

QUALITATIVE STUDY OF JAPANESE STUDENTS' ENGAGEMENT IN THE CARDBOARD EVACUATION SHELTER PROJECT WITH THAI STUDENTS - Case Study: KOSEN KMUTT Engineering Program Enhancement -

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This study attempts to examine Japanese students' learner engagement in the Cardboard Evacuation Shelter Project with Thai students, and to explore perspectives for improving the one-month engineering program for KOSEN KMUTT in 2025. The objectives of our one-month engineering program for KOSEN KMUTT are 1) (for Thai students) to gain practical skills and experience in mechanical, electrical, and information engineering; 2) (for Thai students) to increase their confidence in becoming competent automation engineers through various activities with Japanese students and staff; and 3) (for Japanese students and staff) to interact with Thai students and staff and to develop communication, multilingual, and intercultural skills of Japanese students and staff.

Cardboard Evacuation Shelter Project was one of the six courses offered to KOSEN KMUTT students and was the only project-based learning (PBL) course that involved collaborative work with Japanese students. Thirty-three Japanese students worked with twenty-four Thai students in eight groups to create a cardboard evacuation shelter to provide comfort for affected Thais living in a tropical monsoon climate. The engagement of both the Japanese and Thai students was critical to increase the project's learning outcomes, and this study focuses on the engagement of the Japanese students. The high response values of Japanese students to the learner engagement survey indicate the high educational impact of the project, with two less engaged students having low responses. We examine the engagement of these two less engaged students (Student A and Student B) qualitatively through their responses to the interview survey.

The results are as follows: 1) Both Student A and Student B were less engaged because they could not make use of their area of expertise, information engineering, in the project, but they tried to collaborate in their own group; 2) Introducing the roles in collaborative work (leader, facilitator, operator, etc.) and the skills required for these roles could encourage Student A and Student B to value their participation highly and to fulfil their individual accountabilities; and 3) Reviewing vocabulary and expressions related to basic engineering English,

such as numbers, calculations, and figures, at the beginning of the project could help students to actively participate in the group discussion.

Keywords: *qualitative study, learner engagement, collaborative work, project-based learning*

Introduction

Our school accepted twenty-four students in 2024 and will accept twenty-two students in 2025 from KOSEN KMUTT, established in 2020. The objectives of our one-month engineering program for KOSEN KMUTT are 1) (for Thai students) to gain practical skills and experience in mechanical, electrical, and information engineering; 2) (for Thai students) to increase their confidence in becoming competent automation engineers through various activities with Japanese students and staff; and 3) (for Japanese students and staff) to interact with Thai students and staff and to develop communication, multilingual, and intercultural skills of Japanese students and staff. Cardboard Evacuation Shelter Project (Figure 1 shows its final presentation) was one of the six courses offered to KOSEN KMUTT students and was the only project-based learning (PBL) course that involved collaborative work with Japanese students. The engagement of both the Japanese and Thai students is critical to increase the project's learning outcomes, and this study focuses on the engagement of the Japanese students. We attempt to examine Japanese students' learner engagement to increase the educational outcomes of the engineering program for KOSEN KMUTT in 2025.



Figure 1: Final presentation of Cardboard Evacuation Shelter Project

Carboard Evacuation Shelter Project is one of the four collaborative studies in System Technology Experiments, required four-session (90min. x 4) first-year course of NIT, Matsue college advanced engineering faculty. Table 1 shows the course allocation for 2024, and Figure 2-4, the group discussions. The course consists of four collaborative PBL projects and one individual PBL project. The subject matters of these five projects are not disclosed to the students prior to each day of the project. The students must work and solve the problem in a limited amount of time. The students are organized into groups consisting of four or five members, with each group including individuals with different engineering expertise. These groups collaborate on four projects, with the groups being reorganized for each project.

Table 1: Allocation for System Technology Experiment

| Week | Date of 2024 | Content (Percentage of Grades) |
|------|------------------------|---|
| 1 | April 10 th | Group Project 1 (7%) |
| 2 | April 17 th | Group Project 2 (7%) |
| 3 | April 24 th | Group Project 3 (7%) |
| 4 | May 8 th | Individual Project (58%) |
| 5 | May 15 th | |
| 6 | May 22 nd | |
| 7 | May 29 th | |
| 8 | June 5 th | Group Project 4 (21%) with Thai students in 2024 & 2025 |
| 9 | June 12 th | |
| 10 | June 19 th | |
| 11 | June 26 th | |
| 12 | July 3 rd | |
| 13 | July 10 th | |
| 14 | July 17 th | |
| 15 | Aug. 7 th | |

Note: Group Project 4 is scheduled to coincide with the visit of the Thai students. In previous years, this project took place from week 12 to 15.



Figure 2: The group discussion of June 12th, 2024



Figure 3: The group discussion of June 19th, 2024

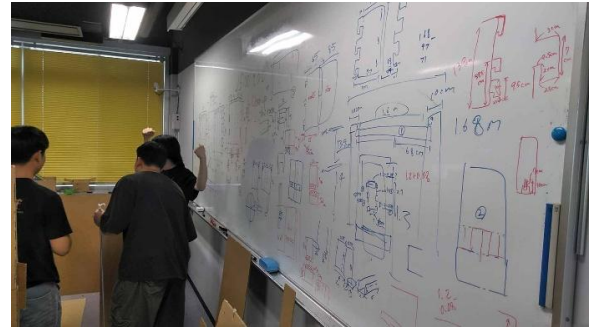


Figure 4: The group discussion of June 26th, 2024

Previous Research

Learner engagement is one of the areas of focus in the field of educational psychology. Mercer & Dornier (2020, p.2) define it as “active participation and involvement in certain behaviours.” Engaged learning improves learning outcomes, academic performance, and motivation for lifelong learning (Hiromori, 2024). Learner engagement measures a person's motivation to learn through four aspects of engagement: emotional, cognitive, behavioural, and social. Sakurai (2020) states that learner engagement needs to be measured by five factors (the four aspects above plus self-efficacy) with nine key points, which are summarized in Table 2.

Table 2: Learner Engagement Metrics (Sakurai, 2020) and Specifics in Carboard Evacuation Shelter Project

| 5 factors of Engagement | 9 key points of Engagement | Specifics in this program |
|---------------------------|------------------------------|--|
| (1) Emotional engagement | (a) Interests | I worked on this project with sustained interest and concern. |
| | (b) Enjoyment | I enjoyed working on this project |
| (2) Cognitive engagement | (c) Goals and Motivation | I was goal oriented and motivated. |
| | (d) Self-regulated learning | To achieve the goal, I tried various intellectual challenges. |
| (3) Behavioral engagement | (e) Effort | I focused on this project and worked hard to achieve its goal. |
| | (f) Persistence (Durability) | I never gave up, even when things didn't work out. |
| (4) Self-efficacy | (g) Self-efficacy | I approached this project with a sense of self-efficacy. |
| (5) Social engagement | (h) Mutual aid | I helped and was helped by others in my group. |
| | (i) Cooperation | I worked cooperatively with my group members and instructors. |

Note: Sakurai (2020, pp.82-83), excerpted by the authors, with the authors' description of the specifics in this project.

Subjects and Methods

We conducted a learner engagement survey with all the thirty-three advanced engineering faculty first-year students involved in the project on Aug. 5th-9th, 2024. Table 3 shows the survey questions, which coincide with the specifics in this program (Table 2). Japanese students' high response values indicate the high educational impact of our project, with two less engaged students (Student A and B) having low responses (Table 4). Student A and B's backgrounds are shown in Table 5. Both are Information Engineering majors; A is reserved, polite, diligent, and not highly active, but able to respond appropriately to questions or requests for help; and Student B is even active in international exchange activities, but B tends to skip things that B is not interested in. We examine the engagement of these two students qualitatively through their responses to the interview survey.

Table 3: Survey questions for 33 Japanese students

| Please indicate your level of engagement in the Cardboard Evacuation Shelter Project. | | | | | |
|--|---|---|---|---|---|
| | ← Not applicable Very applicable → | | | | |
| | 1 | 2 | 3 | 4 | 5 |
| Q1.I worked on this project with sustained interest and concern. | 1 | 2 | 3 | 4 | 5 |
| Q2.I enjoyed working on this project | 1 | 2 | 3 | 4 | 5 |
| Q3.I was goal oriented and motivated. | 1 | 2 | 3 | 4 | 5 |
| Q4.To achieve the goal, I tried various intellectual challenges. | 1 | 2 | 3 | 4 | 5 |
| Q5.I focused on this project and worked hard to achieve its goal. | 1 | 2 | 3 | 4 | 5 |
| Q6.I never gave up, even when things didn't work out. | 1 | 2 | 3 | 4 | 5 |
| Q7.I approached this project with a sense of self-efficacy. | 1 | 2 | 3 | 4 | 5 |
| Q8.I helped and was helped by others in my group. | 1 | 2 | 3 | 4 | 5 |
| Q9.I worked cooperatively with my group members and instructors. | 1 | 2 | 3 | 4 | 5 |
| Q10. Please describe freely what you noticed or thought about through this project learning. | | | | | |

Note: See Appendix 1 for Q10 comments

Table 4: Responses to the survey

| Survey Questions (Specifics in this program) | Student (Subject) | | 33 Japanese students | |
|---|----------------------|---|-------------------------|------|
| | A | B | AVE | SD |
| Q1.I worked on this project with sustained interest and concern. | 2 | 2 | 4.3 | 0.91 |
| Q2.I enjoyed working on this project | 2 | 2 | 4.4 | 0.86 |
| Q3.I was goal oriented and motivated. | 2 | 2 | 4.2 | 0.9 |
| Q4.To achieve the goal, I tried various intellectual challenges. | 4 | 3 | 4.5 | 0.62 |
| Q5.I focused on this project and worked hard to achieve its goal. | 3 | 2 | 4.4 | 0.76 |
| Q6.I never gave up, even when things didn't work out. | 2 | 3 | 4.4 | 0.83 |

| | | | | |
|--|---|-------|-----|------|
| Q7.I approached this project with a sense of self-efficacy. | 3 | 2 | 4.4 | 0.78 |
| Q8.I helped and was helped by others in my group. | 4 | 2 | 4.5 | 0.71 |
| Q9.I worked cooperatively with my group members and instructors. | 4 | 4 / 3 | 4.7 | 0.54 |

Table 5: Two subjects' background

| | Major TOEIC | Academic advisor's view |
|---|---|--|
| | | |
| A | Information Engineering 450 (May 18 th , 2023) | A is soft-spoken, reserved, polite, diligent, and not highly active, but able to respond appropriately to questions or requests for help. |
| B | Information Engineering 495 (Jan.12 th , 2023) | B is active, has experience as a tutor for international students, and has attended an international conference in Taiwan. B tends to skip things that B is not interested in. |

Student A's Results and Discussion

Table 6 shows Student A's responses to the interviews.

Table 6: Student A's responses to the interviews

| Interview Question: Can you talk about your survey responses? | | |
|--|---|--|
| Q1 | 2 | My answer was low because I am a graduate of the Dept.of Information Engineering, and <u>there was nothing I could do that would allow me to use what I had learned there.</u> |
| Q2 | 2 | Of course, I enjoyed the interaction with the Thai students, but <u>I felt that I could not do much work or contribute much to the actual creation of the house,</u> so it was difficult for me to enjoy the experience. |
| Q3 | 2 | I chose a 2 because <u>I found it difficult to be enthusiastic about the project.</u> |
| Q4 | 4 | It was difficult, but <u>I thought I was able to review and make adjustments in cooperation with my group members;</u> |
| Q5 | 3 | I worked hard, but <u>I did not feel 100% motivated</u> and I answered a 3. |
| Q6 | 2 | <u>I did not actively work on the design of the cardboard shelter,</u> which I thought I should have worked on with persistence. |
| Q7 | 3 | I wasn't sure at the beginning if we could get what we originally designed, and I didn't think we could if we tried that hard, but <u>after working with the group I thought we ended up with something much better,</u> even if it wasn't perfect in terms of what we designed. |
| Q8 | 4 | I struggled to explain what I didn't understand in simple English, but <u>I managed to illustrate and talk about it, and foreign students also drew pictures to explain it to me.</u> |
| Q9 | 4 | <u>I thought the interaction was solid when working together to figure out or teach something I didn't understand.</u> |

Student B's Results and Discussion

Table 7 shows Student B's responses to the interviews.

Table 7: Student B's responses to the interviews

| Overall comments |
|---|
| The cardboard shelter was something that most of the students had probably never used before, so it was difficult for us to work on it. <u>I would like to see a subject that is easier to visualize and that any engineering majors can use what we have learned.</u> For example, the civil engineering majors could make a model, and the electrical and electronics engineering majors could make something like a monorail or robot, which could be programmed and controlled by the information engineering majors. This time, <u>the shelter was destroyed as soon as it was built</u> , so <u>I thought it would be better if it was something that the international students could take home with them</u> if possible. |

Note: underlined parts, cited in the body text in italics

Student A's emotional engagement (Table 2-(1)) was low because the subject matter was not familiar to A, as it says *there was nothing I could do that would allow me to use what I had learned and I could not do much work or contribute much to the actual creation of the house*. Solving problems from multiple engineering perspectives is one of the course goals, and Student A, outside of mechanical or civil engineering, must struggle with this project. Introducing the roles of cooperative learning (such as leader, follower, facilitator, manager, and operator) and the competences needed to fulfill these roles could help Student A to be more confident about its contribution to the group (Hattori, 2024; see Appendix 2), and could improve its emotional engagement. Student A *found it difficult to be enthusiastic about the project at the beginning*, but A's group members helped A to make several attempts, and A's cognitive engagement (Table 2-(2)) gradually improved. Student A was not persistent and was not behaviourally engaged (Table 2-(3)). This is because, although A worked hard, A *did not feel 100% motivated and did not actively work on the design of the cardboard shelter*. Meanwhile, Student A felt self-efficacy (Table 2-(4)) with the help of A's group members, as A says *after working with the group I think they ended up with something much better*. Student A's social engagement (Table 2-(5)) was relatively higher than other factors of engagement, as it says *I managed to illustrate and talk about it, and foreign students also drew pictures to explain it to me and I thought the interaction was solid when working together to figure out or teach something I didn't understand*. This indicates successful interaction and cooperative learning among A's group. In overall comments, Student A wishes to see *a subject that any engineering majors can use what we have learned*, which is already realized in System Technology Experiment course (Table 1) because Group Project 1-3 require the skills of electrical, electronics, and information engineering, and Group Project 4, Carboard Evacuation Shelter Project, requires the skills of mechanical and civil engineering. Student A thinks it is a pity that *the shelter was destroyed as soon as it was built*, but at the same time this is a practice of SDG 12: Responsible Consumption and Production. Making the shelter glue-free is also in line with SDG 12.

| Interview Question: Can you talk about your survey responses? | | |
|--|--------|--|
| Q1 | 2 | It was a good opportunity for me to use my English, but <u>it was too hard for me to work with the Thai students on the cardboard shelter from designing to building in a limited time</u> . It was difficult for me to use <u>construction-related vocabulary</u> (simple words like "structure" are fine, but difficult words were not), and <u>my motivation dropped</u> . |
| Q2 | 2 | |
| Q3 | 2 | Thai students only understand English, so <u>it was difficult to have a clear goal within the group</u> . There was one Japanese student in the group who could speak English very well, and he tried to lead the whole group, but <u>he and a few others were the only ones who knew the goals</u> . We felt like we were <u>on a lower level, and we often wondered what they were doing, and it was hard for me to be aware of our goal</u> . |
| Q4 | 3 | <u>It was difficult to communicate with the Thai students in English</u> , which made it challenging to review and make changes. However, I believe <u>I should have been more proactive</u> . |
| Q5 | 2 | <u>I didn't know why I came to the department of Electronics and Information Systems Engineering to work on a cardboard shelter, and I wasn't excited about the project</u> . |
| Q6 | 3 | <u>It was difficult to communicate with Thai students in English</u> . |
| Q7 | 2 | My answer was a little too low, but I chose a 2 because <u>it was too hard to exchange opinions because of the language barrier</u> . |
| Q8 | 2 | Teaching something in a foreign language is a high level of communication. For example, <u>I was asked to explain a structure, but the words were difficult, there were calculations, and I could not explain the complex structure in English</u> . |
| Q9 | 4 or 3 | The answer to Q9 could be a 4 or a 3. <u>I did cooperate</u> . |
| Overall comments | | |
| I think that working on a project with Thai students is a good opportunity to communicate with them and improve my English, and <u>I would like to see the number of such projects increase</u> , but <u>the subject matter, from designing to manufacturing cardboard shelters, was difficult</u> . I would like to see more projects that are easier to work on. The pressure to finish it by the deadline was too much. I wish it had been something I could do without feeling pressured. Well, <u>pressure is what makes us want to do what we have to do</u> . | | |

Note: underlined parts, cited in the body text in italics

Student B appreciates the opportunity to work with Thai students, saying *I would like to see the number of such projects increase* in overall comments, but B had lost interest in the project and its emotional engagement (Table 2-(1)) was low. B attributes its low motivation in the project to the subject matter, lack of time, and communication difficulties; *it was too hard for me to work with the Thai students on the cardboard shelter from designing to building in a limited time and It was difficult for me to use construction-related vocabulary*. Student B's cognitive engagement (Table 2-(2)) was low, though B believes that *I should have been more proactive*. There was a leader in B's group, but that student did not seem to be doing an adequate job of fulfilling its role, as B says *he and a few others were the only ones who knew the goals. We felt like we were on a lower level, and we often wondered what they were doing, and it was hard for me to be aware of our goal*. Again, introducing the roles of cooperative learning (leader, facilitator, operator, etc.) and the skills needed to fulfill these roles could help the group members to demonstrate their abilities and take the initiative (Hattori, 2024). Role awareness will create awareness of the group's purpose and facilitates collaboration. The Japanese student playing the role of leader could have taken the initiative and share their goal with the group.

Student B's behavioural engagement (Table 2-(3)) was low, reflecting B's emotional engagement and cognitive engagement. Student B *didn't know why I came to the department to work on a cardboard shelter*, and had almost skipped this project because B was not interested in it (Table 5). Student B had been active and good at international exchange activities, but it didn't work in this project. B found *it was too hard to exchange opinions because of the language barrier*, and B lost its self-efficacy (Table 2-(4)) in this project. The social engagement (Table 2-(5)) of Student B was relatively higher than other factors of engagement, but B repeated the difficulty of the subject matter and vocabularies needed, as *I was asked to explain a structure, but the words were difficult, there were calculations, and I could not explain the complex structure in English*. Reviewing vocabulary and expressions related to basic engineering English that they had previously learned, such as numbers, calculations, and figures, at the beginning of the project could have helped students like B to actively participate in the group discussion and feel self-efficacy.

Conclusions

This study attempted to examine Japanese students' learner engagement in the Cardboard Evacuation Shelter Project with Thai students, and to explore perspectives for improving the one-month engineering program for KOSEN KMUTT in 2025. Our discussion can be summarized in the following three points.

The first point is that both Student A and Student B were less engaged because they could not make use of their area of expertise, information engineering, in the project, but they tried to cooperate in their own groups. Solving problems from multiple engineering perspectives is one of the course goals. Students need to

remember this, and the students outside of the engineering department involved will have to struggle. This following second point may help those struggling.

The second point is role awareness. Introducing roles in collaborative work (leader, facilitator, operator, etc.) and the skills required for these roles could encourage all the students to demonstrate their abilities and take the initiative. Role awareness could create awareness of the group's purpose and facilitates collaboration.

The third point is that reviewing vocabulary and expressions related to basic engineering English, such as numbers, calculations, and figures, at the beginning of the project, could help students to actively participate in the group discussion and feel self-efficacy.

This conclusion is based on a qualitative study of only two students with low engagement and therefore does not represent a comprehensive assessment of the educational program. Nevertheless, the reflections of students with low engagement levels can offer substantial and insightful recommendations for the enhancement of educational programs.

We welcomed twenty-four students from KOSEN KMUTT in 2024 and will welcome twenty-two students in 2025. Modifying our project with the three points mentioned above could improve the learning outcomes and academic performance of the students involved in this course.

Acknowledgements

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References

- Hattori, M. (2024). Qualitative Study of Learners' Individual Accountability in Group Presentation -A Case Study for Enhancing Cooperative Learning-, *Journal of the Council of College English Teachers*, 43, 11-20.
- Hiromori, T. (2024). 3 things to know about learner engagement. *The English Teachers' Magazine*, Vol.73 No.3, 36-37.
- Mercer, S., & Dorney, Z. (2020). *Engaging Language Learners in Contemporary Classrooms*. Cambridge University Press.
- Sakurai, S. (2020). "Engagement" in learning -Assess and encourage a proactive attitude toward learning-, Tokyo: Toshobunkasha.

Appendix

Appendix 1: Table 3-Q10 comments from 33 Japanese students

| Positive comments |
|--|
| <ul style="list-style-type: none"> • I thought the planning was really good. I figured that even though we speak different languages, we can still make the project a success, exciting, and fun. • The Thai students were very active in the project, and we ended up with a pretty decent shelter. • I was surprised by how much better the Thai students were at English compared to us. I had a good experience with my own design. • I realized that even though we speak different languages, we can still create something together. • I realized that even my English will help us communicate, if we make an effort. • It was a bit of a challenge at first, talking to someone who spoke a different language, but as the number of conversations increased, it got easier. I realized the importance of output. • I had a lot of chances to speak English, so it was good practice for using English every day. I'm not sure about the "cardboard shelter" project, but if you look at it as "international exchange," it was good. • I realized that even if I didn't understand English, I could still communicate better than expected. • I'm looking to keep improving my English skills and expertise by participating in international exchanges. • The chatting time was exciting and fun. When we played picture shiritori in both Thai and Japanese, it was difficult to find each other's language from the pictures, but it was fun. • Communication was a challenge, but I did my best. • My English isn't the best, but I've found that I can get by with a little momentum and a smile. Listening was a bit of a challenge, so I'm hoping to work on that. • I realized how difficult it is to communicate in English. |
| Negative Comments |
| <ul style="list-style-type: none"> • If we do this again next year, we need to clarify the rules. • The schedule was too tight, so we need to review it. • The presentation venue was too hot and dangerous. |

Appendix 2: Roles of cooperative learning

| Roles | Competencies required for the role |
|-------------|--|
| Leader | The ability to express one's will, influence and move others |
| Follower | The ability to understand, believe, cooperate and synchronize with their leader and others |
| Facilitator | The ability to build relationships that maximize the strengths of each member |
| Manager | The ability to create a safe and secure environment for members (time, records, etc.) |
| Operator | The ability to faithfully carry out what has been decided |

Note: extracted from Hattori (2024)