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Developing an Engineering Identity Framework for Malaysia: Insights from a Pilot Focus Group Discussion

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ABSTRACT

Engineering identity plays a crucial role in shaping students' motivation, academic success, and career persistence. This research-in-progress aims to refine and expand the Engineering Identity Development Framework for Malaysia through a pilot Focus Group Discussion (FGD). Building on Alison Godwin's original framework, which includes Recognition, Interest, and Performance/Competence as core domains, this study investigates additional factors that influence engineering identity in the Malaysian context. The findings suggest the emergence of two new domains: Cultural & Societal Influence and Industry Readiness & Employability. These dimensions reflect the unique socio-cultural landscape and the evolving demands of the engineering profession in Malaysia. The pilot FGD reveals that family expectations and societal pressures play a significant role in shaping students' engineering identity, while exposure to real-world engineering practices is crucial to ensure industry readiness. This study proposes the integration of these additional dimensions into a more localized framework to better support engineering students in Malaysia. The next phase of the research will involve refining the framework based on expert feedback and conducting further FGDs to validate the findings.

Keywords: Engineering identity; focus group discussion; Godwin's framework; cultural & societal influence; industry readiness & employability

INTRODUCTION

The current trend in Malaysia shows a concerning decline in the number of students choosing engineering as a field of study, particularly at the secondary school level. Despite the growing need for skilled engineers to drive the nation's development, fewer students are enrolling in engineering courses at universities, and the interest in STEM education is gradually waning. In the Malaysian context, Idris and Bacotang (2023) highlighted that these trends reflect a systemic decline in the STEM pipeline, raising concerns about the nation's ability to produce sufficient engineers for Industrial Revolution 4.0 and Society 5.0. This decline poses a significant challenge for the country, as engineers are essential for infrastructure, technological advancement, and economic growth. The question arises: What is contributing to this trend? Has there been a loss or a decrease in engineering identity among students? If students are not identifying themselves as engineers, or fail to develop a strong engineering identity, this could have long-term consequences on the profession's future (Wallwey et al. 2024). While much research has been conducted on engineering identity in regions like Europe, the USA, and Australia, there remains a gap in studies specifically addressing engineering identity in Malaysia (Gray et al. 2021). Understanding the state of engineering identity in Malaysia is crucial for designing effective frameworks and strategies to nurture and strengthen this identity, ensuring that future generations are equipped to meet the demands of the rapidly evolving engineering industry (Chu et al. 2019).

Engineering identity plays a pivotal role in shaping students' motivations, persistence, and success in engineering education. Previous studies have consistently highlighted three core dimensions of engineering identity: recognition, interest, and performance-competence, each

contributing uniquely to students' perceptions of themselves as engineers (Godwin 2016). These three dimensions are visualized in Figure 1. Recognition refers to how students are perceived by others in the engineering community, while interest encompasses their passion and affinity for the discipline. Performance-competence relates to students' self-belief in their ability to succeed in engineering tasks.

However, the existing frameworks, such as Godwin's model (Figure 1), while comprehensive, may not fully capture the complexities of engineering identity formation in diverse socio-cultural contexts like that of Malaysia. In Malaysia, the socio-cultural dynamics, including family expectations and societal pressures, significantly influence students' educational choices and professional aspirations.

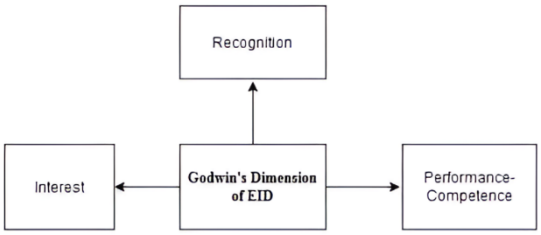

FIGURE 1. Godwin's (2016) Model of Engineering Identity, comprising three core dimensions: Recognition, Interest, and Performance/Competence.

Furthermore, the evolving needs of the industry in the context of globalization and Industry 4.0 necessitate an understanding of how well students' academic preparation aligns with the practical skills demanded by employers.

To address these gaps, this study builds upon Godwin's framework and seeks to expand it by exploring additional factors that may shape the engineering identity of Malaysian students. Through a pilot Focus Group Discussion (FGD) involving expert panelists from Malaysia's top engineering institutions, it is anticipated to extract new factors within Malaysia context. These new dimensions will intertwine with the established dimensions of recognition, interest, and performance-competence, reflecting the unique cultural and professional landscapes of Malaysia.

This paper aims to refine and localize the Engineering Identity Development (EID) Framework for Malaysian students, ensuring it reflects both academic competencies and socio-cultural factors. By incorporating these new dimensions, the framework will better guide educational practices, support policies, and ultimately enhance the development of engineering identity among Malaysian engineering students.

METHODOLOGY

RESEARCH DESIGN

This research employs a qualitative methodology to explore the development of engineering identity among Malaysian engineering students, with a particular focus on refining an EID Framework that is tailored to the Malaysian context. A pilot Focus Group Discussion (FGD) was conducted as part of the preliminary phase of this study to gather insights into the factors that influence the formation of engineering identity. The pilot FGD is intended to assess the applicability of the existing framework by Alison Godwin (2016), which includes the dimensions of Recognition, Interest, and Performance-Competence, and to identify potential additional dimensions that might be relevant in the Malaysian socio-cultural and educational context.

PARTICIPANTS

The pilot FGD involved three expert panelists who were selected for their extensive experience in the field of engineering education and their familiarity with the Malaysian context. The participants included:

1. Panelist 1: A retired professor with a long career in university management and Outcome-Based Education (OBE) development at UTM, with deep insight into the structural aspects of engineering education.
2. Panelist 2: An administrator and associate professor from Universiti Teknologi Malaysia (UTM), specializing in educational policies and teaching methodologies in engineering programs.
3. Panelist 3: A senior lecturer in engineering from Universiti Sains Malaysia (USM), with expertise in engineering education and curriculum development.

These panelists were chosen for their professional backgrounds, involvement in academia, and their expertise in shaping educational programs that impact engineering students in Malaysia. Their diverse perspectives were deemed crucial for generating comprehensive insights into the factors influencing engineering identity.

FOCUS GROUP DISCUSSION PROCESS

The pilot FGD was held on February 18, 2025, from 2:00 PM to 4:00 PM (120 minutes) via Webex to accommodate the geographical locations of the participants. The session was recorded for subsequent analysis. The pilot FGD

protocol was designed to facilitate rich, open-ended discussions on the dimensions of engineering identity, with particular emphasis on recognition, interest, and performance-competence from Godwin's framework. In addition to these dimensions, the protocol incorporated probing questions to explore potential additional factors such as cultural & societal influence, industry readiness & employability, or other relevant factors. The discussion was structured around 10 key questions as tabulated in Table 1, developed based on a comprehensive review of Godwin's framework and insights from preliminary literature on engineering identity (Tonso, 2006). The questions aimed to elicit participants' views on how engineering students' identities are shaped by various factors, including academic experiences, family background, cultural influences, and industry exposure. The protocol was reviewed by two experts (one from engineering background and the other one from education background) to ensure that it is aligned with the research objectives and captured the relevant data needed for developing and refining the framework.

TABLE 1. Mapping of Godwin's Dimensions to Pilot FGD Questions

No	Godwin's Dimensions	Questions
1.	Performance-Competence	Can you share a key moment in your STEM education that made you feel confident in your engineering skills?
2.	Interest	What were the most influential factors in your decision to pursue engineering?
3.	Recognition	Has anyone, mentor, professor, industry leader, ever told you that you have the skills of an engineer?
4.	Performance-Competence & Recognition	What are the biggest challenges students face in feeling like real engineers?
5.	Performance-Competence	What are the most essential skills an engineer must develop?
6.	Performance/ Competence	Can you share an experience where you faced a difficult engineering problem?
7.	Recognition & Performance-Competence	Beyond academics, which experiences (competitions, internships, clubs) had the greatest impact on shaping your engineering identity?
8.	Interest	What strategies do you use to stay updated with new trends in engineering?
9.	Interest & Recognition	Do you believe having a strong engineering identity improves academic and professional performance?
10.	Recognition & Performance-Competence	If universities or industry leaders wanted to strengthen engineering identity among students, what practical steps should they take?

The key areas of inquiry during the pilot FGD included:

1. The core dimensions of engineering identity (Recognition, Interest, and Performance/ Competence).
2. The role of family, societal, and cultural influences in shaping students' engagement and self-perception as engineers.
3. The importance of industry exposure and practical experience in fostering a strong engineering identity.

DATA COLLECTION

Data for this study was collected through the pilot FGD, which was moderated by the principal researcher. The Webex platform enabled real-time interaction, and the session was recorded with the consent of all participants. The pilot FGD format allowed for in-depth discussions, enabling participants to build upon each other's ideas and perspectives, thus enriching the data. During the session, the moderator encouraged active participation from all panelists, ensuring that their diverse views on the influence of cultural and societal factors, as well as industry readiness, were captured.

The recorded pilot FGD was transcribed verbatim, and the resulting transcript served as the primary data source for analysis. The transcription process was meticulous to ensure that no key points were overlooked. Following the transcription, the data was subjected to thematic analysis, focusing on identifying recurring themes related to the core dimensions of engineering identity, as well as emerging factors such as societal influence and industry readiness.

DATA ANALYSIS

The data from the pilot FGD was analyzed using thematic analysis, a method suitable for identifying patterns and themes within qualitative data. Thematic analysis was selected due to its flexibility and effectiveness in organizing and interpreting complex, qualitative data. The analysis followed the steps outlined by Braun and Clarke (2006), which include:

1. Familiarization with the data: The researcher carefully reviewed the transcript to become thoroughly familiar with the content.
2. Generating initial codes: Codes were generated based on the predefined questions and emerging themes that were present in the discussions.
3. Searching for themes: Codes were collated into potential themes, reflecting both the existing dimensions of engineering identity (Godwin's framework) and any new dimensions introduced during the FGD
4. Reviewing themes: The themes were refined by revisiting the data to ensure that they were robust and accurately represented the participants' perspectives.
5. Defining and naming themes: Each theme was defined and clearly labeled to reflect the key factors influencing engineering identity.
6. Reporting: The final report summarized the themes and provided a detailed discussion on how they contribute to the development of the Engineering Identity Development Framework for Engineering Students in Malaysia.

To enhance transparency and demonstrate how the coding process was carried out, an excerpt of the coding scheme is presented in Table 2. This table illustrates how raw data from the pilot FGD transcripts were systematically coded into subthemes and then organized under broader themes. The exemplar quotes highlight the analytical progression from participants' statements to the identification of both Godwin's original dimensions (Recognition, Interest, and Performance/Competence) and the newly emerging dimensions relevant to the Malaysian context (Cultural & Societal Influence, and Industry Readiness & Employability).

The coding scheme demonstrates how participants' narratives were systematically analyzed and connected to theoretical constructs. By aligning subthemes with both established and newly emerging dimensions, Table 2 provides evidence of a rigorous and transparent analytic process. This approach not only strengthens the trustworthiness of the study but also illustrates how the Malaysian context extends Godwin's original framework. The systematic presentation of themes, subthemes, and exemplar quotes ensures clarity in showing how the findings are grounded in the raw data while highlighting the interpretive steps taken by the researcher.

In addition to presenting the coding scheme, it was also necessary to clarify the procedures adopted to ensure analytic rigor, reliability, and reflexivity during the data analysis process.

To further clarify the analytic process, the coding was conducted by a single researcher (the first author). As this was a pilot study with a small dataset from three panelists, interrater reliability statistics such as Cohen's κ were not applied. Instead, rigor and trustworthiness were established through several strategies. Triangulation was achieved by comparing the FGD findings with relevant policy documents and existing literature. In addition, peer debriefing was carried out with two academic experts who reviewed the coding framework to ensure that the identified themes were credible and appropriately derived from the data.

The first author's positionality as a doctoral researcher in engineering education with prior teaching and research experience in STEM contexts provided both valuable contextual insight and potential risk of interpretive bias. To manage this, reflexive journaling was maintained throughout the analysis to document assumptions and analytic decisions. Combined with external validation from experts, this reflexivity practice strengthened the transparency and credibility of the findings, ensuring that the analysis was both systematic and trustworthy.

ETHICAL CONSIDERATIONS

All participants were informed about the purpose of the study, the voluntary nature of their participation, and the confidentiality of their responses. They provided written consent prior to the pilot FGD, and their identities were

kept anonymous in the final report. The data collected from the pilot FGD will be securely stored and only used for the purposes of this research. Additionally, the FGD evaluation form was given to the panelists to assess the process of the FGD.

TABLE 2. Excerpt of Coding Scheme with Themes, Subthemes, and Exemplar Quotes

Theme / Dimension	Subtheme	Exemplar Quote (Pilot FGD)
Performance/Competence	Problem-solving through programming	"*…knowing programming shaped me to be a problem solver… having these skills of doing programming helped me at the end of the day being a problem solver*." (Panelist 1, Q1, 00:15:14)
Interest	Early passion in science	"*…my interest or basically my love for science continued on… when I choose what to study for my degree, I choose to be a chemical engineer… the passion, the excitement are still the same*." (Panelist 2, Q1, 00:20:44)
Recognition	Indirect validation	"*…I can say that it is very indirect recognition… I got the prize for Seni Perusahaan… that made me the best student… something related to engineering at a very early stage*." (Panelist 3, Q3, 00:47:16)
Cultural & Societal Influence *(New)*	Family and societal expectations	"*…I was offered medical at UKM or civil engineering overseas… I took engineering because I wanted to go abroad… motivation from family was there.*" (Panelist 1, Q2, 00:31:01)
Industry Readiness & Employability *(New)*	Communication and teamwork	"*…skills the Board of Engineers currently wish them to have – communication skills, teamwork-, investigative skills, problem-solving skills – this is what universities are trying to develop now*." (Panelist 1, Q5, 01:02:35)

RESULTS AND DISCUSSION

This section presents the findings from the pilot FGD with three expert panelists, exploring the factors that influence engineering identity among Malaysian engineering students and addressing all the research objectives.

Question 1: Can you share a key moment in your STEM education that made you feel confident in your engineering skills? What specific skills did you gain?

Pilot FGD Responses: Panel 1 highlighted his experience at Liverpool University, where he was introduced to programming and computational tools that helped him develop problem-solving skills, which still guide his approach today. Panel 2 shared that her passion for science, especially physics and chemistry, developed early on and influenced her decision to pursue chemical engineering. This strong foundational interest helped shape her identity as an engineer. Panel 3, focusing on the practical side of engineering, emphasized his affinity for hands-on work, which helped him engage with engineering concepts more effectively, instilling confidence in his ability to solve real-world problems.

The speakers discussed moments in their education that boosted their confidence and helped form their engineering identity. The insights reveal key factors influencing engineering identity development, such as early engagement with practical skills and foundational knowledge. The responses also touch upon the importance of competence (as seen in Panel 1's programming skills and Panel 2's interest in science). Additionally, a potential new dimension emerges, namely Cultural & Societal Influence, as seen in Panel 1's desire to study abroad and Panel 2's family background in science, and Industry Readiness & Employability, as reflected in the real-world applications shared by Panel 3.

Question 2: What were the most influential factors in your decision to pursue engineering? How do you think family, cultural background, or society's expectations influenced your decision?

Pilot FGD Responses: Panel 1's decision was influenced by the opportunity to study abroad, a motivation supported by his family. His societal expectation was to pursue a profession that offered global opportunities, which led him to choose engineering. Panel 2's interest in engineering stemmed from her family's strong background in science, with several family members pursuing similar paths, which instilled in her a deep passion for engineering. Panel 3, influenced by a remarkable engineer, chose civil engineering early on. His family's guidance further reinforced this choice, and while he initially pursued chemical engineering, his interest remained rooted in the broader engineering field.

Cultural & Societal Influence is clearly present in the responses, as all speakers mentioned their family backgrounds or societal expectations as motivating factors in their decisions to pursue engineering. Panel 1's desire to study abroad due to family support aligns with societal influences, and Panel 2's family-driven interest in science and engineering further emphasizes the role of cultural and societal expectations in shaping engineering identity. The responses point toward the influence of early exposure and support in forming a student's engineering identity, which could contribute to the framework development for engineering identity.

Question 3: Has anyone ever told you that you have the skills of an engineer from the beginning? How did this affect your confidence?

Pilot FGD Responses: Panel 1 shared that he was expected to pursue engineering due to his background in science, which reinforced his confidence in his engineering identity. Panel 2, though not directly told she had engineering skills, found that her industry experience and ability to apply engineering principles helped strengthen her sense of being an engineer. Panel 3, on the other hand, noted an indirect form of recognition when he excelled in subjects like *Seni Perusahaan*, which contributed to his confidence in his engineering abilities.

The discussion brings attention to Recognition, as both Panel 1 and Panel 3 reflected on how recognition (direct or indirect) contributed to their confidence. This highlights the importance of external validation in the development of engineering identity. The responses also provide insight into how confidence in engineering skills can shape a student's professional self-image, a key factor in the development of a valid framework for engineering identity. Though Cultural & Societal Influence wasn't directly discussed here, it subtly appears in how family or societal expectations shaped their academic paths.

Question 4: What are the biggest challenges students face in feeling like real engineers?

Pilot FGD Responses: Panel 1 pointed out that a major challenge for students is mastering fundamental knowledge, especially in mathematics, which forms the basis for engineering. Panel 2 emphasized that students often struggle with stress and pressure due to assessments, and she encourages students to focus on gaining industry exposure. Panel 3 highlighted a significant challenge, where students lose curiosity and interest in the subject matter, which hinders their ability to fully engage with engineering concepts and develop their identity as engineers.

The responses shed light on the Performance/Competence dimension, as challenges in fundamental knowledge (Panel 1) and assessment pressure (Panel 2) were discussed. Panel 3's focus on curiosity ties into the Interest dimension. The responses also reveal a potential new dimension, Cultural & Societal Influence, in terms of how societal pressure and academic stress may impact students' ability to form a strong engineering identity. Overall, the answers reinforce the importance of both academic competence and mental engagement in the development of engineering identity.

Question 5: What are the most essential skills an engineer must develop currently? How prepared do you think our students are for the industry and employability?

Pilot FGD Responses: Panel 3 stressed the importance of curiosity and problem-solving skills for engineers, noting that students must be interested in real-world problems to be prepared for the industry. Panel 2 emphasized the importance of critical thinking and applying knowledge to real-world situations, particularly through industry exposure. Panel 1 added that communication skills, teamwork, and the ability to use engineering tools are crucial for modern engineers to thrive in the industry.

Industry Readiness & Employability emerged as a central theme, with all three speakers focusing on the need for skills like problem-solving, communication, and industry exposure to enhance employability. These are key factors that help students feel ready for the professional world, thus impacting their engineering identity. The responses suggest a need to incorporate Industry Readiness & Employability into the framework for engineering identity development, alongside traditional factors like Recognition and Performance/Competence.

Question 6: Can you share an experience where you faced a difficult engineering problem? How did you solve it, and did collaboration play a role?

Pilot FGD Responses: Panel 1 discussed how being resourceful and working collaboratively with others helped him solve complex engineering problems. Panel 2 emphasized that communication and collaboration are vital in addressing challenging engineering issues, especially when using advanced technologies. Panel 3 also stressed the importance of being resourceful and seeking help when facing difficult problems, highlighting collaboration as a key element in problem-solving.

The responses reflect the Performance/Competence dimension, as the speakers discussed their problem-solving abilities and how they approached difficult engineering tasks. The focus on resourcefulness and collaboration also points toward the importance of teamwork in engineering identity development. While Recognition and Interest were less prominent, the discussion reinforces the importance of competence in both individual and collaborative contexts. It highlights how engineers should possess both technical skills and the ability to work with others to solve complex problems.

Question 7: Beyond academics, which experiences have had the greatest impact on shaping your engineering identity?

Pilot FGD Responses: Panel 1 shared that discipline and responsibility in meeting deadlines, especially in project work, had a significant impact on his engineering identity. Panel 2 recalled how her time studying in the US, being the only Malaysian among American students, helped her develop independence and shaped her engineering identity. Panel 3, while focusing on academic achievement, noted that hands-on projects and practical experience played a major role in shaping his identity as an engineer.

These experiences contribute to the development of Performance/Competence, as they highlight the role of discipline, independence, and practical application in shaping an engineering identity. Panel 2's experience also hints at the influence of Cultural & Societal Influence, where studying abroad shaped her identity. The responses provide valuable insights into the types of experiences that nurture an engineering identity, especially those that extend beyond academic achievement, such as independent study or working with peers in diverse environments.

Question 8: What strategies do you use to stay updated with the new trends in engineering? Do you think staying informed strengthens your sense of being an engineer?

Pilot FGD Responses: Panel 1 emphasized the importance of lifelong learning through CPD (Continuous Professional Development), as well as engaging in conversations with peers and colleagues. Panel 2 echoed this sentiment, noting that staying informed about new trends helps engineers remain relevant. Panel 3 added that curiosity and continued learning are vital, particularly in an age where technology is evolving rapidly.

The responses affirm the importance of Performance/Competence in the context of staying updated with the latest trends in engineering. Lifelong learning is a core competency that engineers must develop to remain effective and innovative. The responses indirectly emphasize the role of Interest in maintaining an engineer's passion and drive to stay informed. Industry Readiness & Employability is also touched upon, as keeping up with trends helps engineers stay competitive in the job market.

Question 9: Do you believe having a strong engineering identity and attributes improves academic and professional performance?

Pilot FGD Responses: Panel 1 strongly agreed that a strong engineering identity improves both academic and professional performance. Panel 2 also agreed, noting that a strong identity gives engineers a sense of purpose, which helps in their professional lives. Panel 3 highlighted that having a clear identity as an engineer motivates individuals to overcome challenges and excel in their careers.

This question directly links to the development of engineering identity and its impact on both academic and professional performance. The responses reinforce the importance of Recognition, Performance/Competence, and Interest in shaping engineers who perform well academically and professionally. Additionally, a sense of purpose stemming from a strong engineering identity appears to enhance employability, aligning with the Industry Readiness & Employability dimension.

Question 10: What practical steps should universities or industry leaders take to strengthen engineering identity among students?

Pilot FGD Responses: Panel 2 suggested that universities bring industry leaders into the classroom to provide real-world perspectives, while Panel 1 recommended more involvement from professional engineers in academia. Panel 3 emphasized the importance of mentorship programs and industry placements to help students gain practical experience and develop their engineering identity.

The speakers identified Industry Readiness & Employability as a key factor that universities and industry leaders can address to strengthen engineering identity. The practical steps of integrating mentorship, industry exposure, and professional involvement in the curriculum are all vital to ensuring students are well-prepared for their future careers. The responses also underline the need for

a blend of academic knowledge and industry experience in the formation of a robust engineering identity.

NEW DIMENSIONS FOR EID

While Godwin's original framework (Godwin, 2016) focused on the three dimensions of Recognition, Interest, and Performance/ Competence, the pilot study highlights two additional dimensions: Cultural & Societal Influence and Industry Readiness & Employability. These new dimensions are particularly relevant in the context of Malaysian engineering students. The cultural context in Malaysia, with its diverse ethnicities and family-driven aspirations, significantly shapes students' engineering identities. This aligns with the findings of Ju and Zhu (2023), who noted that societal expectations could either bolster or hinder students' engagement with their chosen careers. The influence of family and culture on career choices is well-documented in the literature (Tonso 2006), and it was clearly evident in the responses of the panelists in the pilot study.

The dimension of Industry Readiness & Employability is equally crucial in the Malaysian context. Students expressed a desire for more practical exposure and industry-related experiences, suggesting that a strong engineering identity is linked to real-world application and the ability to succeed in a competitive job market. This finding aligns with Godwin's assertion that engineering identity must be linked to real-world applications and career aspirations. Incorporating Industry Readiness & Employability into the engineering identity framework ensures that students are not only academically capable but also prepared for the challenges and opportunities they will encounter in the workforce. The integration of the new two dimensions to the one established by Godwin is illustrated in Figure 2.

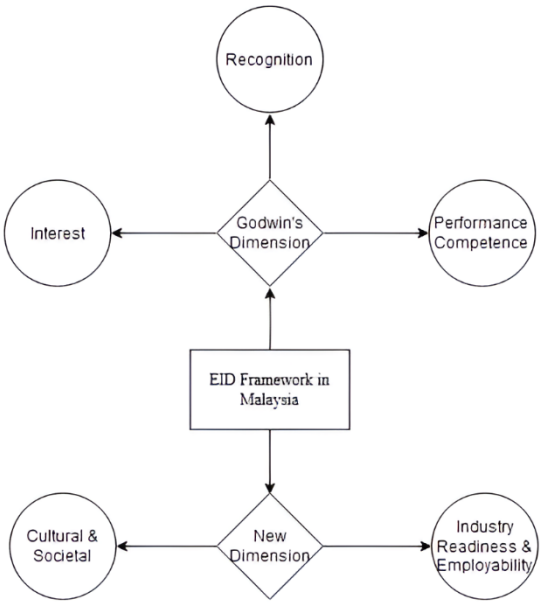

FIGURE 2. Proposed Modified Engineering Identity Development (EID) Framework for Malaysia, incorporating two additional dimensions: Cultural & Societal Influence and Industry Readiness & Employability, based on pilot FGD findings.

STRENGTH OF ADDING NEW DIMENSIONS

The addition of Cultural & Societal Influence and Industry Readiness & Employability to Godwin's framework strengthens the relevance and applicability of the model for Malaysian engineering students. The former reflects the unique cultural dynamics and family expectations that significantly shape students' decisions to pursue and persist in engineering. This dimension is essential for understanding the societal pressures that affect students' academic and professional trajectories. The latter dimension, Industry Readiness & Employability, addresses the evolving needs of the engineering profession in the age of Industry 4.0, where technical competence alone is insufficient. Students must also be prepared to navigate the complexities of a rapidly changing job market that demands both technical expertise and soft skills.

It is crucial to acknowledge that the two newly proposed dimensions are based on preliminary findings from the pilot FGD and still require validation through the actual FGD, which will be conducted soon. There remains

the possibility of identifying new dimensions or refining those derived from the pilot FGD findings. This study highlights the rigorous and detailed process required to determine the critical domains essential for establishing the Engineering Identity Development (EID) framework for Malaysia.

CONCLUSION

The pilot study successfully addresses the research objectives by confirming the relevance of Godwin's dimensions in the Malaysian context while also suggesting new dimensions that better reflect the socio-cultural and professional realities faced by Malaysian engineering students. By incorporating Cultural & Societal Influence and Industry Readiness & Employability into the engineering identity framework, this study paves the way for a more comprehensive and culturally relevant model that can guide educational policies and practices in Malaysia. This new framework will not only enhance the formation of strong engineering identities among students but also better prepare them for the challenges and opportunities of the global workforce.

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DECLARATION OF COMPETING INTEREST

None.

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