

Student Essays Comparison Score

December 5, 2023

The workshop course is provided by technology-oriented engineering department. The goal is to understand technologies but also to foster motivation and active involvement of groupwork. The assignment given to the students was as follows:

1. Kinematic Synthesis of Mechanisms <Train Gap Filler>

The gap between the train and the platform at train stations is a significant safety hazard, often leading to accidents. This risk is especially high for children, the elderly, and individuals with physical disabilities with wheelchairs. The challenge is to devise a mechanism that effectively mitigates this danger.

2. Net Zero X <All Electric Airplane>

The objective of this project is to develop a strategy for reducing CO2 emissions from airplanes. It involves researching the current challenges faced by the airline industry regarding CO2 emissions and conceptualizing an all-electric airplane as a viable solution to significantly lower these emissions.

3. Radioactive <Science Communication on High-Level Radioactive Waste>

High-level radioactive waste (HLW) is created by the reprocessing of spent nuclear fuel. Storage cannot provide the permanent isolation of the wastes from human's environment. This workshop aims to reveal the current conditions and possible disposal methods of HLW, and understand ways of dealing with real social issues.

4. Monster Track <Damages on Infrastructures by Oversized Vehicles>

The oversized loading induced an excessive external load which exceeds load-carrying capacity of bridges, resulted in collapse incidents. Clarify the common challenges in protection of infrastructures during their life cycle from oversized vehicles and come up with initiatives and solutions to this issue.

Around six students formed groups and challenged one of the above problems in seven 3-hour workshops: ideation, interim report, prototyping, final report, and a reflection essay at the end. Each student is requested to create an individual reflection essay including the following descriptions.

- Project description (300-400 words)

Title, goal and conclusion of the project

Process of the project: how you applied design thinking methods

- Contribution (300-400 words)

Your role in the project

Your contribution to the project

- Reflection (200-300 words)

Write freely but we are interested in what you learned from the series of workshops not only professional knowledge and skills but also how to contribute to and facilitate the workshops

The following two essays were prepared by students according to the above instructions.

[STUDENT #2's ESSAY]

After much discussion we had decided to improve and add on a platform of some sort, more specifically to cover the gap that is found between the train itself and the train platform. If we were to cover the gap, we will reduce the risk of accidents regarding the gap such as belongings falling down as well as your foot getting stuck or someone falling onto the platform due to the gap. Our goal is to create a gap that will make it more convenient and safer for people, more specifically, disabled

people, to get on and off the trains. Working as a team, we had come up with two different solutions (Gap Closer 3000 and Mechanism 2) to potentially cover the gap and essentially create a gap filler of some sort.

Once we had decided to do train gaps, we had used the WWWWH (Who, What, Where, When, How) template and filled in all the necessarily details we needed to ensure that we had covered everything that we needed to in the presentation. Besides that, we also considered the pros and cons for each design and evaluated where exactly the mechanism was going to be inputted in, which had been decided to be onto the platform instead of the train due to the fact that it would essentially be easier to input on and would not require to break apart the train to input onto it which would take more time than placing on onto the platform.

Going through the two mechanisms, the Gap Closer 3000 uses pivot and sliding, as well as a gear and piston to function. Mechanism 2 on the other mostly uses a pneumatic cylinder which allows the platform to rotate more freely.

The Gap Filler 3000 is a lot less complicated than Mechanism 2 mainly because Mechanism 2 uses pneumatics and that is a higher degree of complexity. Mechanism 2 is also more costly when compared to Gap Closer 3000 due to its higher degree of complexity and use of pneumatics. Mechanism 2 however is more reliable and won't break as easily, it also has a higher degree of freedom.

As for my role and contribution, I focused more on finding out background information that one may need to know before continuing on to discuss our solutions. The background information that I found would be most useful for this presentation was 'What we had meant by train gap', 'Why exactly was the gap there in the first place' and 'Why had we decided to improve on it in the first place.'

Explaining briefly, the train gap is there due to the fact that trains aren't flexible as a whole which would mean that each train carriage would have to essentially turn and bend which needs space to avoid colliding with the platform. We had decided to improve on this mainly due to safety, many people get their foot stuck or lose their belongings due to the gap. Besides safety, there is also efficiency, we want to make it easier for people, regardless of their mobility, to get in and out on trains. But this would be more beneficial to disabled people as well.

Other contributions would include coming up with the pros and cons as well as filling up the template that was mentioned earlier. Prior to this, there was multiple designs that we had come up with, each of us had to design our own mechanism before voting on which one would deem more successful and more useful in stations. My design had not made it due to the fact that more space would be required to fully function the mechanism which would end up to be more costly and a larger waste of space.

Throughout the workshop, I had learned how to make and captivate the audience with a presentation as well as the basics of CAD that I am eager to implement onto and create better and new designs on new mechanisms in the future. Along with that, I also learned that communication in a presentation, both video and voice improve on a presentation by a lot. When one has good communication, the audience would be more willing or eager to listen and engage with the presenters instead of turning off video and just using voice, it is more impactful when communication is used effectively.

Overall, I had a great time and I'd like to thank the professors as well as the TAs for their hard work and dedication on an early Saturday morning.

[END of STUDENT #2's ESSAY]

[STUDENT #13's ESSAY]

As a group, we constructed a project named science communication on high-level radioactive waste, based on the reason that there may exist some misconceptions or knowledge gap between the general public and the organizations dealing with nuclear activities. The main objective of our project is to find out the public's concerns and understanding of high-level radioactive waste. Since our topic is about communicating on the high-level radioactive waste, we decided to have a questionnaire as a way of communication. Our project includes two questionnaires and results analysis on the responses from the questionnaires trying to identify the major considerations of the general public towards the management and disposal of high-level radioactive waste.

After receiving a general image of what is high-level radioactive waste from our facilitator professor, the students discussed on what kind of questions will be sent to the public and designed suitable questions that involve critical thinking for the respondents. The first questionnaire was a trial targeted mainly to the students and facilitator from the SHIP course, whereas the second questionnaire will be sent to a wider range of audience. Since the topic of radioactive is quite sensitive, we spent time considering the information provided in each question and ensure all the answer choices are appropriate for every possible participant of our questionnaire. After receiving enough responses from the first questionnaire, we started analyzing the choices made by the respondents to find out why he/she has chosen that particular option.

Based on the reflections from the first questionnaire and midterm presentation, we constructed the second questionnaire with improvements. We kept a few questions from the first questionnaire which had given us positive feedback and edited/removed those which was not very helpful. Furthermore, we added questions with the explicit implication of identifying the public's general understanding and concerns based on two major investigations, 1) public and political considerations, and 2) scientific-technical issues, which could better fit our objective of this project. Similar to the first result analysis, we group up each choice made by the respondents in the second questionnaire and provide explanations for each group. From the analysis, we concluded that more than 60% of the respondents have limited understanding of high-level radioactive waste, the organizations of nuclear energy should provide information with educating purpose to the general public to fill up the knowledge gap and avoid misconceptions in dealing with high-level radioactive waste.

Since our project involves question designing and result analysis, my main role was just like other group members, which was to brainstorm ideas on the type of questions to be given to the public in order to obtain the necessary information to support the objective of our project. Before the second questionnaire was sent out, I and 2 other group members worked together with our professor in finalizing the questions for English version. After getting the results from the questionnaire, the whole group worked together in identifying the possible trend of choices from the result of the two questionnaires and I took the role in analyzing the results from the English version of the second questionnaire while those who are bilingual focused on both the Japanese and English version.

For the midterm presentation, I was assigned to present the material section, which I needed to explain the results we obtained for the questions relating to the type of material that is the most suitable for the storing of high-level radioactive waste. Not surprisingly, all the questions from the other groups were material-related, which means the section about the material is the most intriguing topic and caught the most attention. The same happens to the final presentation where more questions were asked on the material section of the presentation. For the final presentation, I volunteered to present the introduction and objective of our project, and it was much harder than I thought. Since each group was given 10 minutes to present, I have only roughly 2 minutes to explain the background of high-level radioactive waste and the objective of the project, while the same section took a total of 4 minutes in the midterm presentation.

Although this was the first time I worked with my classmates from the same major as a group, I tried my best to remove any barriers between each of us. Despite the amount of time spent together during the classes was not plenty enough, I always try to give my opinion and thoughts both during the meeting each week and outside in the line group we made. Furthermore, I participated in answering questions from other groups without being shy or having concerns because I know my group members will support and add-on to what I said if some information is missing.

I believe one of the most important aspects of the series of workshops is about teamwork and collaboration, which is also the reason why the students are in groups of 5 or 6 and not in individuals or groups of 2 only. What I learned from the workshops is not only about the knowledge of high-level radioactive waste, but moreover, I learned how to support my group members and work together with them at the same pace. The question designing part of the project required brainstorming and considerations in all forms (political, emotional, etc.) due to the sensitivity of the topic, and this is when collaborations between the group members, TA, and facilitator become extremely critical. Each of us gives our personal opinion and comes together to decide on the final layout of the questions, during this stage, we learned how to design questions with reference to an explicit objective while taking the sensitive information into consideration.

One possible improvement for our project can be using another type of communication. Due to time constraints, we were not able to conduct an interview to some of the respondents of the questionnaire, by having an interview can also be helpful in understanding the public's concerns and level of knowledge on the high-level radioactive waste. In my opinion, we can have the second questionnaire as an interview while the first questionnaire could be sent to a wider range of public.

[END of STUDENT #13's ESSAY]

Compare and evaluate the above two essays according to the rubric specified below.

[SCORING RUBRIC]

Comprehensive Evaluation of Workshop Course

1. Technical Knowledge and Application (1/3)

- Understanding of Concepts: Evaluates how well the student grasps the technological and theoretical concepts relevant to the project.
- Practical Application: Assesses the effectiveness of applying technical knowledge in practical situations, specifically in project design and development.
- Innovation and Problem Solving: Measures the creativity and innovation in addressing project challenges and proposing effective solutions.

2. Teamwork and Collaborative Skills (1/3)

- Individual Role and Contribution: Looks at how clearly the student defines and fulfills their role within the team, and their contribution to the project.
- Team Interaction and Communication: Evaluates the student's ability to communicate and collaborate effectively within the team.
- Peer Engagement: Considers the student's participation in peer learning, support to team members, and contribution to the team's dynamics.

3. Reflective Learning and Personal Growth (1/3)

- Self-Reflection and Insights: Assesses the depth of the student's self-reflection on personal learning and development throughout the project.
- Design Thinking and Process: Measures how well the student demonstrates the application of design thinking methods and management of the project process.
- Skill and Attitude Development: Evaluates the growth in the student's professional and soft skills, like critical thinking, adaptability, and communication.

[END of SCORING RUBRIC]

Compare and evaluate two essays based on the three main criteria in the above rubric: Project Description, Role and Contribution, and Reflection and Insight. Summarize the comparison of the three main criteria and then determine which essay is better overall.

The final score should be as follows. If one is superior to the other even slightly, award +1 point to the superior essay, and -1 point to the other. If one is clearly superior to the other, award +2 points to the clearly superior essay, and -2 point to the other. If both are the same, give each a score of 0.

To compare and evaluate the essays of students #2 and #13 based on the specified rubric, let's break down the analysis into the three main criteria: Technical Knowledge and Application, Teamwork and Collaborative Skills, and Reflective Learning and Personal Growth.

1. Technical Knowledge and Application

Student #2

- Understanding of Concepts: #2 demonstrates a good understanding of the technical challenge (train gap safety), describing two different solutions (Gap Closer 3000 and Mechanism 2) with distinct technical features.
- Practical Application: The essay shows effective application of technical knowledge, detailing the mechanics of each proposed solution.
- Innovation and Problem Solving: #2 displays innovation in conceptualizing two distinct solutions, considering their practicality and safety implications.

Student #13

- Understanding of Concepts: #13's project focuses on science communication about high-level radioactive waste, which involves less technical complexity compared to engineering design.
- Practical Application: The essay reflects practical application in the design and execution of questionnaires, but it's more about communication and research than technical application.
- Innovation and Problem Solving: The approach to understanding public perception of high-level radioactive waste is innovative, but less technically oriented.

Score: #2 (+1), #13 (-1). #2's essay shows more depth in technical knowledge and application.

2. Teamwork and Collaborative Skills

Student #2

- Individual Role and Contribution: Clearly defined role, focusing on background research and evaluation of pros and cons.
- Team Interaction and Communication: Mention of active participation in team discussions and decision-making processes.
- Peer Engagement: Engagement is implied through teamwork but not explicitly detailed.

Student #13

- Individual Role and Contribution: Active role in questionnaire design and analysis, as well as presentation preparation.
- Team Interaction and Communication: Describes collaborative efforts in refining questionnaires and presentations.
- Peer Engagement: Explicit mention of engaging with peers, supporting, and collaborating in a sensitive topic.

Score: #13 (+1), #2 (-1). #13's essay provides a clearer insight into teamwork and collaboration.

3. Reflective Learning and Personal Growth

Student #2

- Self-Reflection and Insights: Reflects on learning presentation skills and basic CAD, but lacks deeper personal insights.
- Design Thinking and Process: Some mention of the design process using the WWWWH template.
- Skill and Attitude Development: Mentions learning about communication in presentations, but limited detail on personal growth.

Student #13

- Self-Reflection and Insights: Reflects on the importance of teamwork and collaboration, and personal growth in this area.
- Design Thinking and Process: Detailed description of the iterative process of questionnaire design.
- Skill and Attitude Development: Discusses overcoming barriers, contributing to discussions, and learning from peer interactions.

Score: #13 (+1), #2 (-1). #13 shows more depth in reflective learning and personal growth.

Overall Evaluation

Based on the rubric criteria:

- Technical Knowledge and Application: #2 is superior.
- Teamwork and Collaborative Skills: #13 is superior.
- Reflective Learning and Personal Growth: #13 shows more depth.

Final Score: Student #13 (+1), Student #2 (-1).

Conclusion: Overall, while Student #2's essay excels in technical knowledge and application, Student #13's essay is superior in terms of teamwork and collaborative skills, and reflective learning and personal growth, making it the better essay overall.