

# Navigating and reconciling identity interference and values conflicts associated with our engineering identities: A conceptual framework

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**Abstract**—Identity research has revealed that the identities that we take on can impact on our motivations and behavior. For example, the extent to which a person identifies themselves as an engineer influences how they fulfill that role. Identity research also points out that people have multiple identities, and our response to a situation is dynamically constructed based on the identities at play. However, the importance a person ascribes to one identity relative to another can potentially create interference between identities, especially since different cultural norms can inform those identities. This is particularly important for students from underrepresented populations in engineering, where the dominant identities are male, white, and heteronormative. Therefore this work-in-progress paper describes a framework for use and validation in future studies exploring our students’ identities and how they can be better supported in navigating identity interference resulting from values conflicts.

**Keywords**—*engineering identity, identity interference,*

## I. INTRODUCTION

An individual’s sense of self, or their identity, has a powerful impact on their motivations and behavior. As described in Oyserman’s theory of identity-based motivation, our motivation to act is based not only on our interpretation of our readiness to act and the difficulty of the proposed task but also on our sense of our ability to act in an identity congruent way [1]. As educators, we are all too familiar with the critical role that students’ motivation to learn plays in improved student outcomes, such as improved content knowledge, retention, and persistence [2]–[4]. Within engineering education specifically, the ongoing challenges of retention and persistence, or better yet, thriving in engineering [5]–[7], have made exploring student motivation and the role of identity critical. In response, engineering education researchers have explored the role of motivation to learn engineering [3], [8] and practice engineering [9], the impact of engineering identity formation on persistence [10]–[12], and the intersection of the two [13].

However, many of these studies have isolated motivation from identity or only considered a single identity, e.g., engineering as a profession or a particular gender, race, or ethnicity, separate from motivation. Identity research points out that people have multiple identities, and our response to a situation is dynamically constructed based on the identities at play in a particular context [1], [14]. While some studies in engineering education have begun exploring the engineering

student experience with an intersectional lens [15]–[17], more research is needed that explicitly explores the student experience from a multiple-identities framing that recognizes the impact of environment and context on our student’s dynamically constructed response.

This is particularly important for students from underrepresented populations in engineering, where the predominant identities are male, white, and heteronormative. Too often, students, for whom one or more of their identities do not match the dominant identities of the environment, are forced to let go of or suppress those identities (e.g., race/ethnicity, gender) to be taken seriously as an engineer [18]. Others have left engineering altogether.

However, rather than disowning one identity and its respective culture for the sake of assimilating into another, such as engineering, how does a person navigate the various identities and reconcile potentially conflicting cultural beliefs, values, and assumptions? Further, as co-creators of the engineering culture, how can we, as engineering educators, recognize and use these moments of identity interference to pinpoint opportunities to reshape what it means to be an engineer into something more inclusive? By answering these questions, we seek to craft a future for engineering education that is inclusive and responsive to diverse identities, supporting and removing obstacles that induce identity interference in our students.

However, we first need a conceptual framework that illustrates the forces at play. Therefore, this paper describes a framework for use and validation in future studies exploring our students’ identities and values conflicts. Here we construct a conceptual framework in tandem with an exploration of the literature informing our thinking. Further, we draw on insights from our own experience documenting identity interference and reconciliation throughout our development as engineers [18].

## II. IDENTITY DEVELOPMENT

From a narrative lens, identity can be construed as people’s “primary self-concepts and orientations in narrating their lives (Drake, 2005) ...” (as cited in [19] p. 284). Thus, one’s identity is both the basis and foundation for their behavior [19]. However, identity research also points out that people have multiple identities, and our response to a situation is dynamically constructed based on the identities at play in a particular context [1], [14], [20]. This concept of multiple identities harkens to

early identity research that describes how this dynamic construction occurs. According to the sociocultural theory of identity, for instance, individuals develop their identity, not only from their lived individual experiences, but also from the cultural beliefs and attitudes of their “community of practice” or their “cultural world” [21]. This recognition that our identities are personal and constructed in society based on our sense of self-concept relative to our membership, or lack of membership, in particular groups, was further espoused by Burke in social identity theory [22]. This process, of reconciling one’s sense of who they are as an individual with external pressures and forces coming from society, is what Erikson describes in their identity stage theory [23]. These identities are also associated with society’s expectations of the roles an individual takes on [24]. In exploring education specifically, Gee describes four perspectives for viewing identity. These perspectives, nature identity (derived from recognizing innate or natural characteristics), institutional identity (assigned by an organization to people in particular roles or positions), discourse identity (derived from observations by others of an individual’s trait), and affinity identity (belonging to a particular affinity group), vary in their prominence based on the context in which the individual finds themselves [14]. But even those identities derived from an individual’s innate or natural state of being are given power and recognition through the influence of institutions, discourse, and affinity groups they associate with [14]. Ultimately, in this study, we lean heavily on Stryker and Burke’s perspective that identity is the “composed meanings that persons attach to the multiple roles they typically play in highly differentiated contemporary societies” [25].

However, not every one of our multiple identities is equally important or at play in all contexts all the time. Rather, they can vary over time and situations. As illustrated in Figure 1, Identities 1 & 2 are equally important, or central, to this hypothetical individual’s sense of self. Denoted by the length of the connecting lines, Identity Centrality is the level of psychological attachment or importance an individual ascribes to a given identity [26], [27]. Centrality, especially for race/ethnicity or gender, is a powerful support in moments of stereotype threat, discrimination, or persistence in exclusionary environments, e.g., URMs in STEM [28], [29].

However, not all environments demand the same level of reliance on each of our multiple identities, and only a subset may be enacted and relied upon in a given moment. This likelihood of an identity being enacted in a given situation is termed Salience [27]. Salience, in a sense, is the operationalization of the hierarchical importance we assign to each identity moderated by our interpretation of the forces and needs of a given context.

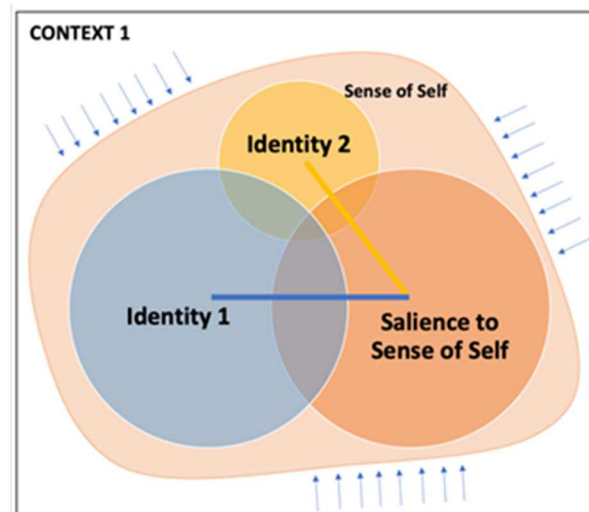


Fig. 1. Multiple identities (Centrality: Length of line; Commitment: Solid line vs. Dashed line; Exploration: Dashed line; Salience: Intersection with sense of self; Identity Interference: Lack of intersection between identities; Maturity of Identity: Diameter of circle; Environmental forces impacting development: Small arrows)

Returning to our hypothetical individual in Figure 2, suppose the context changes and the individual has matured. In this new context, identities 2 and 3 are underdeveloped. Identity 2 is the most central to who this person is in this context. Identity 1 is more highly developed of all three but the least salient in this context, denoted by the smaller intersection with their sense of self. Identity 3 is being explored as a new component of this person’s sense of self. But they have not yet formed a strong connection, hence the dashed line. As too would students of engineering considering taking on an engineering identity, they are practicing putting on this new identity but have not yet reconciled it with their other identities; therefore, there is potential for identity conflict.

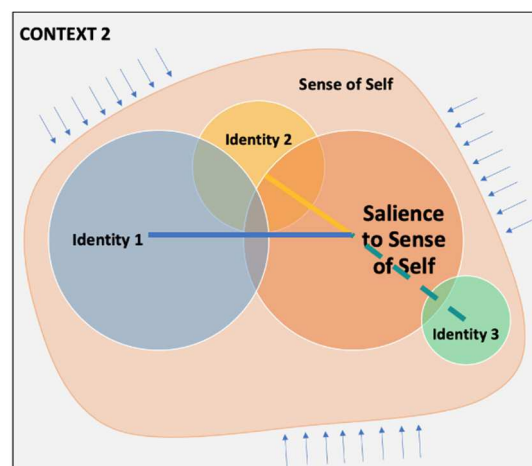


Fig. 2. Identity interference (Centrality: Length of line; Commitment: Solid line vs. Dashed line; Exploration: Dashed line; Salience: Intersection with sense of self; Identity Interference: Lack of intersection between identities; Maturity of Identity: Diameter of circle; Environmental forces impacting development: Small arrows)

### III. VALUES CONFLICT AND IDENTITY INTERFERENCE

The importance a person ascribes to one identity relative to another can potentially create interference between identities, especially since different cultural norms can inform those identities [21]. From this perspective, culture can refer to racial/ethnic, religious, political, or socioeconomic groups (e.g., Latinx, White, Catholic, Protestant, middle class, upper class). It can also refer to occupational or organizational groups (e.g., teachers, doctors, engineers) with shared goals and values (see [30]). As such, we often interpret the importance of our identities through the socially-constructed lens of those cultures and the beliefs, values, and assumptions that govern the group's actions. However, not all cultures share common beliefs, values, and assumptions, and thus interference between multiple identities can arise [26]. This interference, or identity conflict, can take two forms: cognitive, in deciding which identity to enact, or behavioral, when conflicting identities require different behaviors [31], [32].

In understanding the creation of value systems, we shift from the identity theories to Schwartz's research on human and cultural values. This research has revealed that an individual's prioritization of specific values is relative, both in being context-dependent and influenced by how their culture assigns priority [33], [34]. This means that, concerning identities informed by cultural norms, an individual's multiple identities may share common or conflicting values. Necessarily, the relative importance an individual places on particular values in a given context can create values conflicts among the identities a person holds. We theorize this is the underlying cause for identity interference, those moments where individuals are conflicted over how to act because they cannot find an action congruent with both of the conflicting identities. For example, the values an individual associates with their gender identity as a woman could conflict with the values they perceive are associated with their identity as an engineer (e.g., my prioritization of relationships as a woman makes me less capable as an engineer where individualism is commonplace).

### IV. ENGINEERING IDENTITY INTERFERENCE

Defining and understanding how individuals describe their identity as an engineer has been a topic of interest among engineering education researchers to explore issues of retention and persistence in engineering [5]-[7]. Drawing from the work of Gee, who encouraged the use of identity as an analytic lens in education [14], Carlone and Johnson described a physics identity [33]. Further expanded on by Hazari [34] and adapted to engineering by Godwin [35], [36] and Prybutok [37], students construct their engineering identity based on their *interest* in the field, their sense that they can *perform* and demonstrate *competence* as an engineer, and feel *recognized* as an engineer. However, engineering is a distinct profession with unique values, culture, and practices [38]. Therefore, students' affect towards what it means to practice engineering contributes to their development of an engineering identity [39].

However, while there is much that we love about this field we call engineering, the culture is problematic. Cech asserts that engineering is fraught with a *culture of disengagement* [40]. This culture is exacerbated by habits of mind and ideologies with underlying values of depoliticization, social-technical

dualism, and objectivity [41], [42]. As such, perceptions of engineering often do not view it as a career with goal affordances associated with communal goals such as intimacy, affiliation, and altruism [43], [44]. According to Role Congruity Theory [43], these factors conflict with perceptions of gender roles and significantly influence women's choice to avoid STEM careers [44]. Because engineering identities formed by students are heavily influenced by such values and beliefs, it stands to reason that women would experience identity interference between their professional roles (engineering identity) and their gender roles. These moments of interference can emerge in multiple domains, from engineering to leadership [45]. Furthermore, because underlying values are manifest in one's goals, the goal affordances often associated with engineering can cause women and other minoritized groups to experience incongruence or conflicts between their personal values and those of engineering education or careers.

### V. IDENTITY RECONCILIATION

Based on [18], we hypothesize that to reconcile potential conflicts between current and emerging engineering identities, an individual must work to reframe and restructure their identities to bring towards the overlap those values and norms that are congruent while minimize or reject those that do not reconcile (Figure 3). With maturity and experience, this becomes easier [46]. But for some identities, this reconciliation is not possible, and either the individual must reject the identity altogether or the forces imposed by the context must change [18], [47]. A vital element of this process relies on evaluating procedural and action readiness, described by Oyserman, where an individual assesses the level of ease or difficulty of the task and options available in the moment [47]. Further, since the source of interference often boils down to incongruence between the value systems driving culture and expectations of particular identities, the value systems themselves must be evaluated. This will be explored further in the continuation of this work in progress.

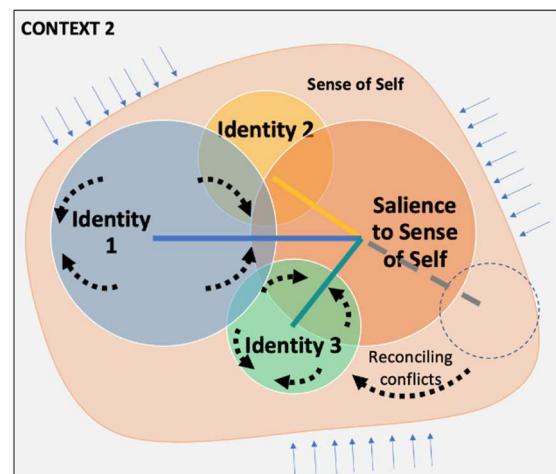


Fig. 3. Identity reconciliation (Centrality: Length of line; Commitment: Solid line vs. Dashed line; Exploration: Dashed line; Salience: Intersection with sense of self; Identity Interference: Lack of intersection between identities; Maturity of Identity: Diameter of circle; Environmental forces impacting development: Small arrows)

## VI. FUTURE WORK

The next step in developing this framework will focus on the theoretical foundation for identifying and understanding competing or conflicting values in engineering education and other engineering contexts. Doing so will allow us to explore how women and other minoritized groups in engineering uniquely experience competing or conflicting values. This new understanding can inform the development of intervention strategies to help women and other minoritized groups reconcile potential values conflicts, which has implications for their persistence in engineering education and careers.

## VII. CONCLUSION

The purpose of this paper was to begin laying a theoretical foundation from which to explore the identity interference that occurs from incongruent value systems between our students' personal and engineering identities. By understanding how a person navigates their various identities and reconciles potentially conflicting cultural beliefs, values, and assumptions, we hope that we, as engineering educators, can recognize and use these moments of identity interference to pinpoint opportunities to reshape what it means to be an engineer into something more inclusive.

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