The Effects of COVID-19 on the Development of Expertise, Decision-Making, and Engineering Intuition

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Abstract

This full paper explores the self-perceived influences of COVID-19 on the development of expertise, decision-making processes, and engineering intuition among early-career engineering practitioners. Intuition is a skill used by experts in the decision-making process when problem solving, and believed to develop alongside expertise largely through experience. Previous work supports that at least six years of experience is necessary for expertise development. We subsequently define early-career as up to six years of post-baccalaureate experience and expect that this population will not yet have expertise and therefore not use intuition. However, research has shown that early-career practitioners who graduated from a primarily undergraduate institution (PUI) prior to the onset of COVID-19 both claim expertise and report using intuition in their decision-making. This unexpected result may be reflective of the PUI's emphasis on high-impact experiences, such as undergraduate research, extracurriculars, and internships. For current early-career engineers, the COVID-19 pandemic affected their undergraduate education, first years on the job, or a combination of the two by limiting access to certain types of experiences. The goal of this research is to better understand how COVID-19 influenced the development of expertise, decision-making processes, and intuition of early-career engineers who are alumni of the same PUI as prior work. We interviewed 11 current early-career engineering practitioners who graduated between 2018 and 2023. Interviews included several questions regarding expertise, decision-making, and intuition. In this paper we consider the questions: 'Do you feel you have an expertise?,' 'Does your decision-making process differ from when you first started?,' 'Do you have engineering intuition?,' and 'How did COVID-19 affect the development of your expertise/decision-making/intuition?' Responses to these questions were qualitatively coded to capture common themes. Results from coding reveal that the loss of experience due to COVID-19 parallels a lack of ownership of expertise by three participants and claims of having a faulty, or underdeveloped, intuition. Further analysis of responses indicates that hands-on and collaborative experiences are most helpful for developing expertise and intuition, highlighting their usefulness when integrated into engineering education curriculum.

Introduction

COVID-19 sparked both short- and long-term societal changes such as in-person universities temporarily teaching classes over online platforms [1] and businesses permanently adopting more technology and work-from-home models [2]. This work investigates the effects of COVID-19-related educational and work environment changes on the development of expertise, decision-making, and intuition in early-career engineering practitioners (fewer than six years of post-baccalaureate experience).

Expertise is a status held by those who have a large accumulation of knowledge that is leveraged for quick decision-making, making connections between concepts, and quickly referencing relevant information [3]. Becoming an expert is thus a combination of collecting knowledge and gaining the ability to use it through experience. Many models of expertise development acknowledge that at least six years of post-baccalaureate experience is necessary for this shaping of an expert [4], [5], [6], [7], [8]. However, previous work with a sample of alumni from a primarily undergraduate institution (PUI) has shown that even engineering practitioners with fewer than six years of experience claim to have an expertise [9]. This unexpected finding may be explained by the population's shared background. The PUI they attended emphasizes experiences that have been previously tied to the development of expertise such as internships, undergraduate research, and other hands-on experiences [4], [8]. In the wake of COVID-19, these types of experiences were largely put on hold at this PUI as well as others, offering the opportunity to investigate the following questions related to expertise and its development through experience:

1. Do current early-career engineering practitioners affected by COVID-19 claim to have an expertise?
2. Do current early-career engineering practitioners claim COVID-19 influenced the development of their expertise in any way? If yes, how?

If results deviate from prior findings, that will suggest that the experiences affected by COVID-19 are an important component of expertise development. We are also interested in effects on decision-making, as expertise supports decision-making [4], [7], [8], [9], [10]. Decision-making involves identifying potential choices and choosing the best alternative as assessed by the decision-maker [11]. Decision-making is integral in day-to-day operations in the engineering workforce, whether it be deciding what angle to make an incline or who to talk to when uncertain of the next steps to take [9], [10]. While there is variation in who makes decisions at different companies, those with more experience (and subsequently, more expertise) typically make more decisions. Therefore, a lack of experience may impede the development of expertise and preclude engineering practitioners from practicing and improving their decision-making skills. We aim to explore this through the lens of COVID-19 with the following questions:

3. Have the decision-making processes of current early-career engineers affected by COVID-19 changed since starting as engineers?
4. Do current early-career engineering practitioners claim COVID-19 influenced the development of their decision-making processes in any way? If yes, how?

Lastly, we are interested in intuition because it is integrated into the decision-making of experts [4], [8]. Intuition is an expert skill that manifests in decision-making as the ability to quickly

access relevant information and leverage it to efficiently narrow down solutions to problems [4], [6], [7], [8], [10]. This contrasts the analytic approach which involves slower decision-making due to a thorough evaluation of all possibilities with research, calculations, and consulting others [4], [8]. Like expertise, intuition is developed through experience [4], [6], [8], [9], [10], [12], [13]. The concept of intuition in the workplace has been established in business management, nursing, and recently engineering [10], [12], [14], [15], [16]. Due to intuition's relatively new emergence in the literature, research thus far has focused on qualitatively describing perceptions of intuition, how it is used, and how it may be developed. Previous work specific to engineering defines engineering intuition as "subconsciously leveraging experience to assess a situation and/or predict a future outcome" and situates its usage in the problem solving process as a tool used by experts when the problems they are tasked to solve face constraints [10]. Further work in the domain of engineering suggests hands-on experiences are a major contributor to intuition development [13]. The lack of such experiences during the peak of the pandemic led to the final research questions addressed in this work:

5. Do current early-career engineers affected by COVID-19 claim to have an engineering intuition?
6. Do current early-career engineering practitioners claim COVID-19 influenced the development of their intuition in any way? If yes, how?

Positionality

The investigation of expertise, decision-making, and intuition is motivated by the research team's belief that all three are integrated and integral to the work of engineering practitioners. This positionality statement is included as an opportunity for transparency [17].

The first author of this work is an undergraduate student at the PUI the sample was recruited from. She is a non-engineer woman in STEM who experienced the effects of COVID-19 at the PUI beginning in the fall of 2020, giving her personal insight into the responses of some of the participants. Though her own experiences are similar to some of those expressed by the participants, biases were mitigated through adequate training, cross-checking, and interpretive awareness following an established quality management framework [18].

During each interview, two additional team members trained in human subjects research were present to ensure the protocol was uniformly applied across interviews. Of the two additional team members, one also experienced the effects of COVID-19 at the PUI beginning of 2020 and the other did not. When analyzing the interviews, all three interviewers and one additional team member were involved in the coding process to ensure accurate interpretation of the participants' points of view and avoid personal biases.

Methods

Eleven engineering practitioners with fewer than six years of experience were interviewed with a modified version of a previously established protocol of questions involving expertise, decision-making, and intuition [12]. Modifications were made to include COVID-19 as a topic. The full interview protocol is attached in Appendix A. For this paper, questions regarding if they have an expertise, if their decision-making process has changed over the course of their career, if they have and use engineering intuition, and how the COVID-19 pandemic affected the development of their expertise/decision-making/intuition were analyzed using previously established coding practices.

Sample and Recruitment

The participants are engineering practitioners with fewer than six years of post-baccalaureate experience. All participants are graduates of the same primarily undergraduate institution (PUI). Participants were recruited through emails sent to all engineering alumni who graduated with their undergraduate engineering degree between 2018 and 2023. This email included a selection survey to ensure only those fitting selection criteria (defined as answering at least 75% of questions and having no more than six years of experience in engineering-related roles) would be invited to interview. Aside from having fewer than six years of post-baccalaureate experience, we aimed to over-sample for women to amplify this perspective in an effort to address continued underrepresentation of women in STEM [19], [20]. Recruitment ended once saturation was reached, indicated by a lack of exceedingly new ideas in interview responses [21].

Six of the participants were affected by COVID-19-related change during both their undergraduate education and on the job, three were solely impacted while working, one was affected during both their undergraduate and graduate education, and one was affected both on the job and during their graduate education. Degree disciplines represented in this sample include: computer science and engineering, chemical engineering, electrical engineering, mechanical engineering, and biomedical engineering. Additionally, one participant previously earned a master's degree and another is in a PhD program. These details are not reported individually because of the small size of the institution and risk of participants becoming identifiable. More information about the demographics of the sample can be found in Table 1.

Table 1 Pseudonyms with gender identity, racial/ethnic identity, undergraduate graduation year, and years of experience

Pseudonym	Reported Gender	Reported Race/Ethnicity	Graduation Year	Years of Experience
Charlie	Man	White/Caucasian	2018	5
Leah	Woman	White/Caucasian	2018	5
Liam	Man	White/Caucasian	2018	4
Anthony	Man	White/Caucasian	2019	3
COVID-19-Related Change Began				
Dan	Man	White/Caucasian	2020	3.5
Will	Man	White/Caucasian	2020	3
Abby	Woman	White/Caucasian	2021	2.5
Isabella	Woman	White/Caucasian, Asian	2021	2.5
James	Man	White/Caucasian	2021	2
Emily	Woman	White/Caucasian	2022	1.5
Hannah	Woman	White/Caucasian	2022	1

Data Collection

Invited participants were interviewed over Zoom in the fall of 2023. Interviews followed a previously tested protocol [9], [10], [12] with the addition of questions regarding the effects of COVID-19 on the development of expertise, decision-making processes, and intuition. Transcripts were automatically created by the Zoom software and checked for accuracy by members of our team.

Data Analysis

Responses to the following questions were extracted from interview transcripts and analyzed:

1. *'Do you feel you have an expertise?'*
2. *'Does your decision-making process differ from when you first started?'*
3. *'Do you have engineering intuition?'*
4. *'Did COVID-19 affect the development of your expertise/decision-making/intuition? If so, how?'*

Analysis involved a combination of inductive and deductive coding following coding practices described by experts in qualitative research methodology [22], [23], [24], [25], [26]. This coding aided in finding common patterns in responses to the above questions which allowed us to make progress in answering our research questions.

Deductive Coding

Deductive coding began with categorizing responses by if the participant responded 'yes' or 'no' (Table 2). If the response was coded yes for questions 2 and 4, a subcode was used to qualify if the effect was positive or negative.

Table 2 Deductive codes used to categorize responses to the four questions above

Code	Sub-Code	Definition	Descriptors	Example
No	-	The response indicated 'no' in some way.	no, I don't think so, not really	"Not specifically for me" -Charlie
Yes	-	The response indicated 'yes' in some way.	yes, yea, I think so, definitely	"I guess I would say yes to this" -James
	Positive*	A change was seen in a way that was helpful.	helped, beneficial, efficient	"it has changed a little bit to where there's a almost a tighter knit community" -Dan
	Negative*	A change was seen in a way that hindered progression.	hurt, held back, lack of	"it definitely makes it more challenging and can be more discouraging" -Emily

*Codes only applicable to questions 2 and 4

Inductive Coding

While deductively coding the responses to the question *'Did COVID-19 affect the development of your expertise/decision-making/intuition? If so, how?,'* labels were assigned to further capture the perspectives of participants in an open coding approach [22], [23], [27]. Most labels fell into two categories, leading to the emergent codes: 'Insufficient First-Hand Experience' and 'Insufficient Second-Hand Experience' (Table 3). These codes and their definitions resemble the emergent codes 'First-Hand Experience,' 'Second-Hand Experience,' and 'Insufficient Experience' from our previous work [10]. Co-coding was employed when both codes fit the response [22].

Table 3 Emergent Codebook

Code	Sub-Code	Emergent Sub-Codes	Definition	Descriptors	Example
Yes	Negative	Insufficient First-Hand Experience	Indicating missed opportunities for hands-on work due to COVID-19.	missed experiences, couldn't be there myself	"I didn't have an internship […]so I kind of lost that summer to COVID" -Hannah
		Insufficient Second-Hand Experience	Indicating missed opportunities for collaboration, observation, asking questions, or learning from others due to COVID-19.	can't stop at someone's desk, not being able to work with people	"you learn most from people around you, especially on the job. And during COVID […] there wasn't a lot of people on site" -Will

Limitations

The primary limitations of this work stem from the homogeneity in the sample. All participants were graduates from a small, liberal-arts PUI that remained open in-person for all but three academic months during the COVID-19 pandemic. Following these three months, the institution provided a hybrid format in which most students partook in a combination of online and in-person experiences. The engineering curriculum, specifically, made strides in maintaining as many in-person experiences as possible. Though this shared experience is beneficial in minimizing variability in COVID-19-related change explored here, and allows for comparison to prior work, it limits the generalizability of the results.

The sample also lacks diversity in the racial and ethnic backgrounds of the participants. Most of those interviewed are White, which is representative of the population of the PUI as well as the lack of diversity in the field of engineering [19], [28], [29]. Organizations created to support engineers of color, such as the PUI's chapter of the National Society for Black Engineers, were explicitly contacted during recruitment in an effort to boost sampling of underrepresented groups, but only one individual that identified as non-White responded to the interview invitation. Future work further focused on recruitment of underrepresented groups would capture a wider range of perspectives of the topics discussed in this paper and dive deeper into the effects of COVID-19 on other groups of people.

While we acknowledge the sample size is also relatively small, data were collected until saturation. Additionally, we acknowledge that these responses were captured at a single moment in time. Participants were not previously primed to discuss the topics of the interview prior to the

Zoom call in an effort to get their authentic perspective. This method may not address all potential effects of COVID-19-related change and offers a subjective approach rather than other objective measures. This, however, offers a more holistic approach in recognizing participant perspectives, emotions, and experiences.

Results & Discussion

Unlike prior related work where all early-career participants claimed expertise [9], some members of this sample population denied having expertise. These participants noted that a lack of experience due to COVID-19 hindered their development of expertise. More similar to prior work, most participants did feel their decision-making processes improved over their career, suggesting COVID-19 did not fully hinder the development of decision-making processes. As for intuition, all participants claimed to still have developed an intuition despite missing intuition-building experiences during COVID-19. However, similar to the results regarding expertise, most participants claimed that the gap in experiences due to COVID-19 had a negative impact on their intuition development. This similarity in results for expertise and intuition further supports the entanglement of experience, expertise, and intuition [5], [6], [7], [13]. Each of these findings is further elaborated on in the following sections.

COVID-19-Related Change Hindered Expertise Development

In previous work, all early-career engineering practitioners interviewed claimed to have domain-specific expertise despite limited years of experience [9]. In this sample, three of the eleven participants denied having an expertise. Of the eight that claimed to have expertise, three were hesitant about it with one saying their expertise was not expertise "by research methodology or wording" (Dan). Since this sample has been affected by COVID-19-related loss of experiences either during their education, on the job, or both compared to other samples interviewed, this finding supports the possibility that this loss of experiences has hindered expertise development.

When directly asked if COVID-19 affected the development of their expertise, eight claimed that it had while only three said it did not (Table 4). The three that responded that there was no effect either never had to leave the office or are in a field that adapted well to a virtual environment. Four of the eight participants who felt an effect claimed that there was a positive result of the pandemic saying that it forced them to think outside the box more, hone their skills independently, and/or get accustomed to Zoom which is common in their workplace. One participant commented that "it showed [him] what [he] didn't like" (Anthony) which was working from home. His response was co-coded as both positive and negative because he expressed both the positive mindset of learning what he does not like while also expressing a loss of hands-on experience and feeling like he "wasn't worth [his] salary." A pattern in responses for this question with four participants describing it, though, was the sentiment that losing second-hand experiences such as collaboration and learning from the work of others most

negatively affected their expertise development. The combination of this sentiment and those who felt that a loss of first-hand experiences comprises the majority of the code-occurrences, supporting the notion that experience is crucial for expertise development [4], [5], [6], [7], [8].

Table 4 Code-occurrences for *'Did COVID-19 affect the development of your expertise? If so, how?'*

No	**Yes**		
	Positive	**Negative**	
3	4	**Insufficient First-Hand Experience**	**Insufficient Second-Hand Experience**
		2	4*

*The total sums to more than the sample size (*n=11*) due to code co-occurrences.

COVID-19-Related Change Did Not Affect Decision-Making Processes

All but one participant claimed that their decision-making process had changed since the start of their career. The outlier participant demonstrated a fixed mindset throughout the interview, such as when they commented "I'm a pretty stubborn person, so you're not gonna be able to change my mind" when asked if they wanted to modify their original definition of intuition after discussing the construct further; this question was not intended to change participants mind but rather capture any additional thoughts they may have developed in discussing the construct.

A common thread linking the other ten responses was that the participants reported growth in their decision-making process, specifically in confidence. Participants noted that compared to when they first began, they currently know more with respect to both technical content and how to seek support from others. This increased knowledge allows them to narrow down solutions faster and with less hesitation. Being able to eliminate potential solutions efficiently is a common growth in decision-making, often facilitated by practice in making decisions [30]. This form of growth in decision-making suggests that despite the hindrances to expertise development discussed above, participants are still progressing on their path to developing expertise [4], [6], [7], [8] and their ability to identify how to seek support from others may indicate increased metacognition [31].

Participants' growth in decision-making also suggests that while adapting to new COVID-19 work protocols, such as working remotely, the practitioners were able to continue practicing their decision-making skills. This possible explanation is supported by seven of the eleven participants' claim that the development of their decision-making process was not affected by COVID-19 (Table 5). The participants who discussed some COVID-19 effect said it taught them to expect the unexpected and further affirmed a need to be in-person for collaborative

decision-making. One participant shared there was an effect on the information they now consider when making decisions, because of new COVID safety precautions, but did not indicate a positive or negative shift. The overall lack of effect of COVID-19 on decision-making and continuing development of the skill suggests that it can still develop in a remote and/or hybrid environment without in-person experience and observation.

Table 5 Code-occurrences for *'Did COVID-19 affect the development of your decision-making process? If so, how?'*

<table>
<tr><th>No</th><th colspan="3">Yes</th></tr>
<tr><td rowspan="4">7</td><td colspan="3">1</td></tr>
<tr><td>Positive</td><td colspan="2">Negative</td></tr>
<tr><td rowspan="2">1</td><td>Insufficient First-Hand Experience</td><td>Insufficient Second-Hand Experience</td></tr>
<tr><td>1</td><td>2*</td></tr>
</table>

*The total sums to more than the sample size of (*n=11*) due to code co-occurrences.

COVID-19-Related Change Hindered Intuition Development

All participants claimed to have and use engineering intuition. This result is contrary to what was expected because of the known tie between intuition and expertise [4], [5], [6], [7], [8] and three participants not claiming expertise. One participant, however, who claimed to have intuition despite not claiming expertise described her intuition as "not a good one" (Hannah). It is possible that responses differ from what is expected because of conflation between the colloquial understanding of intuition and the expert skill of intuition. All but two participants discussed instances where their intuition had led them down the wrong path. The two that did not, shared that they haven't put their intuition to the test enough to know. We argue that what may otherwise be termed "bad" intuition that leads people to the wrong solutions is actually undeveloped intuition and an indicator of a more novice status. This is not to say that expert intuition is 100% accurate, but intuition does promote better outcomes overall [10], [12], [14], [16].

Code-occurrences for the effects of COVID-19 on intuition development more closely mirror the results for expertise, as expected. Four participants asserted that COVID-19 had no effect on their intuition development, six that it had a negative effect, and one a positive (Table 6). Three of the four participants that claimed no effect graduated before the pandemic. This potentially suggests that the foundation for their development of intuition specifically began in academia. Previous work highlighted that, within an undergraduate education, hands-on experiences, ill-structured questions, making mistakes in school, diverse presentation of class materials, and having encouraging professors were all key to the development of intuition [13]. Similar

suggestions, specifically an emphasis of hands-on and other experiences, were mentioned in this sample as well.

Table 6 Code-occurrences for *'Did COVID-19 affect the development of your intuition? If so, how?'*

No	Yes		
	Positive	Negative	
4	1	Insufficient First-Hand Experience	Insufficient Second-Hand Experience
		2	4*

*The total sums to more than the sample size *(n=10**) due to code co-occurrences.
**The sample size for this question is 10 because this question was accidentally skipped during one interview. We have reached out to this participant for a response, but haven't heard back.

The six occurrences of COVID having a negative impact on intuition development via a lack of experiences emphasize first- and second-hand experiences. Isabella, for example, felt the move from a hands-on computational space to a computational space had a negative impact on her intuition development as her "intuition would have been better developed in a physical space" because there is no "undo button" that easily reverses mistakes rather than having to adapt and fix new problems that arise. The loss of second-hand experiences mentioned as a hindrance to intuition development reference the lack of being able to talk to people in the office. For example, Dan described a pattern of experts leaving his company due to offerings of early retirement stemming from COVID-19-related financial problems. As a result, his company "lost a huge amount of [their] intuition backbone" which impacted his access to valuable information that may have helped him build his intuition.

The hands-on experiences mentioned above are consistent with previous work, but collaboration emerged as a new source of intuition development. Collaboration was referenced by four different participants, each in a unique way. Anthony claims that he uses collaboration as feedback to determine if his intuitive ideas are worthwhile by "trying to build relationships with people [...and…] read their body language." Hannah passively uses collaboration in the form of observing to ensure she understands "all sides" of a problem, making sure her developing intuition is well informed. Dan more actively uses collaboration in the form of asking questions and likes to "lean on experts to add information" that supplements his intuitive ideas, revealing where there are deficits. Lastly, Emily uses collaboration as a motivational tool by "finding people who are also eager and willing to attack things" because the enthusiasm prevents her from giving up when problems get hard.

The combination of sentiments from participants that the loss of first- and second-hand experiences due to COVID-19 hindered both expertise and intuition development further supports the relationship between experience, expertise, and intuition [4], [5], [6], [7], [8], [10], [13]. The importance of experience in the development of expertise and intuition highlights the importance of integrating high-impact experiences, such as the ones described above, throughout an engineer's career, including their undergraduate education.

Implications

Expertise, decision-making, and intuition are all imperative to the role of an engineering practitioner. Experience is known to be a critical developer of expertise and intuition, subsequently supporting decision-making [9], [10], [13]. Intuition in particular is an understudied skill and often stigmatized in engineering education [10]. We argue that intuition is an important engineering skill that deserves attention in engineering education to better prepare the engineering workforce for future challenges. Previous work has elucidated potential avenues for educational interventions (such as competency-based grading allowing for student mistakes without extreme penalty, encouragement from professors, and presenting class material in various ways) through participant suggestions [13]. This work extends these suggestions by examining the implications on expertise, decision-making, and intuition when these experiences are limited, such as during the COVID-19 pandemic.

While many of these influential experiences are back in place, the impact of the loss of such opportunities at a formative point in an engineering career cannot be fully made up. The resulting consequences on development of expertise and intuition highlight why such experiences are so important. This work specifically emphasizes the importance of both hands-on experiences, such as active research, and second-hand experiences, such as observing others work, in the development of an engineer's expertise and intuition. Such experiences can be fostered through the new educational, research, and career opportunities provided by the recovering world [32]. Ensuring equitable access to such experiences will be crucial as the field grows and fosters the new generation of engineering practitioners.

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Appendix

Appendix A Interview Protocol

Bolded questions are additions to the previously tested protocol.

1. Greetings
2. Note that interview is recorded – confirm that is okay
    - Only to be seen by PI Team
    - Everything will be anonymized
3. Read full consent
4. Give the option to not answer questions by "If there is a question you don't feel comfortable answering, you don't have to answer it. Just say pass or however you want to tell me you don't want to answer"
5. Reiterate that the data will be confidential, the recording won't be shown outside the research team, and that pseudonyms will be used for all reported information.
6. Mention how the interview is going to be run.
    - The interview is semi-structured.
    - Run by me and [another student] is observing
    - There are no right or wrong answers.
7. Interview questions:
    - State your name
    - Career History:
        - What is your academic background?
        - What is your current occupation? (XX)
        - How long have you been working as XX?
        - Did you have any prior roles?
        - What are your general responsibilities as XX?
        - What would be a typical day for you in your role?
    - Expertise:
        - Do you consider yourself to have an expertise? What would you consider your expertise to be? (experience -> expertise -> intuition)
        - How do you think you developed this expertise?/Are you in the process of developing an expertise? Why or why not?
            - Formal education vs. informal training/experience vs. on-the-job training
            - **Do you feel COVID impacted your development of expertise? How?**
    - Decision Making:
        - How do you make decisions on the job?
        - How does this differ from when you first started?
        - **Do you feel COVID impacted your decision making? How?**
    - Intuition:
        - One thing we're interested in is the role of intuition in the workplace. How would you define engineering intuition?
        - Do you think it's applicable in the workplace?
        - Do you use it? If so, how? If not, why not?
        - **On a scale of 1 to 7, 1 being never and 7 being all the time, how often do you rely on your intuition at work?**

        - **Has your intuition ever failed you?**
        - How did you develop your intuition? (ex: in activities)
            - **Do you feel COVID impacted your intuition development? How?**
        - Why didn't you mention intuition prior?
        - **Having given the concept more thought, would you define engineering intuition differently than before?**
8. [interview observer] – did you have anything to add?
9. END: Thank you so much for your time. Is there anything we missed?
10. If it's okay with you, we might reach out if we have questions about anything that came up or to confirm that we've represented your input accurately.