

# Essay Evaluation Rubric Design

November 16, 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. Kinematic Synthesis of Mechanisms <Say “NO” to Door Knobs>

This project develops a new mechanism for touchless doors, inspired by the widespread unease with touching door handles in public spaces like schools, hospitals, and restrooms during the Covid-19 pandemic. This design aims to eliminate the need for physical contact with door knobs.

3. Net Zero X <Carbon Dioxide Removal>

Given that emissions of CO<sub>2</sub> are produced by all sectors of society, identifying effective ways to capture CO<sub>2</sub> and store it safely is crucial. Create methods to extract CO<sub>2</sub> from the air and separate it into its constituent elements, carbon and oxygen, and explore how these elements can be repurposed effectively.

4. Net Zero X <All Electric Airplane>

The objective of this project is to develop a strategy for reducing CO<sub>2</sub> emissions from airplanes. It involves researching the current challenges faced by the airline industry regarding CO<sub>2</sub> emissions and conceptualizing an all-electric airplane as a viable solution to significantly lower these emissions.

5. 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.

6. 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 six 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

Here is a student essay to be evaluated.

[STUDENT ESSAY]

The goal of this project is to design a questionnaire to understand the public's thoughts and concerns about the disposal of high-level radioactive waste, and one which can at the same time give the respondents some information and a general idea about the disposal of high-level radioactive waste. Then by gathering the results and by analyzing the results we aim to understand the public and at the same time assess the questions in the questionnaire to see if the questions are able to earn the information or results that our group wants and to modify any questions. The importance to understand the public's thought and concerns about the disposal of high-level radioactive waste all lies in the point that the disposal of high-level radioactive waste is not carried out because of the lack of public approval. So, by understanding about the public, we could think of ways to earn the approval by the public.

Through the two months working in this project, we were able to design and analyze two questionnaires. One questionnaire was designed for the people in the SHIP class, there were 40 responses and through the analysis we concluded that the questionnaire had confusing wording and there was a need to modify the words. The other questionnaire was designed for the public, there were 133 responses and through the analysis we concluded that the public only has a little knowledge about high-level radioactive waste, does not know the details of the disposal of high-level radioactive waste and that most accept that the waste should be disposed in their own countries.

Throughout the project what we have done was to design questions. When doing so, we first thought of what specifically we had to know about the public, then after that we thought of the type of format that is suitable for what we want to know and after that we chose the appropriate choices for the question. Finally, we shape it up and make it into a question and modify the wording so it would fit the target respondent.

I thought that my role in this project was an idea giver, analyzer, and translator. I thought that I was an idea giver as I thought that I have contributed to the project by thinking of new ideas for the question of the questionnaire. For example, I have thought of the idea for the question number 11 which asked the closest radius that the respondents can accept the disposal site of high-level radioactive waste, this question intends to find an image of a specific distance that the public can accept, by knowing a distance that the public can accept it could be used for the consideration of the disposal site of high-level radioactive waste.

I thought that I was an analyzer as I had contributed in the analysis of the results. When talking about the analysis, I have contributed especially on the analysis to divide the respondents of the Japanese questionnaire into public and experts. When dividing the respondents we had to analyze many of the technical issue related questions and free answer questions, so as one of the native Japanese speakers I had to analyze the people's answers and see if there were any respondents that could be classified as "experts". For example, although we gave an overall classification by seeing whether the respondents answered that they have done any scientific research related to the disposal of high-level radioactive waste, some respondents who was not classified as experts was then classified as an expert as their response to the free answer question was an answer which a person with expert knowledge could only answer. I thought that I was a translator as I have contributed in the creation of the Japanese questionnaire. Like I have previously explained, as I was one of the native Japanese speakers in our group, after the English questionnaire was made, I have done the translation of the questionnaire into Japanese.

As our group's project was different to other groups, I thought that it was very hard but interesting to do the project. On the other hand, as our group's project was different to other groups, many of the things that we learnt in the SHIP lecture was hard to apply into the project. I thought so because our group's project aimed to design a questionnaire to understand the public, while for the other groups' project they aimed to find, or think of a solution to a problem that they found, which is very different

and as the previous SHIP workshop and this SHIP workshop both focused on trying to find a problem and then think of a solution, it was hard to apply.

From the series of workshops, I thought that I have learnt the importance of sharing each person's idea no matter how small or boring it might look. Through out the SHIP workshops each group had to think, or find a problem and a solution to it and in this process all the members in the project had to think of some ideas, but when thinking of ideas there would always be some ideas that may seem very small or meaningless for the person and the person usually won't present that. On the other hand I learnt that it is important to present any small idea as these ideas could then be a trigger for other members or even yourself to think of new ideas.

[END of ESSAY]

Please do the followings:

1. First, define a rubric that will serve as the evaluation criteria.
2. Explain the existing theory behind determining the above rubric.
3. Use the rubric to evaluate the student's reflection essay above on a scale of 30 points.
4. Explain the reason why you gave the above points.

To effectively evaluate the student essay, a rubric will be designed based on three primary components: Content Quality, Contribution & Role Clarity, and Reflection & Insight. This rubric takes into account both the technical and reflective aspects of the student's work.

## **1. Evaluation Rubric**

### **A. Content Quality (10 points)**

- Comprehensiveness (4 points): How well does the essay cover the project's title, goals, conclusions, and process?
- Clarity (3 points): Is the essay clear and easy to understand, avoiding ambiguous or confusing wording?
- Relevance (3 points): Does the content directly relate to the project's objectives and the workshop's goals?

### **B. Contribution & Role Clarity (10 points)**

- Role Identification (4 points): Clear identification and explanation of the student's role in the project.
- Contribution Explanation (4 points): Detailed description of the student's specific contributions.
- Teamwork (2 points): Insights into how the student's role and contributions fit within the group dynamic.

### **C. Reflection & Insight (10 points)**

- Depth of Reflection (5 points): Depth of personal reflection on the learning experience.
- Insight & Learning (5 points): Demonstration of what was learned, including professional knowledge, skills, and workshop contribution.

## **2. Existing Theory Behind Rubric**

The rubric is grounded in educational theory that emphasizes holistic evaluation. It focuses not only on the content and factual accuracy but also on reflective learning and self-assessment, crucial in project-based learning. The rubric encourages students to engage in metacognitive activities, like reflecting on their learning process and understanding their role in a collaborative environment. This approach aligns with contemporary educational models that value critical thinking, self-awareness, and the application of knowledge in practical contexts.

### **3. Evaluation of the Student Essay**

#### **A. Content Quality (6/10)**

- Comprehensiveness (3/4): The essay adequately covers the project's goals and process but lacks a clear conclusion.
- Clarity (2/3): Generally clear, though some parts, especially around questionnaire analysis, could be more concise.
- Relevance (1/3): The essay is somewhat focused on the project but could more directly address the workshop's overarching objectives.

#### **B. Contribution & Role Clarity (7/10)**

- Role Identification (3/4): Clear identification as an idea giver, analyzer, and translator.
- Contribution Explanation (3/4): Specific examples are provided, but more detail on how these contributions impacted the project could enhance this section.
- Teamwork (1/2): Limited insight into how the student's role integrated with the group's dynamic.

#### **C. Reflection & Insight (7/10)**

- Depth of Reflection (4/5): Good reflection on the project's unique challenges, but more depth on personal learning would be beneficial.
- Insight & Learning (3/5): Insights about idea sharing are valuable, yet the essay could benefit from more on learned skills and knowledge application.

### **4. Reason for the Assigned Points**

The student's essay shows a good understanding of the project and their role within it, which is why it scores relatively high in the Content Quality and Contribution & Role Clarity sections. However, there's room for improvement in linking the project to the broader objectives of the workshop and in providing more depth in the reflection section. The essay demonstrates a solid understanding of the subject matter and personal learning but lacks detailed insights into how these experiences integrate into broader educational and professional contexts.