Accessing Complex Constructs: Refining an Interview Protocol

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Abstract—A well-developed interview protocol is an essential data collection tool in qualitative research. An established process to refine interview protocols can help build quality and consistency into data collection. However, despite the importance placed on interview protocols by academic texts, there is little guidance regarding how to systematically develop and refine interview protocols, particularly when exploring complex constructs, such as beliefs and identity. In this special session, attendees will learn and practice an approach for refining interview protocols for investigating complex constructs in engineering education. We share this interview refinement approach as it enabled us to determine if our interview questions prompted participants to provide data essential to answering our research questions for a pilot study investigating students' beliefs and identities. This special session will also include conversations around best practices related to data collection to access complex constructs and how these practices can impact and shape future research. We welcome attendees of all experience levels (novice to expert) with regard to designing interview protocols. The session will be facilitated by Dr. Emily Dringenberg, Dr. Rachel Kajfez, and their graduate students. Dr. Dringenberg is a qualitative researcher well versed in beliefs. Dr. Kajfez is a mixed methods researcher well versed in identity. Both have multiple NSF grants exploring these complex constructs.

Index Terms—Interview Protocol, Qualitative Research Methods, Beliefs, Identity

I. SPECIAL SESSION GOALS

The goal of this special session is to facilitate an engaging learning environment for engineering and computing education researchers interested in qualitative research design featuring interviews as a data collection method. Through this special session, attendees will be exposed to and gain insights into an approach for refining interview protocols that investigate complex constructs, such as beliefs and identity. Interviews are commonly a key data collection method for qualitative researchers and well-established interview protocols build quality and consistency into the research. During this special session, participants will work with pilot interview data from an active project to learn and practice this refinement approach.

II. BACKGROUND AND JUSTIFICATION

Complex constructs can be challenging to access during an interview due to a variety of factors. In many cases, people do not think deeply or explicitly about complex constructs, such as their beliefs about smartness or identity as an engineer. Therefore, it is crucial that researchers consider their approach to interviewing about these topics to allow participants the opportunity and time to think deeply. Also, the approach must allow researchers to organize the interview in a way that will allow them to answer their research questions. The key is generating an interview protocol that allows participants to access complex constructs in a thoughtful and purposeful manner.

Semi-structured interviews are often part of qualitative research protocols in which complex social constructs such as beliefs and identities are being investigated [e.g, 1-6]. Academic texts stress the usefulness of such interviews within research; however, details for a process to generate and refine a semi-structured interview protocol are often left open to interpretation [e.g, 7-10]. The purpose of this special session is to introduce attendees to an interview protocol refinement approach with the aim of accessing complex constructs, such as beliefs about smartness and engineering identity.

III. PILOT STUDY

In this special session, we will introduce the interview refinement approach utilized in our current research project aimed at understanding first-year engineering students' beliefs and identities related to smartness and to engineering (i.e., beliefs about smartness, beliefs about engineering, self-identity as smart and self-identity as an engineer) across institutionalized pathways into engineering (e.g. honors, learning communities, community college courses, etc.). The overall purpose of our research is to identify patterns in these aspiring students' beliefs and identities as a function of their pathway and to leverage our findings to make recommendations for how to improve our use of institutionalized pathways as a mechanism to broaden participation.

In our pilot study, the primary objective was to refine the interview protocol. Participants were recruited from introductory first-year engineering courses and selected

based on their responses to an online recruitment survey used to gather preliminary information regarding their educational experiences using short-form essay questions. The team selected a diverse sample of the population, targeting participants with different demographic backgrounds and educational experiences to test and refine the interview protocol. To obtain this sample, several team members individually selected students that they felt offered unique perspectives and then met to make a final selection based on the narrowed down list of participants. Ultimately, we selected nine students for the pilot across three different educational pathways, including the Honors program, standard program, and a regional campus. We felt that participants from these three pathways provided a diverse sample for the interview protocol refinement. The nine student participants were then interviewed by one graduate researcher using the semi-structured pilot interview protocol.

IV. INTERVIEW PROTOCOL REFINEMENT

The pilot interview protocol was initially designed based on the main constructs of interest for our study, beliefs and self-identity with respect to smartness and engineering. We developed the interview questions based on the co-lead researchers' prior experience studying beliefs about smartness and engineering identity independently. As such, a key issue when refining the protocol was to not only determine the adequacy of the questions aimed at allowing the participants to articulate their beliefs and self-identity but also how these constructs complexly interact.

Once the interviews were completed, the research team implemented the interview refinement approach to determine if the research questions could be answered and to ensure clarity of meaning of the interview questions. The interview refinement approach consisted of team members individually listening and reading several transcripts and subsequently completing a spreadsheet that contained the research questions that we were trying to answer. The spreadsheet contained the following questions designed to reveal the participant's beliefs and self-identity about engineering, and then smartness:

- What does the participant believe about engineering?
- How does the participant identify with engineering?
- What does the participant believe about being an engineering student in their pathway?
- What does the participant believe about smartness?
- How does the participant identify with smartness?

The spreadsheet concluded with two all-encompassing questions designed to put the ideas together and an opportunity to list any additional comments:

- What does the participant believe about the relationship between smartness and engineering?
- How does the participant identify with smartness and engineering?

We then gathered to discuss our answers, carefully analyzing differences and noting the degree of ease or difficulty in answering each question above based on the data. It was imperative that the answers to the initial questions painted a picture of the participant's beliefs that could then be translated to the overarching research questions. Upon having this discussion, we determined that

several of the questions focusing on self-identity needed to be rephrased for clarity. Specifically, the participants struggled articulating their self-identity related to engineering and the relationship between their engineering identity and smartness identity. Also, some of the participants requested that we rephrase and reexplain those questions before they were able to provide an answer. To address these concerns, we added follow up questions to these items as the demonstrated below:

A. Original question from protocol: *Based on that definition, do you consider yourself to be an engineer? Why or why not?*

Follow-up questions added during interview protocol refinement: *1) What skills do you have or don't have that relate to engineering? 2) Is engineering a big part of who you are?*

B. Original question from protocol: *How does your own smartness relate to your pursuit of an engineering degree?*

Follow-up questions added during interview protocol refinement: *1) Earlier you said that you believe "xxx" about smartness, how does that view relate to your views of yourself as an engineering student? 2) Earlier you said you believe "xxx" about your own smartness and "xxx' about you as an engineer (or engineering students). Are these two things related?*

This interview refinement approach process allowed us to determine if our interview questions prompted the participants to provide the data essential to answering our research questions.

V. OVERVIEW AND AGENDA

Opportunities for engagement, discussion, and feedback will be provided throughout the session. The session will be structured as follows:

- *Welcome and introduction to generating a semi-structured interview protocol to access complex constructs.* During this time, we will introduce ourselves and provide a brief background on our prior work experience exploring the complex constructs of beliefs and identity. We will also present the conceptual framework we utilized to initially develop our interview protocol and our research questions. To provide context, we will also provide a brief overview of the study from which the data is coming. (20 minutes)

- *Small group work engaging with pilot interview responses and refining of interview protocol.* Participants will be purposefully divided into groups of 2-4 based on experience interviewing and level of knowledge related to the constructs of interview. The groups will be given sections of interview transcripts from our study with first-year engineering students as well as the corresponding portions of the pilot interview protocol. During this time, we will also present and provide the small groups with the interview refinement approach we created to refine the interview protocol. The groups will then review the transcripts to determine how well the initial interview protocol was able to access the complex constructs of beliefs on smartness

or engineering identity and answer our research questions. (30 minutes)

- *Whole group reflection of interview protocol refinement process.* During this time groups will be asked to report out a summary of their findings. As a group, we will discuss which questions need refining and how the questions could be refined to elicit the responses from the interview participants that would provide better insight into their beliefs and identities and our research questions. During this time, we will also share how we adjusted the protocol based on the pilot data to compare their results to ours. (20 minutes)

- *Summary and discussion of reflection.* We will provide a summary of our own experiences refining interview protocols beyond this work. We will highlight and document the insights gained from the group through their own processes. The discussion will conclude with recommendations for how this special session could inform and direct future work more broadly in the field. (10 minutes).

VI. ANTICIPATED AUDIENCE

This special session is intended for engineering and computing education researchers who are interested in qualitative research interview protocol design. We believe both those who are experienced and novice education researchers will benefit. This session will be particularly useful to researchers interested in investigating a variety of complex constructs, including but not limited to beliefs and identity.

VII. EXPECTED OUTCOMES

There are several expected outcomes of this workshop. First, participants will have the opportunity to engage with a pilot study interview protocol and the resulting data as an example of how to refine a semi-structured interview protocol to access complex constructs. Also, participants will engage in conversation around best practices for generating semi-structured interview protocols aimed at accessing complex constructs. Finally, participants will discuss how such best practices for interview protocol development will impact future work.

ACKNOWLEDGMENT

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