Stakeholders' Perceptions about an Undergraduate Engineering Program Accreditation Process in Ecuador: Exploratory Work in Progress

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Background

Accreditation of an engineering program allows a university to show that its program meets specified quality criteria in relation to teaching strategies, assessment methods, curricula, and resources [1]–[6]. Although institutions, such as those in Ecuador, might already be required to participate in national accreditation processes, undertaking international accreditation can require complex adjustments [7]–[9]. One way universities can make sure that contextual factors are being considered in the accreditation process is by involving advisory boards that include stakeholders, such as industry employers, who provide feedback on how the graduates meet industry needs [10].

The present study investigates the experiences of stakeholders participating in international accreditation systems, focusing on an academic program that belongs to the college of electrical and computer engineering from a polytechnic university located on the coast of Ecuador, which was accredited by the ABET Engineering Accreditation Commission [11] in 2019. This exploratory study draws on interviews with industrial advisory board members. The following research questions were formulated to guide the study:
1. What do industry members consider important in terms of the competencies acquired by recent graduates?
2. What are industry members' views on the role of international accreditation for the enhancement of engineering programs?

Conceptual Framework

To inform the study, we chose the conceptual framework proposed by Volkwein et al. [12] (Figure 1), developed for the project "Engineering Change: A Study of the Impact of EC2000". It postulates that the modified EC2000 accreditation standards will effect changes in curriculum, instructional methods, assessment initiatives, institutional procedures and faculty activities and values. This model proposes that these then influence student learning outcomes, allowing the program to develop closer alignment with employer needs.
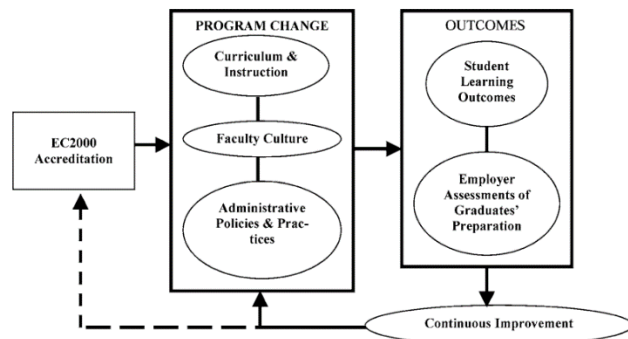
Figure 1. *Conceptual Framework proposed by Volkwein et al.* [12]

Methods

Context and Participants

The participants of this exploratory study were industry members that are part of the advisory board of an undergraduate engineering program located in the college of electrical and computer engineering at a public polytechnic university located on the coast of the Republic of Ecuador that operates with funding from the central government of that country. The advisory board meets annually in the last quarter of the year. The study objective was explained to the participants, indicating that their responses would be kept anonymous in any reporting on this study.

Based on the purposive sampling technique [13], we selected participants according to two criteria: (i) that the members had attended the two last board meetings, held in October 2021 and December 2022, and (ii) have five or more years of engineering practice relevant to the field of the academic program. In 2021 there were fourteen attendees at the meeting, while in 2022 there were nine. Using both criteria, five industry members met the requirements and were invited to participate in the study. For this work-in-progress paper, we present the preliminary analysis of two of these interviews.

Data collection and analysis

We elected to use interviews as our instrument for data collection to get in-depth responses from the participants on their experiences. Following the confirmation of informed consent, interviews were conducted in person, and the interview protocol was designed to elicit open-ended responses, with the potential for the interviewers to ask follow-up questions. Each interview lasted between 30 to 40 minutes. The research design was approved by the Institutional Review Board (IRB) at Virginia Tech [14].

Our first stage of analysis involved data condensation, and thereafter we used a thematic inductive approach [15]. For this work-in-progress paper, we selected two interviews for analysis: Participant A has more than six years of work experience in professional activities related to software and firmware engineering, especially in the context of R&D departments in the industry. He also has been involved in the hiring of graduates from the engineering program analyzed in this study. Participant B has more than fifteen years of professional experience in cybersecurity, telemetry, and wide-area network deployments, during which period which he has interacted with recent graduates from the engineering program that is the object of our study. We selected these two interviews for this initial analysis because of the contrasting responses that they gave.

Preliminary findings

The findings are reported according to the two research questions, the first centered on graduate competencies and the second on the experience of accreditation.

Graduate Competencies

Participants were asked whether they preferred graduates from particular programs. Participant A responded that no strict filter is applied to classify graduates according to their academic program. However, he said that he looks for the effectiveness and efficiency of recent graduates since the industry expects they can learn by themselves, mentioning: *"... the profile that we look for is that the students have that desire of learning by themselves, that they do not get stuck in learning."*

On the other hand, Participant B indicated that a higher weight is given to the recent graduate, emphasizing that it depends on the institution of higher education from which they come. He values particular institutions which he thinks are at the vanguard of academic excellence, stating: *"(The) Human Resources department gives a high weight when the engineer comes from these (academic) programs or (specific) universities."*

When discussing specific skills, Participant A indicated that time management should be paramount when running a project. He remarked that effective communication can indirectly improve response times in the execution of projects and processes. He also indicated that engineers should use different ways to express themselves, for instance, by graphics to convey ideas about projects, mentioning that: *"engineers have ideas in their minds, but when communicating them (...), they can get complicated. (...) you should know how to convey these processes or ideas. (If they are) working on projects, the ideas must be clear."* Participant B responded that in the labor market, especially when dealing with a customer, engineers should have technical certifications to support their participation in the industry, *"a graduated engineer must have updated certifications (for example) from recognized brands. It must be considered (by the graduate) when leaving the university."*

These responses show that industry members are looking for specific skills or competencies in graduates. For example, as a young professional, Participant A realizes that effective communication is a must for an engineer, which aligns with the requirements of ABET accreditation, while, Professional B, with more years of experience, is less focused on the specifics of educational outcomes and focuses more on the reputation of the institution more generally as well as vendor certifications.

Awareness of accreditation

Participants were asked about their perceptions of the ABET international accreditation process. Participant A considered the importance of the process by itself, arguing that ABET accreditation allows the program to follow models from prestigious international institutions:

> *Regarding the academic processes, for me, it is something extremely useful and interesting in the sense that the education I am receiving involves resources for the learning process similar to other countries (...). Knowing, both as a student and as a professional, (that) the education you are receiving follows similar rules as abroad.*

Participant B commented that it is convenient to align with an accreditation process since the curriculum is relevant to the knowledge of new trends that a graduate must have when getting into the labor market: *"We can say that these engineering program curriculums are already related to a vendor (...). There are courses focused on specific knowledge so that the student already knows them at the time of graduation."*

These responses allow us to infer that Participant A has a specific point of view about the purpose of accreditation, focusing on improving educational processes, which he remarked on throughout the interview. Participant B focused his response on relating accreditation to content taught in the courses, being an indication of how it aligns with vendors.

These responses suggest that more work can be done in the industrial advisory board meeting to make sure all members understand the purpose of accreditation.

Discussion and Conclusions

This work-in-progress paper has reported on preliminary work in a study that seeks to explore the experience of ABET accreditation in a non-US context where it is still a relatively new phenomenon. Specifically, we sought the perspectives of stakeholders who had served on the advisory board for the accreditation of an undergraduate engineering program at a public polytechnic university in Ecuador. For the purposes of this paper, we drew on interviews that had been conducted with two such stakeholders, to test out our research design.

The preliminary findings suggest that industry participants might have very different perceptions of graduate competencies and the value of accreditation. With globalization, the labor market has changed dramatically for graduates, and thus younger graduates are likely more attuned to the value of having a qualification that has an international brand. Moreover, with an increased focus on professional skills that has come during this period, we also were interested to note that the younger graduate spoke more explicitly about these. Our broader study seeks to expand these preliminary findings through the analysis of further interviews with the stakeholders in this particular program and then to expand our study to an advisory board of another program at the same institution.

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