

# Balancing Engineering and Religious Identities

Kelly J. Cross

University of Illinois Urbana-Champaign, [kjcross@illinois.edu](mailto:kjcross@illinois.edu)

**Abstract** - How can engineering educators support students that seek to integrate their multiple identities? More specifically, how can engineering educators teach students to integrate their engineering identity into their current sense of self? Previous research found that African-American college students integrate their religious and professional identities by using religion as a lens to make meaning of other identity dimensions. This research, through the theoretical lens of multiple identities, seeks to understand the experience of a single engineering student that expressed the challenges he faced as an African-American male integrating his Christian and engineering identities during his student team project. The interview data presented here was part of a larger phenomenological study design, which included a thematic analysis process. The results of the current analysis suggests that this engineering student perceived an intersection between his engineering and religious identities where his religious identity impacted his team experience. His story provides insight for engineering educators to understand the benefits and barriers that emerge at the intersection of religious beliefs and the development of an engineering identity.

*Index Terms* – Multiple identities, Engineering identity, Religious identity, and Student teams

## INTRODUCTION

How can engineering educators support students that seek to integrate their multiple identities? More specifically, how can engineering educators teach students to integrate their engineering identity into their current sense of self such as their multiple identities? Previous research on the multiple identities of African-American engineering students found that students chose to separate their social and professional identities [1]. Conversely, research beyond engineering education literature found that African-American college students integrate their religious and professional identities by using religion as a lens to make meaning of other identity dimensions [2]. Furthermore, African-American students have been found to use religion as a coping mechanism to find comfort and support, and to combat negative social cues or microaggressions that are common in engineering. Also, recent intersectionality studies consider how the interconnectedness of social identity dimensions influence students choices to pursue an engineering education [3]. Other previous studies considered Asian-American's intersections of religious and racial identity as well as the intersection of sexual orientation and Jewish identity [4]. However, the intersection

of student's religious and engineering identities has not been explicitly investigated. To fill this gap, this paper highlights the experience of a single engineering student that expressed the challenges he faced as an African-American male integrating his Christian and engineering identity during his student team project.

The data reported in this paper is drawn from a larger phenomenological study of the experiences of African-American engineering students working on multiracial teams. The analysis revealed that informal social interactions among the team members supported professional behaviors. Additionally, conflict that developed from unmet expectations was another emergent theme from the larger data set. In this paper, we focus on the experience of a single participant, Zion. Zion's Christian values influenced his engineering education as he stated that it is "because of Jesus" that he is studying engineering mechanics. According to Zion, it was divine intervention that allowed him to change his major and switch into the department from another major without resistance. Also, the unmet expectations between him and his teammates lead to significant team conflict in particular his interpersonal communication style and how he chose to interact with his teammates. While Zion expected only professional language to be used during team meeting, his teammate frequently used profanity; contrarily, that same teammate found Zion's constant discussion about his religious views similarly inappropriate. As Zion reflected on this extended conflict with his teammate, he questioned his approach to integrating his engineering and religious identity. As a result, the intersection of his identities during his experience on a multiracial student team in engineering provides a poignant case of a student trying to integrate his religious and engineering identities. This study seeks to start a conversation about the intersection of religious and engineering identities which has not been explicitly investigated.

Zion consistently expressed a strong sense of his personal identity, which impacted his team experience. First, Zion had a strong religious dimension to his self-concept, and he saw himself as a natural leader. For example, he stated, "I'm not necessarily the logical thinker. I'm just the leader who keeps organization. Also, Zion made multiple statements suggesting that he was reflecting on his engineering identity as he said, "So, lately I've been trying to do some soul searching and figure out what kind of engineer I'm going to be. 'Cause that's what I've been struggling with on the inside, trying to figure out what kind of engineer I am or if I'm even an engineer." This quote by Zion was expressed during the final installment of his interview sequence. Zion's description of his team experience helps us

begin to understand the benefits or barriers presented by the intersection of religious beliefs and developing an engineering identity. Zion's question is an important and timely question that we should engage with as engineering educators that view education as a journey toward self-discovery.

### **THEORETICAL FRAMEWORK**

Multiple Identities is a conceptual framework that provides a way to examine how an individual's demographic (e.g., race, class, gender, ethnicity, and age), cultural, social, and personal identities intersect. This approach emphasizes that a person's experience is not simply an additive sum of individual identities (e.g., African-American + male + engineering); instead all identity dimensions effect an experience simultaneously in ways that are more complex. In addition, the salience of any single dimension of identity can vary greatly by context. The initial conceptual Model of Multiple Dimensions of Identity (MMDI) was developed to address multiple traditionally oppressed identity dimensions such as race and gender [5]. In this study, religious identity refers to the level to which Zion identifies with Christianity and the salience of his religious beliefs as demonstrated by his willingness to discuss his beliefs [6]. Similarly, engineering identity was operationalized as the extent the extent to which Zion defines himself as an engineer (centrality) and develops a sense of belonging in the engineering profession [7, 8].

The MMDI was re-conceptualized as the result of the investigation of additional student characteristics or identity dimensions to account for the complexity of context, meaning-making, and identity perceptions [9]. Various studies applied multiple identities theory to African-American college students [10] [2] [1]. Key in this research is that college students are continually experiencing intersections of their various identities (e.g., racial, gender, professional), while simultaneously exploring and developing these identities. Furthermore, the relative salience of any dimension of a college student's identity, particularly students of color, varies by context [1]; and in some context, multiple identities may be in conflict with each other, leading to negative outcomes [11]. For example, Tate & Linn's study on the multiple identities of Black college students, found that females tend to separate their social and professional groups [1]. Other studies found that Black college students were able to integrate the multiple dimensions of their identity and grew less reliant on external validation [10]. Also, multiple identities has been used to explain Black college students perceptions of the role of spirituality in the making sense of their identities and college experiences [2]. Therefore, multiple identities is a useful conceptual framework to explain how different dimensions of African-American engineering students' identities intersect during multiracial student team experience.

### **METHODS**

The larger study employed a phenomenological approach to

understand the phenomenon of being an African-American on a multiracial student team in engineering. This approach included a three-interview sequence with eight African-American male engineering students (across academic levels) as they worked on team projects at a large research-intensive, predominantly white institution (PWI). Data collection consisted of three individual interviews with each participant to understand his experience on a multiracial student team. Each three interview sequence was conducted over the course of a spring semester. All interviews were audio recorded and transcribed verbatim. Typically, the interviews lasted 45 minutes and each was conducted as least three weeks a part. Although data was collected from both males and females, initially only the male participants were analyzed. For each participant, the data analysis followed the process outlined by Hycner [12] and described in detail elsewhere [13]. This paper highlights the experience of one participant, Zion, with a strong sense of self and the intersection of his identity dimensions.

### **PARTICIPANT**

Zion, a senior in the engineering mechanics department, working on his senior design project. His team members were assigned based upon the interest in the project. This student team was multiracial with members from different racial or ethnic groups in addition to being mixed gender with half males and females. Zion had a generally positive disposition toward teamwork, despite challenges and he learned teaming skills by participating on multiple teams during his engineering education, even those prior to senior design. He had a clear sense of identity and described being stereotyped multiple times. Zion had a strong religious dimension to his self-concept, and he saw himself as a natural leader. For example, he stated, "I'm not necessarily the logical thinker. I'm just the leader who keeps organization." Finally, Zion also made statements that suggest the salience of engineering identity, where his work as an engineer was important to him. The combination of his statements coupled with his significant self-awareness, led to the question of how and in what ways do the multiple identities of Zion intersect and influence each other during his engineering education.

### **CURRENT STATUS**

This project is currently in the data analysis phase, where emergent themes are being identified from clusters. The males have been analyzed with a phenomenological analysis procedure but will be further analyzed with a constant comparison method [14]. Also, evaluating the experiences of the female participants is also part of the next steps in this study. Specifically, two relevant themes are summarized below that are specific to Zion, our exemplar of his intersecting multiple identities.

### **PRELIMINARY FINDINGS**

Preliminary findings from Zion's team experience suggest three key points. First, as a senior, Zion was comfortable with

his major and successfully navigating his engineering education, but still pondered the question,

“what kind of engineer I am or if I’m even an engineer.”

In this quote, Zion is not referring to a discipline or type of engineering, but how will his professional activities integrate with his strong religious identity and lifestyle.

Another example of the intersection of Zion’s religious and engineering identities became evident through his major selection. When asked why he choose his engineering major, Zion replied, “Jesus, literally. Um, I wanted to go to graduate school to do biomedical engineering. And I didn’t know how I would necessarily get there, so I had to do a lot of praying.” In this statement, his religious beliefs directly influenced a major decision about his engineering education and identity development. Zion also stated during his second interview,

“Umm, one of the biggest things for me is, and this is, this goes both ways, and I recognize that I have a work, I have something to do with it as well, but keeping even religion and personal values, outside of the workplace. That’s a difficulty Cuz, I, I am a Christian and I love Jesus. And I talk about him, I sing, all the time and when were in our meetings, I do my best to try to keep it to a minimum, because I can’t really cut it out altogether, but umm, what I do is I try to ask for respect, if I can try to cut mine out, that my cohorts could cut out their excessive cussing. Cuz, there’s like extreme, excessive cussing, like the F bomb, drops a lot of times and there was one day, last semester, or two semesters ago, we had a conversation before we were in a group where I asked her, if she was stop cussing. And she said, “well I’ll stop cussing, if you stop talking about Jesus” and stuff like that. And around her, I thought that I was regulating, you know, for me. What I thought, I didn’t talk about Jesus as much anymore”

In this statement, Zion identifies himself as a Christian who talks about Jesus often. Furthermore, his strong religious identity is evidenced by his inability to minimize how much he talks about Jesus even during team meetings. His statements can be interpreted as his consistent conversation about Jesus is critical to his core sense of self and he will bring that trait into the engineering environment. Another example of his willingness to introduce his beliefs into engineering was explained during his third interview when he said,

“Um, I think the most important thing to me, I really care about people’s feelings a lot more. Um, I know I’m an engineer and inside of my engineering degree, I think a lot of the things that I focus on aren’t even technical as much as I studied for, they’re a lot um, social.”

In this statement, Zion emphasizes the social aspects of

being an engineer. His comment about caring about others is consistent with his religious beliefs, but he also identifies himself as an engineer. The above quotes are three examples of the intersection of Zions religious and engineering identity.

1) He mentioned the role his faith played in his decision to choose his major; 2) He talks about his religious beliefs during common events in the engineering culture including the team meetings; and 3) He expressed that caring for people (a tenant of his faith) is just as important as the technical side of what he does as an engineer.

Another theme that emerged from Zion’s experience was the way in which conflict materialized from unmet expectations based on anticipated professional behaviors. According to Zion,

“We had a lot more, letting loose and it really um, it set off a very bad vibe between a couple of team members, a little bit of arguments going on. But because it was too much personal inside the work environment, it got really bad, so. Um, one’s religion conflicted with one’s mouth.. As the year went on, I knew what not to do, what buttons not to push. And it was a hard thing for me. You know, to learn how, what professional really meant. Um, separating my personal beliefs from my work experience.”

In this quote, Zion indicates that his teammate’s use of profane language was counter to his religious beliefs. Lastly, Zion, during his reflective interview, described his identity conflict as he continued to characterize his experience with his engineering student team. Zion spontaneously began to passionately thank God as he reflected on his teaming experience and stated,

‘Cause that’s what I’ve been struggling with on the inside [Okay] trying to figure out what kind of engineer I am or if I’m even an engineer.”

Conversely, Zion recognized that he had to control his conversation about his religion when he stated,

“Um, I was, I’m a zealous individual when it comes to my faith, very zealous, and zeal doesn’t always get the job done ... And now I’m starting to realize that there is realism. That you can’t just be all out, unless, I’m a minister of the gospel for a living. If I’m going to somebody else’s work place, where they’re providing a check, I’m going to follow their rules.”

Collectively, these statements illustrate how his religious beliefs impacted his interactions with team members and how his experiences in engineering led him to see his religious beliefs as potentially in conflict with his engineering identity.

The analysis of the data will provide a more holistic description of the ways students’ multiple identities intersect during their engineering education. More importantly, these nuanced understandings can illuminate strategies for engineering educators to support students integrating the multiple dimensions of their identity including their

engineering identity and religious beliefs. Finally, the results of the analysis could have pedagogical implications that point to ways of being more accepting of students' difference and inclusive in our engineering context.

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## AUTHOR INFORMATION

**Kelly J. Cross**, Post-Doctoral Researcher, University of Illinois Urbana-Champaign, [kjcross@illinois.edu](mailto:kjcross@illinois.edu)