

Appendix A.

Interview Protocol.

We would like to audio tape our conversations today. Please sign the consent form if you agree to participate in the research. For your information, only Dr. [Deleted] and [Deleted] (graduate research assistant) will have access to the recording, which will eventually be erased after they are transcribed. Dr. [deleted], the instructor of the course, is a member of the research team but will ONLY have access to transcripts of the interview that do not include your name or other identifying information including race, ethnicity, gender, etc. Thank you for agreeing to participate.

We have planned this interview to last no longer than one hour. During this time, we have several questions that we would like to cover. If time begins to run short, it may be necessary to interrupt you in order to push ahead and complete this line of questioning.

Introduction

You have been selected to speak with us today because you have been identified as someone who has a great deal to share about teaching, learning, and experience of the [Deleted] Design of a Robotic Computer Vision System for Autonomous Navigation course. Our research project as a whole focuses on the improvement of teaching and learning in graduate engineering education, with a special interest in understanding how to generate and improve instructional activities that facilitate the transfer of knowledge and development of professional skills to the real world, with the aim of educating a new generation of engineering professionals, with strong teamwork, communication, and critical thinking skills, among others. Our study does not aim to evaluate your techniques or experiences. Rather, we are trying to learn more about teaching, learning, and experience of the [Deleted] course that helps improve student learning on campus.

A. Background (note: this section will NOT be available to the instructor):

Describe your academic background.

What team were you on and what component was your team responsible for?

Did you have experience working in projects with multiple teams whose products need to integrate, before this course?

What is your gender identity?

What is your racial and ethnic identity?

Do you consider yourself a typical engineering student? Why?

Do you think your gender or racial group is underrepresented in engineering in the US, or is it a traditional group in US engineering? Underrepresented means that your gender, ethnicity, or other group identity is not the same as the majority. For example, in biological sciences majors, women are a highly represented group, while men are an underrepresented group. In software engineering, males constitute the majority and females are underrepresented.

B. Confidence (TRUST)

Do you have confidence in your engineering skills?

This course seeks to get closer to "real engineering" work through the challenge of solving complex problems through multiple teams whose products need to integrate into a single working system. That entails interacting with your teammates and with other teams as well. Do you think this job has impacted (increased or reduced) your confidence in solving a complex engineering problem?

Do you feel prepared and confident to participate in a team responsible for one component of a complex problem?

Do you feel prepared and confident to represent your team and coordinate with other teams to construct the ultimate product?

Through working on this course, is there a skill that you thought was one of your strengths but now realize is an area for improvement?

Through working on this course, is there a skill that you thought was one of your weaknesses but now feel confident about?

During the weekly progress update, were you confident in your abilities to present and answer questions from your fellow students and the instructors?

C. Trajectory within their CoP.

Describe your interaction, participation, and communication with your team. Please also reflect on whether and how your professional relationship (among your teammates) has evolved as the course progressed.

Have you had the opportunity to transfer or use the tools, procedures, terminology, vocabulary, etc. that you learned (in this class or previous engineering classes) to your project group work for this class?

What are the aspects that you value or have learned, in addition to programming or robotics aspects, with the interaction with your teammates?

What were some things that made you feel comfortable and confident when interacting with your teammates?

What were some things that made you feel nervous or uncomfortable when interacting with your teammates?

D. Brokers: Making a Bridge between two communities.

Have you had the opportunity to transmit or share the ideas, skills, procedures, etc. that your team developed, to any of the other teams? Please give me some examples.

Have you had the opportunity to transmit or share the ideas, skills, procedures, etc. that *other* teams developed, to your own team? Please give me some examples

Within your team, you probably had colleagues from a different major or with different experiences than yours. What was the hardest thing about working with them? Did you have to adapt your language, terminology, vocabulary, examples, procedures, etc. of your discipline to be able to communicate more effectively? What concepts did you learn from their discipline that was foreign to yours? consider as a concept: tools, terminology, vocabulary, or procedure.

Do you think you managed to connect with the other units of the projects? Can you describe the process coordinating or integrating your assigned project area, with the ones assigned to the other teams?

At the beginning of planning meetings between all teams, how did you feel? (if necessary: Did you feel more like an "outsider" or a coordinator or leader?) Has this changed across the course?

If you felt like an outsider or novice at any point, what kinds of tasks did you do? Were those tasks central to the work of the robotics project?

E. Perceptions of psychological safety

During the preview presentations, do you feel nervous, uncomfortable or unsafe when communicating with your teammates? And with those of other teams?

Let's say you have a new idea for your class project. How do you think your classmates will react when you describe this new idea to them?

And if your new idea involves improvements in the activity that the other teams are doing, how do you think the members of the other teams would react when you communicate it to them?

When you are in class, do you feel safe asking questions of your teachers, or are you nervous or fearful about it? Describe.

How do you feel when you need to ask questions of the other teams? Do you feel that they are friendly or receptive, or do you think they might judge you or react negatively?

F. Contributions and challenges to full participation

Have you encountered challenges in your participation and interaction with the other teams? Describe.

Have you made contributions towards improving the activities or tasks entrusted to the other teams? Which ones?

Have you made contributions towards improving the activities in your team? Which ones?

G. Student perceptions of class effectiveness and their preparation for professional engineering work.

Do you think the course helped you prepare for professional engineering work? If so, how?