group”, and the other way involves “collaborative learning between different groups”, described for example,  $[G1 \Leftrightarrow G2]$  in **Table 2.1**.

The final goals of individual teams are to edit the new “business scheme planning for future strategic design”, which proposes the next-generation platform service management and application software, by using smart phones and/or smart movable devices.

### 3. Comparison of Learning Environment Systems between Face-to-Face Classes and Online Classes

Regarding "Global Product Strategy II" (Professor Tamaki), which is the fall semester course in the School of Business Management of Aoyama Gakuin University, the course is implemented by the educational method of "group work exercises". This group work exercise was conducted in a face-to-face class in 2019, but in an online class in 2020. **Table 3.1** shows the differences between face-to-face classes and online classes from the perspective of learning environment systems, teaching materials, and learning support (underlined where differences occur) [8].

**Table 3.1:** Comparison of learning environment system for face-to-face classes and online classes

|                                        | Face-to-face class in 2019                                                                                                                                                                           | Online class in 2020                                                                                                                                                                                                                                                                                 |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Learning environment system/function   | 1) Learning Management System (LMS)                                                                                                                                                                  | 1) LMS<br>2) <u>Web conferencing system for lectures</u><br>3) <u>Online whiteboard function for group work exercises</u>                                                                                                                                                                            |
| Teaching materials                     | 1) Digital lecture materials (PDF)<br>2) Paper worksheet for group work                                                                                                                              | 1) Digital lecture materials (PDF)<br>2) <u>Digital worksheet</u> for group work by using the online whiteboard function                                                                                                                                                                             |
| Learning support/questions and answers | Before and after class:<br>1) Function of questions and answers by LMS<br><br>During group work exercises in the classroom:<br>2) Q & A by face-to-face communicating with a Teaching Assistant (TA) | Before and after class:<br>1) Function of questions and answers by LMS<br>2) <u>Automatic questions and answers with an AI chatbot system</u><br>During <u>online group work exercises</u> :<br>3) Q & A by <u>online communicating/chat function</u> with TA using a <u>web conferencing system</u> |

The above-mentioned curriculum of “Global Product Strategy II” was applied to 2nd to 4th year undergraduate students, especially in remote online classes in fiscal year 2020. Most Japanese educational institutions adopted online classes as a countermeasure against COVID-19 in 2020. Therefore, from 2020, we slowly started to take up the challenge of conducting online classes in this course as well.

First, the “Learning Management System (LMS)” with complementary functions made it possible to realize the following aspects: management of digital teaching materials (registration and distribution of teaching materials), attendance management of learners, assignment report management submitted by each team/group. As a result, “remote on-demand learning” could be implemented at a learning pace suited to each team/group.

Next, Microsoft “Teams” as a tool for web conferencing was selected to carry out “synchronous online communication”. By utilizing Teams, the instructor conducted distance lectures for all learners at the beginning of each lesson. After that, group work exercises were possible by dividing the learners into teams/groups. A special reason for choosing Teams was that the “online whiteboard function” allows group members to co-create report assignments.

Finally, as a first step in the research and development of future AI learning management systems, IBM's Watson was utilized to implement an “AI chatbot system” for all learners to automatically respond to questions and answers.

## **4. Team / Group Formation and Educational Organization for Online Group Work Exercises**

### **4.1 Team / group formation for online group work exercises**

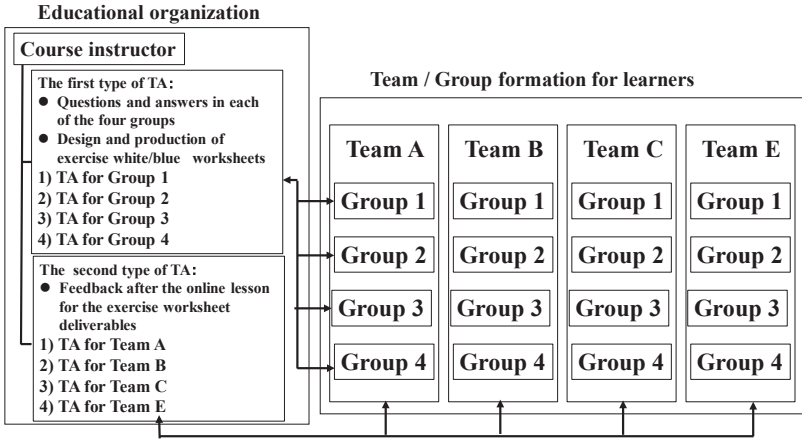
Forty-three learners were able to continue taking the "Global Product Service Strategy II" course until the end of the fall semester in 2020. In the second class of this course, all learners were organized into teams and groups as described below. Most of the learners were second-year or third-year students in the School of Business at Aoyama Gakuin University.

All the learners were assigned to four teams on the instructor side so that each team (A / B / C / D team) consisted of about 10 students. After that, the learners assigned to each team decided which group they chose to belong to among the four groups (G1 / G2 / G3 / G4: 1 group included two to three students) by themselves.

At the time of the discussions within each team, one team leader and four group leaders were decided. Based on the above team / group organization, when submitting report deliverables for a common team or report exercises for each group, those team leaders and/or group leaders on behalf of the members submitted the deliverables compiled with all members' report exercises.

### **4.2 Learning support by educational organization for online group work exercises**

**Figure 4.1** shows the educational organization for implementing and managing the "Global Product Service Strategy II" course in the fall semester of 2020. The instructor (Professor Tamaki) in charge of the course comprehensively supervises the



**Figure 4.1:** Learning support by educational organizations for online group work exercises

management of the entire course and has assigned TA (Teaching Assistant) who plays the role of learning support [9].

Two types of TAs were prepared for learning support roles during the operation and management of online exercises. The first type of TA was responsible for learning support in each of the four groups, and responds to in-class and post-class questions and answers across all teams. The TA was also responsible for the design and production of exercise worksheets (called "White Worksheets (WS)") prepared for learners before classes, which were used when conducting group-based exercises. In addition, the TA had to design and produce description examples of the exercise worksheets (called "Blue WS") so that each learner could easily visualize the concrete description examples when working on the exercises for each group.

After the online lessons, the second type of TA was responsible for providing feedback on the submitted exercise worksheet

deliverables of the report exercises by each team / group.

As mentioned above, the first type of TA was 6 (4th grade undergraduate) students, while the second type of TA was 6 (3rd grade undergraduate) students, for a total of 12 students. By playing their respective roles, we were able to enhance the learning support before, during, and after class for the online group work exercises. All of these TAs were students who belonged to the laboratory of the instructor (Professor Tamaki) in charge of the course and were engaged in research on “future strategy design” for human resources.

## **5. Operational Management Problems and Causes in Implementation of Online Group Work Exercises**

### **5.1 Drastic decrease in the number of registered students for online group work exercises**

As a countermeasure against COVID-19 in 2020, online classes started at Japanese educational institutions and continued for almost a year from the spring semester. In the case of online lessons compared to face-to-face lessons, there was a tendency for the instructors in charge of each subject to give more homework, which was a problem with university education during that period. Individual learners taking multiple online classes created the problem of having to stay at home for long periods and do a lot of homework.

In the spring semester of 2020, the number of registered students for "Global Product Service Strategy I," which is a lecture-type online class, was about 220. In comparison, the

number of registered students for the “Global Product Strategy II” online group work exercise in the fall semester dropped sharply to 43.

The reason for the decrease in the number of registered students in the fall semester was that most of the courses selected by learners generally tend to be lecture-type online classes. On the other hand, in the case of "Global Product Strategy II", dealing with complicated educational methods combining PBL and AL, it seems that the students gave the impression that it was too difficult an educational method. In addition, even after taking classes, students were required to submit worksheet deliverables as exercises while engaging in online collaborative learning between team / group members, so the students felt that the burden of learning activities was too great.

## **5.2 Problems in online exercises operational management (1):**

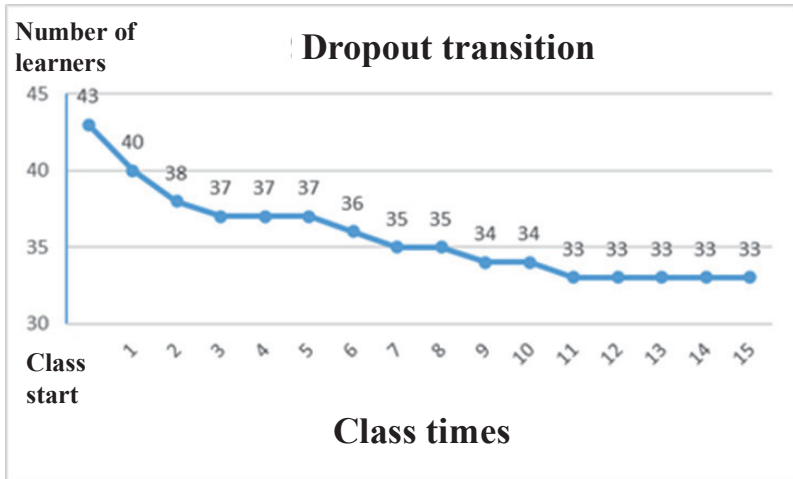
### **Dropout transition of all learners**

As shown in Figure 5.1, many dropout problems occurred over the entire 15 classes of online group work exercises in the fall semester.

As a time-series analysis of the dropouts shows, 43 students were initially registered, but only 33 learners were able to submit the final task "Business Concept Plan" as a team / four groups. There were 10 dropouts and a 23% dropout rate for the 15 classes.

First, it was found that during the short class period from the first class to the fifth classes, there were five dropouts: that is half of the overall dropouts. Next, over the long class period from the sixth to the 15<sup>th</sup> class, the remaining five students dropped out.

While observing the transition with respect to **Figure 5.1**, the



**Figure 5.1:** Dropout transition of online group work exercises [10]

causes of the learner's dropout are considered below by dividing the class period from the first to the fifth classes and the sixth to the final 15th class period.

The withdrawal reason at the beginning of the lesson was to utilize various online learning environment systems to carry out online group work exercises, as shown in "3. Comparison of Learning Environment System". And it seems that there were some students who were less motivated because we asked each learner how to use those systems in order to participate in the classes.

They had long been accustomed to the LMS (Fujitsu Course Power) that was previously used for on-demand classes in Aoyama Gakuin University.

However, using Microsoft Teams, a web conferencing system, was a new experience for learners. For lectures and online



discussions between team / groups, it was necessary to use normal web conferencing system functions. In addition, it was necessary to use the whiteboard function during collaborative learning between team / groups.

Individual learners may have been less motivated to participate in the classes due to the apparently time-consuming tasks such as creating a new account with the introduction of Microsoft Teams and operating the system based on detailed rules. The TA side made efforts to deal with system issues individually, but it is undeniable that the system required extra effort from the learners.

One possible countermeasure is that online discussions between members within each group can be successfully promoted during the lesson period when the exercises are switched to group-based exercises. Therefore, it is effective to arrange TAs that can support learning by groups and facilitate online discussions between group members.

Withdrawal from the sixth to seventh class periods corresponds to the class period in which the common group work of the entire team was switched to four group-based work. At the time common teams were used, about 10 learners could work on the exercises as team members, but the burden of learning activities for each learner became heavier as the number of members decreased. In addition, the content of the exercises for each group was also directed towards each specialty, and they felt that the difficulty level increased.

One possible countermeasure is to carefully incorporate joint exercises by multiple groups into the course design so that the exercise content can be shared among different groups. This is

related to the course design of "2 Curriculum Design for Online Group Work Exercises" mentioned at the beginning, and can be a particularly important future course design study for online group work exercises.

### 5.3 Online course management problems (2): Comparison of dropouts between the teams

**Table 5.1** shows the number of dropouts by teams. Before the team division, the students who dropped out were described as unknown [10].

As a result, the E team has a lot of dropouts. Furthermore, looking closely at the number of learners belonging to each group within the E team, it was found that only one G3 and two other groups were conducting online group exercises. When the exercises were conducted by four groups, the other team members comprised about 10 learners, while the E team members comprised only seven or eight learners (including occasional absenteeism). Looking at the comparison results of grade evaluation by team (described later), it was Team E that had the lowest average grade evaluation.

Table 5.1: Comparison of dropouts between the teams

|                           | <b>A</b> | <b>B</b> | <b>C</b> | <b>E</b> | <b>Unknown</b> | <b>Total</b> |
|---------------------------|----------|----------|----------|----------|----------------|--------------|
| <b>Number of dropouts</b> | 0        | 1        | 2        | 6        | 1              | 10           |

The cause mentioned above was to be analyzed from the usage log data of online communication related to Microsoft Teams. At the second online class, the instructor explained how to log in and use the Microsoft Teams web conferencing system. The TA side had set up a team-specific channel prepared in Microsoft

Teams so that online communication by team / groups could be performed. Most of the team members were able to proceed with the exercises while communicating online as teams / groups with each other, utilizing their respective channels over the subsequent classes. As a result, each of the four groups independently worked on creating the deliverables of the exercise worksheets.

On the other hand, among the E team members, a problem occurred on the web conferencing system side of Microsoft Teams due to differences in the PCs and the communication environment of each member. Unfortunately, the TA side could not deal with the system trouble promptly. These system troubles triggered an inability to actively engage in online discussion between team / groups via the Microsoft Teams web conferencing system from the subsequent classes to the final class. It is probable that due to the above influences, there were many delays in responding to lectures and submitting assignments, leading to a decrease in the sense of belonging to the team and withdrawal.

The above is a system problem peculiar to online courses, but it should be noted that the learning support skills of instructors and TAs were insufficient for the learning environment system technology. As a future research subject, TAs should play a role in promoting communication between learners as being closest to the learners. Therefore, it is required to emphasize skill training for online learning environment as well as training for educational content / learning support.

#### 5.4 Online course management problems (2): Comparison of dropouts between the four groups

**Table 5.2** shows the number of dropouts between the four groups. Before the team division, the students who dropped out were described as unknown [10].

Looking at this table, there are a relatively large number of G3 withdrawals. Furthermore, as described later, G3 had the lowest average grade evaluation among the four groups. It seems that there was a correlation between the number of withdrawals of members by team / groups and the performance evaluation of the team / groups members to which they belonged.

**Table 5.2:** Comparison of dropouts between the four groups

|                           | <b>G1</b> | <b>G2</b> | <b>G3</b> | <b>G4</b> | <b>Unknown</b> | <b>Total</b> |
|---------------------------|-----------|-----------|-----------|-----------|----------------|--------------|
| <b>Number of dropouts</b> | 2         | 0         | 3         | 2         | 3              | 10           |

#### 6. Items in a Business Concept Plan as Final Deliverables for Each Team

From the instructor side, the PBL project theme for all teams was presented at the beginning of the class as follows:

- (1) Inventing a new value chain management (VCM) aiming to reduce SDGs food loss, and identifying various stakeholders engaged in the VCM,
- (2) Building a "multi-sided platform (MSP)" business model used by the various stakeholders, and planning products and services for new application software operated by the MSP.

Through the implementation of online group work exercises in the "Global Product Service Strategy II" in the fall semester

of 2020, the final deliverables "Business Concept Plan" for each team in the 14th and 15th classes at the end of the semester were created and submitted. The table of contents of this business concept plan was structured as follows:

1. Outline of MSP business model proposal [Team common work]
  - 1-1. Where in the value chain did you focus to reduce food loss?
  - 1-2. Target customers
  - 1-3. Collaborating stakeholders
  - 1-4. Business purpose of the MSP
  - 1-5. Impact of MPS services on society (effects, market size, etc.)
2. MSP Business Concept Planning / Use Case Diagram [Team Common Work]
3. G1 / G4 [Collaboration between groups]; MPS business model WS
4. G3 / G4 [Collaboration between groups]; Smart products and application software (APS) WS
5. G1 [Work by group]; Business process model diagram, business model canvas, profit model WS
6. G2 [Work by group]; SDGs Product planning for food loss reduction, touch points for target customers, website construction for promotion WS
7. G3 [Work by group]; System design of smart products, APS service content, usability WS
8. G4 [Work by group]; Platform data flow / information processing flow chart WS

While “collaborative learning with all team members” by

applying the PBL method was performed, and “collaborative learning within the same group and/or collaborative learning between different groups” by applying the AL method were performed, individual worksheets (white WS / blue WS) were provided according to each of collaborative learning. After the exercise, a deadline was set in advance, and the deliverable WS from each team / group was submitted, and the feedback from TAs was added within those submitted WS.

TAs wanted to see who among the individual learners belonging to each team / group, and how they revised the already submitted WS in response to the feedback. Therefore, the revised part was marked in the WS, and the name of the revised learner was specified. Through the above learning activities, the degree of contribution to “individual learner's grade evaluation” was set in the business concept plan.

## **7. Comparison of Overall Grade Evaluation between Different Teams / Groups and Questionnaire Results of Course Evaluation**

### **7.1 Comparison of different teams / groups overall grades**

For each of the learners (37 people) of Global Product Service Strategy II, the overall grade results were created. **Table 7.1** summarizes the overall grade results of individual learners belonging to the same team and compares the average and standard deviations of the overall grades among the four teams.

Looking at the comparison results for each team, it was found that the average value of Team A was the highest and at the same time the standard deviation was the smallest. On the other hand, as mentioned above, it was found that Team E had the lowest

average value and the largest standard deviation at the same time due to the high dropout rate and low attendance rate.

**Table 7.1:** Comparison of the overall grades among the four teams [9]

| Team  | Frequency | Average for 120 points | Standard deviation |
|-------|-----------|------------------------|--------------------|
| A     | 10        | 94.80                  | 6.925              |
| B     | 10        | 87.90                  | 11.348             |
| C     | 9         | 85.67                  | 11.811             |
| E     | 8         | 85.13                  | 20.705             |
| Total | 37        | 88.62                  | 13.198             |

**Table 7.2** shows a comparison of the results of the comprehensive grade evaluation for each of the four groups. Looking at the grades for each group, the average value of G4 is the highest, but the standard deviation is the second largest. On the other hand, as mentioned above, the average value of G3 was also the lowest, since the number of dropouts among the groups was the largest compared with the other three groups.

**Table 7.2:** Comparison of the overall grades among the four groups [9]

| Group | Frequency | Average for 120 points | Standard deviation |
|-------|-----------|------------------------|--------------------|
| G1    | 9         | 87.11                  | 16.011             |
| G2    | 9         | 90.56                  | 12.360             |
| G3    | 10        | 85.30                  | 11.235             |
| G4    | 9         | 91.89                  | 14.146             |
| Total | 37        | 88.62                  | 13.198             |

## 7.2 Questionnaire results regarding course evaluation by group

**Table 7.3** summarizes the results of the course evaluation questionnaire after the 14th class (valid responses: 31). As a result of comparing the average and variance of questions for each of the four groups, the motivational factors (questions 4 and 5) related to the course had a high average value and a low variance,

and there was not much difference between the groups. In other words, there are many opinions that learning in this course is useful and can be utilized in the future, so it seems that the educational goals of "Global Product Service Strategy II" in the fall semester of 2020 have been almost achieved.

We would like to understand the following problems with the method of conducting online group work exercises and make them future research issues.

First, the ease of understanding of the teaching material slides (Question 1) is that the difference between the average value and the variance is wide between the groups, so it is necessary to improve the teaching materials of the groups with low scores. Secondly, there is a large difference between the groups in appropriate class progress speed (Question 2). Thirdly, regarding sharing within the same group (Question 3), the average and variance of G3 are much lower than those of other groups, so it is considered that there was a problem with sharing of G3. In particular, there may have been a problem that TA learning support for G3 was not sufficiently implemented.

**Table 7.3:** Questionnaire results of course evaluation by group  
(valid responses: 31) [9]

| (Number of learners belonging to each group)                 |          | G1<br>(8) | G2<br>(8) | G3<br>(7) | G4<br>(8) |
|--------------------------------------------------------------|----------|-----------|-----------|-----------|-----------|
| Q1 The ease of understanding of the teaching material slides | Average  | 4.29      | 3.57      | 4.00      | 3.43      |
|                                                              | Variance | 0.76      | 0.98      | 0.63      | 1.51      |
| Q2 Appropriate class progress speed                          | Average  | 4.29      | 3.29      | 4.00      | 3.71      |
|                                                              | Variance | 0.76      | 0.95      | 0.63      | 1.60      |
| Q3 Enrichment of sharing within the same group               | Average  | 3.71      | 3.86      | 2.83      | 3.57      |
|                                                              | Variance | 1.60      | 1.07      | 0.98      | 1.40      |
| Q4 Usefulness for individual learners learned in this course | Average  | 4.14      | 3.86      | 3.83      | 4.00      |
|                                                              | Variance | 1.07      | 0.90      | 0.98      | 1.00      |
| Q5 Future utility of learning in this course                 | Average  | 4.14      | 3.71      | 4.00      | 3.71      |
|                                                              | Variance | 1.07      | 0.49      | 1.10      | 1.38      |



## 8. Conclusion

As an ongoing activity of “Educational Programs for Business Producer” in AOYAMA BUSINESS REVIEW in 2021 last year [1], the subject of this research was "Global Product Service Strategy II" in the fall course. Therefore, the purpose of this research was to research and develop the new educational methods of an "online group work exercise" that combined both PBL and AL so that it could flexibly respond to the new normal era as a countermeasure against COVID-19.

The main points of the research activities conducted in each chapter are summarized below:

As an ongoing research activity of “Educational Programs for Business Producers” for new human resources development in the AOYAMA BUSINESS REVIEW in 2021 [1], Chapter 2 presented the curriculum design of the "online group work exercises" that combined PBL and AL.

In Chapter 3, we compared how to manage face-to-face lessons and online lessons from the perspective of learning digital teaching materials, learning systems such as LMS and web conferencing systems, and learning support.

Chapter 4 described how to organize learners into team / groups and how to develop an educational organization for the implementation of online group work exercises.

In Chapter 5, we considered how the dropouts occurred for all learners, teams, and groups as problems in class management of online group work exercises.

Chapter 6 introduced the table of contents for each team in order to create a business concept plan as the deliverable.

In the final Chapter 7, the overall results for each learner were summarized according to the teams / groups to which each learner belonged, and then the overall results of each team / group were compared and analyzed. In addition, a questionnaire survey for course evaluation was conducted to verify the achievement of educational goals.

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## References

- [1] Kinya Tamaki, Tomofumi Takamatsu, Yoshiki Nakamura, Katsuhiro Inamura, Hiroshi Sakuta, and Maki Arame, “Development and Implementation of Regular Classes in Educational Programs for Business Producers Combined with PBL and AL Methods” AOYAMA BUSINESS REVIEW, No.43, pp.31-50, March 2021.
- [2] Tamaki, K., “Management Process of Product Strategy Integrated with Platform Strategy and Product Line Strategy.” *Journal of Strategic Management Studies* 2: 3-10, 2011.
- [3] Tamaki, K., Park, Y., and Goto, S., “A Professional Training Program Design for Global Manufacturing Strategy: Investigations and Action Project Group Activities through Industry-University Cooperation.” *International Journal of Business Information Systems* 18 (4): 451-468, 2015.
- [4] Kinya Tamaki, Masahiro Arakawa, Maki Arame, and Yoshiyuki Ono, “Development of Educational Programs for System Creators and Business Producers in Future Strategy Design Based on Action Project Group Activities

- through Industry-University Cooperation”, *Journal of Mechanics Engineering and Automation* 9, 243-247 doi: 10.17265/2159-5275/2019.07.005, 2019.
- [5] Edited by Kinya Tamaki, "*Business Producer in Future-oriented Business Strategy Design: Smart Product Services and Platform Services*", Hakushindo, 2019, ISBN978-4-938137-81-6 C0034. (Japanese)
- [6] Ozaki, T., Hirose, H., Ichikawa, H., and Yamamoto, Y., “Proposal for Class Improvement of Project-Based Learning to Acquire Soft Skills”, *Japan Journal of Educational Technology* 42 (3): 243-53, 2018. (in Japanese)
- [7] Yamauchi, Y., “Educational Technology and Active Learning.” *Japan Journal of Educational Technology* 42 (3): 191-200, 2018. (in Japanese)
- [8] Kinya Tamaki, Maki Arame, “Consideration on the Effectiveness of Adaptive Learning Environment in Educational Organization Applying P2M”, 2021 International P2M Society Spring Conference, pp.96-115, April 18, 2021. (in Japanese)
- [9] Maki Arame, Kinya Tamaki, “Consideration on the Effectiveness of Adaptive Learning Environment in Educational Organization Applying P2M”, *Journal of International Association of P2M*, Vol.16 No.1, pp.91-106, 2021.
- [10] “Course Design and Implementation of "Global Product Strategy" Group Work Exercises based on PBL and Active Learning”, 2020 Tamaki Laboratory Research Results Report in School of Business, pp. 169-364, Aoyama Gakuin University, March 2021. (in Japanese)
- [11] Kinya Tamaki, "*Business Model Innovation: Future-oriented*

*Management Innovation Strategy*”, Chuokeizai, 2018, ISBN978-4-502-25961-6. (in Japanese)