

## **Investigating Use of Critical Consciousness: A Path to Change Engineering Ecosystems**

**Introduction:** The purpose of this research is to investigate how the three components of critical consciousness equip an engineering education community to explore and establish ways to support marginalized students. A core tenet in Ladson-Billings's culturally relevant pedagogy, critical consciousness spans disciplines [1]. Critical consciousness (CC) refers to an individual's awareness of oppressive systemic forces in society, a sense of efficacy to work against oppression, and engagement in action against oppression. It has 3 components: critical reflection (awareness of both historical and systemic ways oppression and inequity exist), critical motivation (perceived capacity or moral commitment to addressing inequalities, and critical action (participation in individual or collective action to change, challenge, and contest perceived inequity) [2,3]. A notable gap that I have identified in the realms of critical consciousness pertains to the evaluation of the oppressor and/or individuals who wield significant power. While critical consciousness has predominantly focused on marginalized communities, youth, and those who have been recognized as oppressed, there is a dearth of research that delves into the perspective of oppressors within the education system, such as supervisors, instructors, and administrators. It is imperative to develop a framework for critical consciousness that can also be applied to scrutinize the complicit role of these individuals in perpetuating oppression and inequities within higher education institutions and organizations.

**Conceptual Framework:** The conceptual framework developed will combine and repurpose existing critical consciousness frameworks, to 1) introduce the three components of critical consciousness, 2) align the components to levels of critical awareness, and 3) use the levels of critical awareness and sensemaking to assess participants' critical awareness. A conceptual framework is being used because it allows the connection between different concepts relevant to understanding critical consciousness in terms of its components and mapping it to how to measure each component. This section will explore the foundational theoretical frameworks and concepts that will be used to develop the conceptual framework. The primary theoretical frameworks that will be discussed, are Waite's (2021a) R.I.S.A. framework, Diemer et al.'s (2015) three core elements of critical consciousness, Jemal's (2016) transformative potential, and Watts, Griffith, and Abdul-Abdil's (1999) five stages of development.

**Research Questions:** 1.) How do engineering faculties' descriptions of critical consciousness vary based on their positionality and lived experiences? 2.) How does engineering faculties' critical consciousness development vary based on their positionality and lived experiences? 3.) How do instructors engage critical consciousness in their teaching pedagogy if at all?

**Methods:** I will conduct a series of 1-on-1, pre-and post-semi-structured interviews with engineering faculty to examine their critical consciousness development and descriptions of CC from childhood to career paired with a workshop that explores the conceptual framework.

**Desired Population:** For my study, I plan to draw from the population of postsecondary engineering faculty who are tenure or non-tenure track faculty. Faculty is defined by the National Center for Education as "professors, associate professors, assistant professors, instructors, lecturers, assisting professors, adjunct professors, and interim professors" [5]. Non-tenure track faculty would be those that identify as instructors, lecturers, clinical, and/or practitioners. Tenure-track faculty are those who identify as assistant, associate, or full professors. Faculty are of interest because they are facilitators of curriculum, are in control of their pedagogical practices, and are involved in departmental policymaking.

**Recruit & Select:** I will work with the College of Engineering Associate Dean of Faculty Affairs and partners to advertise my study through email and physical flyers at events to recruit faculty. The focus of my participant selection is faculty classification and years of experience in the position. To mitigate attrition, I will recruit at least 10 participants to ultimately ensure 5 to 6 participants remain. I aim to get faculty from different engineering departments. I will purposively select participants via screening faculty for their desire to improve students' experiences, especially those students who are marginalized, through reformed policies and teaching practices and a strong interest in learning about culturally sustainable pedagogy. Additionally having faculty and lecturers who are interested in diversity, equity, and inclusion (DEI) research and teaching practices are not a requirement but is encouraged, however, if a participant

does not convey these qualities they are still welcome to participate in the study as it increases the variety of participants.

**Data Collection:** Prior to the interview, I will ask participants to reflect on their engineering trajectory and overall career to highlight critical incidences or thoughts to examine their critical consciousness development over time. During the baseline interview, I will examine participants' CC development and descriptions of the three elements of CC (RQ1 & RQ2) and go over their reflections/timelines. After I will conduct a follow-up interview to review the baseline interview content with the participant to ensure content is accurate, probe for recall, and co-construct knowledge about CC. Then, I will host a workshop to educate individuals on using and implementing the critical consciousness framework in their teaching and/or research practices (RQ3). Later, I will ask participants to reflect on the workshop, their knowledge gained, how it has changed since the initial interview, and how they plan to apply critical consciousness components in their future work. Finally, I will provide a guide about the foundations and implementations of critical consciousness.

**Reciprocal Relationship with Participants:** It is important to me that participants feel empowered and supported by their participation in enduring ways. I will work with the COE Office of Diversity and Inclusion as well as COE Faculty Development initiatives to create workshops on CC to support them in transforming their engineering classrooms.

**Dissemination and Propagation:** I will publish findings for audiences in the research community, such as DEI and higher education scholars, through traditional publication methods (journals, conference proceedings). For STEM faculty and administrators, I will give a seminar through my department's semesterly series. I will create informational material in the form of a podcast or short, accessible videos uploaded to media platforms to reach STEM-focused audiences beyond engineering education and in higher education settings, such as P-12 school systems and non-profit organizations.

**Intellectual Merit:** My focus on transforming pedagogical practices to make them more culturally sustainable, drawing on the 3 components of critical consciousness, will make significant contributions to knowledge and efforts to dismantle oppressive systemic structures in engineering education. This work is timely as stakeholders (e.g., NSF, National Academies) seek to broaden participation in engineering and there is an acute need to understand the roots of existing disparities. Critical consciousness can help educators broaden their conception of engineering knowledge and its role in supporting their students' epistemic agency [3,4] and in helping students achieve ABET Criterion 3. My study design is structured to gauge participants' knowledge and feelings and expose them to the critical consciousness framework and help them apply it. Completing my doctoral work with Dr. Monica Cox (a distinguished professor, qualitative researcher, and change agent committed to DEI) will make my research and dissemination robust and worthwhile to others.

**Broader Impacts:** By creating awareness of how to operationalize the critical consciousness framework, my study has strong potential to promote the incorporation of culturally sustainable pedagogy in engineering education. Asset-based teaching and research practices are critical in creating beneficially diverse spaces where marginalized students feel accepted. Faculty and students knowledgeable of the critical consciousness framework and students' assets are likely to aid in broadening participation as they work to empower, retain, and support students with marginalized identities. The use of CC has emerged in the last decade and engineering with few studies operationalizing its components. This study may lead to the framework's adoption in other STEM disciplines, reforming pedagogical practices and motivating stakeholders to become advocates for change in the STEM education ecosystem.

**References:** [1]. Holly Jr. & Buford (2022) *ASEE.*, [2]. Heberle, Rapa, & Farago (2020). *Psychology Bulletin.*, [3]. Diemer et al. (2021). *Child Development Perspectives.*, [4]. Carlone, Mercier, & Metzger (2021). *J. of Pre-College Eng. Edu. Research.*, [5]. NCES (2022). *Annual Reports.*