ENGINEERING | McMaster University

ENGINEER 2PX3 – REFLECTION ASSIGNMENT 1

Submission instructions: Submit as a single pdf file to the "Self-reflection 1" submission Dropbox on Avenue by **January 30th, 2022.** This is individual submission.

File Naming Convention:

- File naming convention: ENG 2PX_selfreflection1_MacID. e.g., "ENG 2Px_selfreflection1_ebrahs8"

Penalties:

- Late submissions will be subjected to a 20% penalty per day.
- Any submission with wrong file format will lose 10% of the deliverables mark.
- Any submission with wrong convention name will lose 10% of the deliverables mark.
- Any submission to wrong Dropbox folder will lose 10% of the deliverables mark.

Self-Reflection #1

Informed designers are involved in continual learning: learning by doing, learning from brainstorming and prototyping, learning by iteration and from feedback and failure, learning by noticing and troubleshooting, learning by drawing and dialoging with ideas, materials, and people, and **learning from reflection**. All of these emphasize the metacognitive and reflective practice aspects of learning through design (Lawson & Dorst, 2009; Crismond & Adams, 2012).

The purpose of this assignment is to help you reflect back on your previous experiences 1P13 and other engineering courses and apply what you have learned to the upcoming ENGINEER 2PX3 project.

Course Learning Outcomes that will be focused upon for the reflection assignments:

- Reflect in writing on their growth as designers in engineering.

As you respond to the prompts below, please remember that your responses must be related to the intended learning outcomes listed above.

i) At this point in your undergraduate degree, you are beginning to learn the fundamental concepts and knowledge associated with a specialized area of engineering practice (e.g., civil engineering, chemical engineering, etc.). In this course, you will participate in a design project with peers from other specialized areas and will design thinking process in a multidisciplinary team setting.

a) After reviewing the requirements of the design project(s), how might you apply what you have learned in your specialization to this project?

b) What aspects of the design project(s) might relate least to your specialization?

a) I can apply concepts that I learned from ENGINEER 2P04 when considering the physics behind the construction of the house. In terms of the components of the home, I learned about distributed loads, moment, and internal forces of members, which will help my team design a 3D printed home that maintains structural integrity and rigidity. Also in 2P04, I learned about stress and stress transformations, strain, torsion, which can once again help with structural integrity but more so with the material selection process. By analyzing the internal loads that components of the house will endure, we can select a material that will be able to withstand these loads as well as meet thermal and other considerations.

b) The aspects of the design project that relate to me the least are the environmental effect of the design, as well as the filament composition and material properties sector of the materials selection process. I think this because I haven't learned anything relevant to these areas of the design in my mechatronics courses so far. However, I learned the very basics of these concepts in 1P13, so I am confident in my ability to help in whatever way possible.

ii) Consider your experience as a first-year engineering student working on Project 4 over the final weeks in ENGINEER 1P13. You engaged in design thinking by identifying the client's primary need, defining the objectives and constraints, synthesizing various designs, and iterating upon those designs after testing.

In this section, please reflect on an impactful event during which your team exercised designed process by responding to the prompts below (**note:** you are encouraged to reflect on an experience within ENGINEER 1P13, but may choose another event if it is more suitable to this assignment):

a) **What? (3-5 sentences):**

I) How did you define the problem and learned more about the problem?

II) How many possible solutions did you have to choose from?

III) What tools did you use to decide between different ideas?

IV) What criteria did you have to choose from when making the decision?

V) How did you finalize the ideas you had?

i)
  a) We defined the problem in p4 of 1P13 by first taking notes on the client's interests, medical conditions, and things that the client was unable to do or had difficulty doing due to their condition, then defined the problem as the client's inability to paint.
  b) We learned more about this problem and how to overcome it by doing extensive research on the various medical conditions that the client suffers from and how it affected them.

ii) We chose from 6 possible solutions to this problem, which were sketched and prototyped by each group member.

iii) To decide between different ideas, we used a decision matrix and sought peer feedback to determine which solution most effectively solved the most obstacles the client experienced while painting, as well as the fulfilled design constraints set by the group.

iv) The criteria we considered were supports sufficient weight, moves freely, comfortable design, ease of use, ease of movement.

v) We finalized the ideas by using the inventor model to run a dynamic simulation to make sure it can support the load of the client's arm without deforming. We also sought more feedback from peers and considered their comments and concerns.

a) **So what? (3-5 sentences)**:

    I)   What did you learn about design thinking process as a result of this event?

    II)   Regarding what you learned, why do you think this new knowledge is important in the design process or the engineering profession? Why is it important to your professional identity?

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i)   As a result of this design project I learned about the importance of outside feedback and suggestions from peers when designing a product.

ii)   I think this is very important to the design process since a team can become set on a certain design and become blind to its flaws, while the outside feedback keeps us in check. This is also important in a professional setting, as the public view on a large-scale project is an important consideration. For example, 3D printed housing in the middle of an existing neighbourhood should consider the opinion of the surrounding residents.

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b) **Now what? (5-7 sentences):**

    I)   How might you apply your learning in similar, future experiences?

    II)   Looking back, is there anything that you would do differently? Why or why not?

    III)   What opportunities do you expect to encounter when exercising the same practice with peers from other areas of specialized knowledge? How might you get the most out of (i.e., leverage) these opportunities?

    IV)   What barriers do you expect to encounter? How might you overcome them?

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i)   In similar and future experiences, I will make sure to seek feedback from peers whenever I am happy with a design. Though me and/or my team might be satisfied with our work there will always be people who can give suggestions and concerns which we had not thought of.

ii)   Looking back, I wish I had not become so set on the design the group chose, as there were many more improvements that could have been made, but my tunnel vision prevented me from brainstorming them and implementing them. My commitment to "this design is the final design" held back my team's solution.

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iii) I think that in an environment with team members that are of different specializations, the diversity of knowledge would be a great benefit to overcoming the obstacle I described in the previous paragraph. Having a group of very different people with very different skills and interests would result in a more unique design and more suggestions and comments being made throughout the design process.

iv) I expect to understand the barrier of understanding the other group members' specializations, interests and knowledge. If a group member makes a suggestion to implement something I know nothing about (something specific to their specialization), personally I would not be willing to accept this change unless I had an understanding of the proposed change. This can be easily overcome by asking the group member to explain the idea in depth, or by researching the topic on my own before me or any other group members agree to this idea.