

## Individual Essay

A deep understanding of user needs and motivations is essential in any design challenge. In this reflection, I will explore the empathic process of the UCD lifecycle and focus on exploring the topic of climate change. To achieve a deep understanding of user empathy, we employ a variety of techniques and approaches. During this process, I was primarily responsible for implementing the questionnaire, a process that provided key insights for subsequent design decisions.

At the beginning of the empathy process at UCD, we explored a wide range of climate change issues. To generate a variety of ideas, we use brainstorming to open our minds. To delve into specific problems, we narrow our focus to recycling challenges in public places through the QOC approach. Further research shows that the education sector faces more significant recycling problems. Therefore, our objectives focus on the area of education, especially primary, secondary, and university. In response to this finding, I formulate a core hypothesis: there may be different attitudes and behaviors toward recycling in different sectors of education. To test this hypothesis and to discover and focus on problems, I designed a questionnaire. The questionnaire was designed to investigate the differences in recycling habits, knowledge, and challenges faced by groups in different educational sectors. During the design of the questionnaire, I followed a user-centered approach, ensuring that each question was clear and relevant to effectively gather the required information and avoid misunderstandings as much as possible. The questionnaire was structured in an orderly manner to maintain respondent engagement and avoid losing their interest with irrelevant questions. Keeping it brief and straightforward was a strategy to boost the response rate, and I informed respondents that it would take approximately 2-4 minutes to complete. A mix of open and closed questions enhanced the questionnaire's flexibility, allowing for a deeper understanding of the real thoughts of individuals across various education sectors. The privacy of the respondents and the reliability of the data are of Paramount importance, so all responses are anonymized and processed confidentially. Adopting this dynamic, hypothesis-based approach can effectively identify and focus on problems, ensuring that we remain agile and adaptive in understanding user problems and designing solutions.

In designing the questionnaire, I divided it into four parts to support our hypothesis. The first section focuses on the awareness of the respondents and the importance of recycling, which helps us understand their behavior and provides context for follow-up questions. The second part focuses on the actual recycling habits and knowledge of the survey respondents, aiming to assess their daily recycling engagement and thus to judge whether an educational component needs to be added to the solution. The third part focuses on the availability of recycling facilities in schools and the willingness of community members to participate, aiming to understand the actual accessibility of these facilities and the interest of users in participating in recycling activities. The final section asks about the main challenges encountered in the recycling process and effective strategies for

increasing recycling rates, mainly by obtaining personal insights and potential solutions from respondents. The structured design of the questionnaire aims to systematically collect detailed insights from the education sector on recycling to address the challenge more effectively. In the process of collecting data, I found that the response rate to the questionnaire was lower than expected. After analysis, I think this is probably due to the lack of a reward mechanism that demotates users. Based on this finding, I believe that adopting an iterative approach and introducing rewards may be an effective strategy for increasing user engagement. This iterative approach not only helps improve the response rate but also improves the user feedback-based questionnaire to better understand the user.

In processing the questionnaire data, I found that pie charts generated using Google Forms were not sufficient to highlight the different perspectives of respondents in different education sectors. To address this issue, I chose to use CSV files of questionnaire responses and use Python to create a visually valid representation of the data that more clearly reflects the views of respondents from different educational sectors (pie charts, bar charts, word clouds). This method saves time in designing and distributing multiple questionnaires and enhances the ability to extract meaningful information from the data. The results of the data visualization revealed a key trend: university respondents were more active in recycling activities than primary and secondary school respondents, with secondary school respondents in particular showing significantly lower enthusiasm and knowledge about recycling. In addition, the data also showed that university and primary school respondents used recycling facilities more frequently, while secondary school respondents found them more difficult to use. These findings not only validate our hypothesis that different educational sectors have different attitudes and behaviors toward recycling but also highlight the identification of important problems for secondary schools. Based on these data and insights, we conducted further in-depth interviews to better understand the specific needs and challenges of recycling in secondary schools and to better focus and define the problem. Ultimately, this information guided the direction of our solution design, focusing on increasing recycling awareness among secondary school respondents and improving accessibility to recycling facilities.

In conclusion, by reflecting on the empathy process of UCD, I have deeply realized the importance of understanding user needs and learned how to translate user feedback into practical design actions. This process reinforced my user-centered design thinking. It also made me understand that design is not only creative expression but also a process of deeply understanding problems and responding to user needs. Although our study focuses on the education domain, the patterns of user behavior and motivation analysis found are applicable to other domains as well. This learning experience deepened my understanding of the UCD empathy process, which also laid a solid foundation for me to apply these principles and techniques to various design fields in the future.