



Rohde et al. (2020) Analytical Memo

Who writes memo: Nuria Jaumot-Pascual

Date: 04/06/2025

Reference: Rohde, J., Satterfield, D. J., Rodriguez, M., Godwin, A., Potvin, G., Benson, L., & Kirn, A. (2020).

Anyone, but not everyone: Undergraduate engineering students' claims of who can do engineering. *Engineering Studies*, 12(2), 82-103.

Main Ideas

"Anyone, but not everyone, can do engineering"

Memo Writer Summary: 20 undergraduate engineering students from four universities participated in up to four interviews through two years (i.e., one interview per semester) where they talked about their experiences and beliefs. 39 out of 49 interviewees shared that they believed that "anyone, but not everyone, can do engineering." They initially expressed that everyone can do engineering and immediately added qualifiers that limited their initial assertion, such as having interest and passion for it, having a background in math and science, and being highly disciplined. Most students maintained their opinion throughout the study, but the opinions of two students became less inclusive, later saying that engineering is not for everyone because of its difficulty, the need for hard work, and the need for a strong mathematics background.

Author Summary: "Out of 49 interviews in which students were asked the question, 'Who can do engineering?', 39 followed a pattern of expressing that engineering was available to anyone before immediately adding additional conditions" (p. 89). "Further, most students held onto these views throughout the longitudinal interviews. ... Most students did not explicitly address the paradoxical nature of their responses. One student, however, said that while he wished anyone can do engineering, reality negated this idealistic belief. ... The knowledge that engineering has a high attrition rate demonstrated that, in reality, not everyone could do engineering. ... The reasons for not persisting in engineering were not limited to either the institution or the individual, but rather an intersection of exhausting requirements and a lack of motivation or discipline on the individual's part. As shown in both Tranlin's and Eric's quotes, some students justified the exclusivity of engineering by emphasizing its difficulty. Most students remained consistent in their responses over the course of the interviews; however, two students shifted their claims, articulating more exclusionary beliefs over time. These participants, Dominic and Kathie, used the typical refrain of 'anyone, but not everyone' during their first interviews. However, in later interviews both students strongly expressed that engineering was not for everyone. Kathie believed that to do engineering, a person has to have the 'right' mindset or personality, which she framed as fixed rather than learned, while Dominic asserted that math proficiency was critical" (p. 90).

Evidence:

“When I think of who can do engineering, I really think anyone can do it. I guess it requires some skill to learn ... But I think really anyone can pursue it. Anyone can get a degree in engineering. I think it definitely helps if you’re at least interested in it because there is a lot of work. (Eric, Interview 4)” (p. 90).

“In the past, I’ve said everyone, and the last time I guess I was more hesitant to say it but I still said it. And then this time, no. I don’t think everyone can do it. Yeah. That’s hard. And it’s like, okay, well then, who can do it? And I don’t really have an answer for that. But [...] seeing some of these kids who are struggling. [...] if you can’t do pre-algebra, I’m sorry but you really just don’t have a chance making it. (Dominic, Interview 4)” (p. 91).

Qualities necessary to do engineering: Passion and drive for engineering

Memo Writer Summary: 20 undergraduate engineering students from four universities (one Hispanic Serving Institution [HIS] and three Predominantly White Institutions [PWI]) participated in up to four interviews through two years (i.e., one interview per semester) where they talked about their experiences and beliefs. 38 out of 49 interviews contained responses about the need for passion and drive to do engineering. Students explained that engineering requires a lot of effort, so someone not interested in it would not succeed in it. They also pointed out that, due to the need for effort, the level of commitment needed to be exceptionally high, but that difficulties such as a lack of math proficiency could be overcome with sufficient commitment.

Author Summary: “Students identified that ‘passion’ and ‘drive’ were required to be an engineer, often discussing these terms at the same time. Of the 39 interviews that followed the ‘anyone, but not everyone’ theme, 38 contained responses involving hard work or interest. ... Some participants established that students’ interest in engineering led to a will to work hard. They framed engineering as requiring so much effort that a person without sufficient interest would not do engineering.” (p. 91).

“Students believed that an exceptional amount of commitment is needed to be an engineer. Overall, students asserted that difficulties such as math proficiency could be overcome through increased effort, as long as there was sufficient interest and desire to do engineering” (p. 92).

Evidence:

“I think anyone could. You’d have to like it, though. I don’t think anyone gets to this point, I’d hope not, if they don’t like it, because it’s just too much work if you don’t want to be here. But I think ... if they were into learning about why things work, and liked math and science, then anyone could do it. (Candace, Interview 3)” (p. 91).

“Anybody who puts their mind to it. Like as long as, like if you feel that you can give it your all and study as hard as you can, even if you’re not the brightest student, if you want to do something I think that if you really want to do it you would make it happen. (Cara, Interview 1)” (p. 92).

Qualities necessary to do engineering: “Traits, knowledge, skills, or abilities”

Memo Writer Summary: 20 undergraduate engineering students from four universities (one Hispanic Serving Institution [HIS] and three Predominantly White Institutions [PWI]) participated in up to four interviews through

two years (i.e., one interview per semester) where they talked about their experiences and beliefs. 22 of 39 interviews that expressed conflicted responses about who could do engineering included views that certain traits, knowledge, skills, or mindsets are required to do engineering. For some participants these were innate traits and for others they could be accomplished through work.

Author Summary: “Students also discussed how certain traits, knowledge, skills, and abilities were required for a person to be able to do engineering. Of the 39 interviews where students expressed conflicted responses about who could do engineering, in 22 interviews participants noted the need to possess a certain ‘engineering mindset’ in order to work well with others or to be creative. Participants elaborated that if a person did not possess these qualities or skills, they might be able to do engineering but would have a harder time than their peers. The most common required quality that participants described was for a person to think like an engineer, which they characterized as a mindset, as seeing the world a certain way, or as a type of thinking. ... Regardless of whether participants saw thinking like an engineer as a fixed trait or developed ability, they limited participation in engineering to people who could engage in the engineering mindset. Elsewhere in their interviews, participants also discussed how their possession of an engineering mindset supported their own engineering identity.” (p. 92).

Evidence:

“I think anyone can do anything that they want to do. It might definitely be easier for some people to accomplish things than others, with the brain power you’re born with, or your capacity. (Dominic, Interview 2)” (p. 93).

“I think it’s someone who has a lot of discipline. I don’t think you have to be amazing at math to do it. There’s tons of people who are bad at math in engineering. You just have to put in ... if you don’t understand something, you get help. (Tranlin, Interview 1)” (p. 93).

Recommendations:

“We invite the readers to consider why students may feel the need to articulate the beliefs and ideals they perceive to be shared by their peers and the greater community. This could be a fruitful area for future work on dominant discourses and norms in engineering” (p. 96).

“Future work might explore connections between ways that students define engineering and their potentially exclusionary beliefs” (p. 96).

“Investigations of students with other backgrounds would further inform the extent to which the findings are unique to U.S. settings” (p. 96).