”Say It Anyhow You Can”: Unpacking How Engineering Faculty Members Approach Culturally Relevant Engineering Education at an Iraqi University

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Abstract

This evidence-based research paper emanates from an Iraqi context. After 15 years of conflict, Iraqi higher education institutions are crucial to the country's efforts to rebuild and unify. Engineering in particular is an important discipline for the individual and socio-economic development of skilled workers needed to restore and rebuild national infrastructure. Engineering faculty enabled with the tools and skills to productively teach, learn, and research can mentor graduates with the technical and professional skills needed to support the country's economic growth. In 2019, the US Department of State funded a project to invest in the Liberated Universities of Iraq[1]. One of the focus areas of this project was the professional development of each University's engineering educators because of its affordances for sustainable economic growth. Subsequently, Purdue University, World Learning, and an Iraqi University conducted a joint needs assessment to identify the specific areas of interest for the engineering faculty members. A population survey was conducted with all 161 faculty members of the College of Engineering. The needs assessment identified student-centered learning, blended learning, and culturally relevant pedagogy as the faculty members' core pedagogical areas of interest. These needs were identified in a conscious attempt to navigate the disruption to normal day-to-day classroom practices caused by the COVID-19 pandemic. These findings were further used to design and facilitate a virtual 7-session three-month faculty development workshop. Our research team was interested in the cultural lens of engineering education in this context. Our research questions were as follows: *What does culturally relevant engineering education look like in the context of Iraq? How do engineering faculty members who participated in a focused professional development workshop provide culturally relevant support to their students?* We recruited 19 workshop participants, and 9 consented to participate in this study. Our data consist of semi-structured interviews, reflection journals, and survey questions developed to investigate the three criteria (academic achievement, cultural competence, and critical consciousness) suggested by Gloria Ladson Billings in her theory for Culturally Relevant Pedagogy (1995). Using content analysis, we coded the data and categorized the three criteria. Our analysis showed that of all three, participants in this specific context leaned more toward cultural competence. This was evidenced by their frequent use of Arabic language code-switching to navigate the difficulty of explaining technical engineering jargon to their students. Additionally, most of the participants reported frequent cases of using contextual analogies in their engineering classes. This paper further nuances the tripartite criteria of culturally relevant pedagogy, illuminating through the voices of participants in this context, a different way to understand what culturally relevant pedagogy looks like in racially homogenous yet ethnically heterogeneous cultural contexts.

[1] Pseudonym used for University name

Introduction

Context Setting – History of Violence in Iraq

Since the beginning of the 21st century, the Republic of Iraq has been ravaged by wars and conflict: a US-led invasion in 2003, a civil war that raged from 2006 to 2008, and the militarized occupation of Northern Iraq by faith-based extremist groups from 2014 to 2017. Aside from the immeasurable loss of life and psychological trauma, the infrastructural and socioeconomic damages to the nation have been significant. National reformists and officials estimate that the country incurred more than $88 billion dollars' worth of damages in the tumultuous period [1]. The United Nations Human Refugee Agency estimates that over 1 million Iraqis are living in protracted situations and over 2 million remain internally displaced [2]. Yet, the nation has been on a steady path toward reclamation, reformation, and rebuilding of its historical, cultural, and social infrastructure [3].

Education has an important role to play in supporting a country's economic recovery after years of conflict and instability[4], a fact that is not lost to citizens of the republic [5]. Particularly, higher education has a critical role in providing career development opportunities that translate into successful integration in community development in both stable and conflict settings [6]. Addressing infrastructural or socioeconomic challenges requires advanced skills such as problem identification, problem scoping, and problem-solving skills [7]. Similarly, addressing psychosocial challenges requires complex skills like emotional regulation and conflict resolution [8]–[12]. Sometimes, fixing broken relationships can be as important as rebuilding broken bridges.

Engineering in particular is an important discipline for the individual and socio-economic development of skilled workers needed to restore and rebuild national infrastructure [13]. Furthermore, engineering faculty that are enabled with the tools and skills to productively teach, learn, and do research can successfully mentor graduates with the technical and professional skills needed to support the country's economic growth. There is perhaps no candidate better equipped to serve as conduits of cultural and historical knowledge than educators. Competent and qualified educators are integral to the overarching goal of preparing graduates with the requisite hard and soft skills necessary for successfully thriving in and contributing to any economy.

Investing in the Liberated Universities of Iraq

In 2019, the United States Department of State funded a project to invest in the Liberated Universities of Iraq. One of the focus areas of this project was the professional development of the Universities' engineering educators because of its affordances for sustainable economic growth. Since 2019, the project has been overseen by a global nonprofit organization with a long history of implementing projects in Iraq. This organization initiated a collaboration between a US-based institution with highly ranked and respected engineering programs and one of Iraq's top universities. The engineering colleges of both Universities set out to collaborate on meeting international quality standards, through faculty exchange and professional development, curriculum development, and joint projects.

In this evidence-based research paper, we present both the details of the design of the professional development workshop as well as the findings of the ensuing research conducted by members of the partnering institutions and organizations. The sections are presented as follows:

1. Conducting a needs assessment study to design the professional development workshop.
2. Using backwards design for the development of workshop modules.
3. Itemization of workshop curricular priorities and philosophy of engagement.
4. Designing a research study to investigate culturally relevant engineering education in this context.

Conducting a Needs Assessment Study to Design the Professional Development Workshop

The intended participants of the faculty development workshop were engineering faculty members with varied (10-40) years of teaching experience in the college of engineering at the Iraqi University. Each faculty member had excellent content knowledge of their respective disciplines. After a series of meetings with members of the school administration, we sent out a needs assessment survey via personalized links to the 161 faculty members in the college of engineering. The survey consisted of 11 sections including background and qualifications, current work, individualized approach to teaching, Information and Communication Technologies (ICT) self-efficacy and perceived usefulness, professional development history, school climate, and school culture. The primary goal of this analysis was to facilitate conversation and inform stakeholders of the areas of interest to concentrate the efforts of the proposed faculty development workshop. The research team collected open responses from January through February 19, 2021 and recorded an overall response rate of 50% (83 responses started, and 71 responses completed).

Our analyses of the quantitative data received were categorized under four main sections - respondents' demographics, professional development history and needs, nature of instructional practices and resources, and institutional factors. Concerning the demographics of the respondents, we observed that 90% were male, with relatively equal participation across four departments (Civil, Dams & Water Resources, Electrical, and Mechanical Engineering). Chemical & Petroleum engineering had the lowest participation because of the size of the department. Most of the respondents were aged between 40 and 49 years (51%) and most of the faculty were employed full-time (80%). The results also showed that respondents expressed a need for professional development in the following areas: teaching students with special needs, teaching cross-curricular skills such as problem-solving, collaboration, creativity, etc., individualizing learning, and ICT skills for teaching. We also found that previous training that respondents had participated in excluded elements of culturally relevant pedagogy (CRP) & teaching in multicultural/multilingual settings. We discussed these findings with the administrative team at the Iraqi University.

The administrative team requested clarifications on culturally relevant pedagogy as a matter of interest. They confirmed that the location of the University consisted of Sunni and Shiite Arabs, considered to be ethnically similar, as well as consisted of Kurdish residents whose ethnicities are significantly different from the Shiites and Sunnis [14]. The team also confirmed that this school's population distribution was representative of the region and explained that there had been no need for training in CRP since all of the students speak Arabic and were expected according to the school's policy to be able to converse in English. However, after learning of the affordances of CRP, they insisted that it be included in the workshop modules. The analysis of the needs assessment survey also revealed that while most of the faculty respondents agreed that ICT could greatly enhance their teaching, more than 45% were skeptical of its consequences on student engagement. Paradoxically, all respondents found ICT self-efficacy to be important because of the upheaval that had been caused by the COVID-19 pandemic. Most had transitioned to teaching their classes online and were largely unfamiliar with using learning management systems to manage online student learning.

Thus, we identified the following as the most critical needs for the professional development workshop – student-centered learning, blended learning, collaborative learning, and culturally relevant pedagogy.

Using Backward Design for the Development of the Workshop Modules

The modules of this faculty development workshop were informed by the needs assessment survey and guided by literature. One of the key learning objectives was that participants of the workshop would be able to design and facilitate learner-centered instruction using active and collaborative pedagogies in a blended learning environment. Thus, modules were categorized under technological knowledge and pedagogical knowledge. Workshop modules involving technological knowledge were informed by two theoretical frameworks – the 'technology acceptance (TAM) model' [15] and 'technological pedagogical content knowledge' (TPCK) [16]. The TPCK framework illustrates the knowledge needed to make a choice of the appropriate educational technology that best intersects with pedagogy and content [17]. The Technology Acceptance Model theorizes the process by which users adopt any new or existing piece of technology, a logic that translates into adapting educational technology. We included in our workshop modules, a review of the affordances and limitations of learning management systems [18].

Workshop modules involving pedagogical practice were based on theoretical frameworks for improving student engagement in engineering classes using active, blended, collaborative pedagogies [19]–[21], formative assessments, and culturally relevant pedagogy [22]. The assessment of the workshop's overarching learning objective was guided by the situated learning theory [23] which states that whatever is present during learning becomes a part of what is learned, including the context. Based on a review of the literature, we created an itemized list of research-based recommendations for teacher/faculty development which included the following:

1. Effective use of learning management systems requires training and periodic reflection on the impact of using ICT tools in any given context.
2. Blended learning adopts aspects of in-person and online learning environments to improve student engagement.
3. Active, blended, collaborative pedagogies of engagement are more effective than traditional lectures in helping students achieve learning outcomes in engineering classes.
4. Students tend to recollect, internalize, and apply their knowledge of Science, Technology, Engineering & Mathematics (STEM) concepts when learning is connected to real-life experiences and educators employ effective pedagogies of engagement.
5. Teachers can effectively cater to students' contextually different learning objectives if properly equipped with a repertoire of pedagogical skills to choose from.
6. The role of assessment in active pedagogies of engagement should be a formative tool to investigate how well students are learning concepts and not merely a summative tool to award a grade.
7. Teachers develop their practice by carrying out thoughtful reflection on pedagogical decisions they make and sharing and learning from a community of peers.

Wiggins et al. [24] in their proposition for backward design categorized curricular priorities into three levels – enduring outcomes, important-to-know concepts, and good-to-be-familiar-with concepts. Enduring outcomes refer to learning goals that instructors aim for and expect their students to recall or reenact long after the course or instruction is over. On the other hand, important-to-know and good-to-be-familiar-with concepts, though self-explanatory, contribute to enduring outcomes. Guided by the findings of the needs assessment study, a list of curricular priorities were agreed upon by the workshop design team.

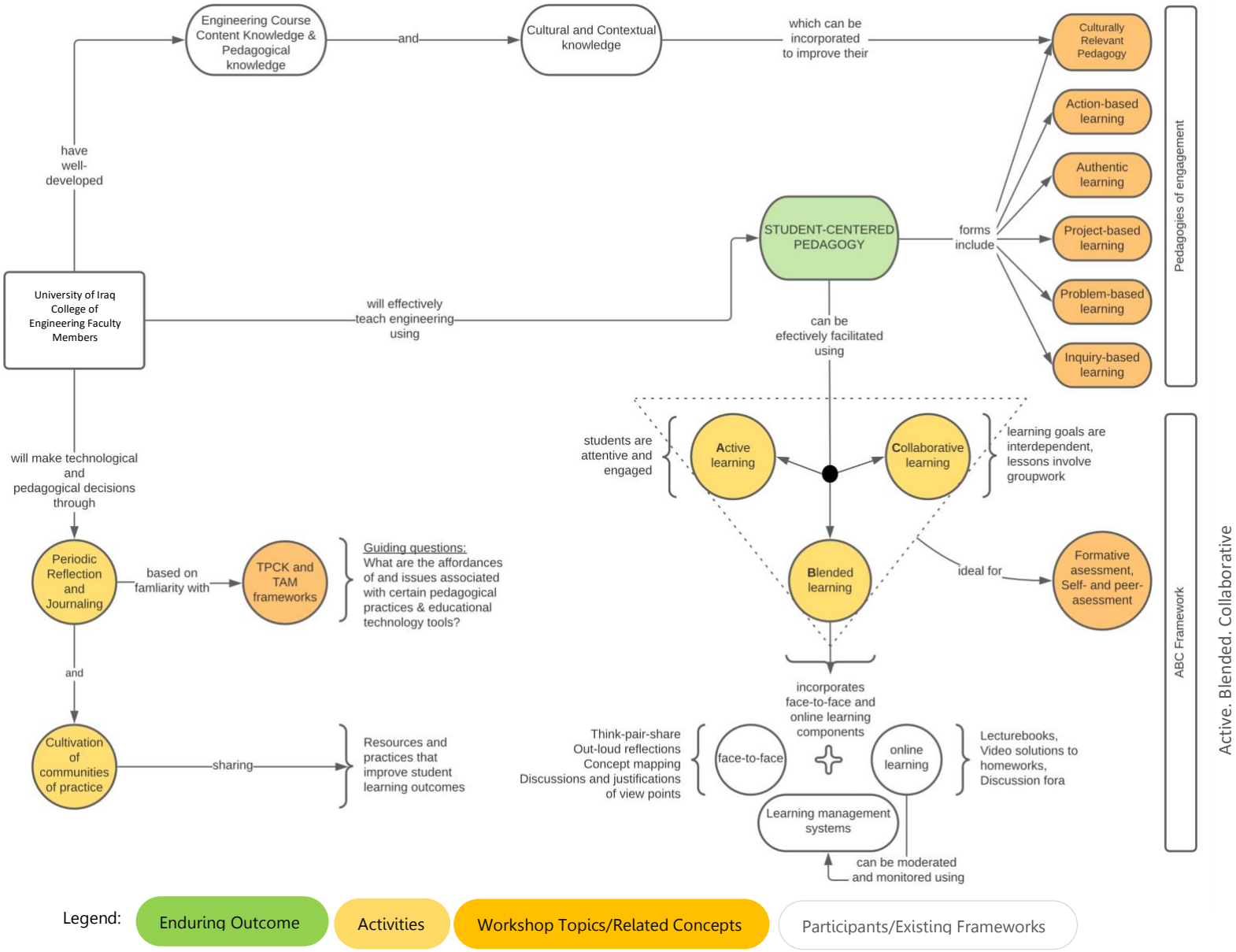

Figure 1. Concept Map of Curricular Priorities for the Faculty Development Workshop

Philosophy of Engagement and Curricular Priorities

The enduring outcomes of the workshop concerned an internalization of various active, blended, collaborative pedagogies of engagement that are particularly effective for teaching engineering students. Participants of the workshop also demonstrated through their reflections and mock classroom sessions that educators effectively monitor and moderate student learning in online environments when the education technology tools are adapted to their context-specific needs. Several online tools useful for blended learning were introduced to the participants as important-to-know resources. Participants reflected in their journals about the role of assessment as a formative tool. For the good-to-be-familiar-with concepts, participants were introduced to literature surrounding culturally relevant pedagogy, pre-existing frameworks for technology adoption in their contexts, and rubrics to assess their students' 21st century skills. A concept map of the curricular priorities is presented in figure 1. The workshop's philosophy of engagement centered on reflective practice and peer collaboration/mentorship.

Reflective Practice

The role of reflection was highly valued in this workshop as an intentional approach to making pedagogical and education technology adoption decisions for students. Thus, we committed to emphasize ongoing reflection and journaling. Through discussion prompts, participants were encouraged to (1) think critically about how they contextualized and individualized course contents to students' needs, (2) explain how they aligned their course contents, teaching methods, and assessment of student learning outcomes (formative, summative, self- or peer-assessment, etc.), and (3) justified their choice of pedagogical aids and education technology.

Peer Collaboration and Mentorship

Most importantly, evidence from the research on teacher scholarship shows that for professional development to be effective, it must be an ongoing process that extends beyond the lifetime of professional development workshops [25]. Instructors are best suited to succeed when they cultivate a community of practice that meets regularly to discuss resources, pedagogical approaches, and tools that teachers use to improve student outcomes. The philosophy of the facilitators was that participation is most effective when participants complement others by bringing their wealth of individual experiences. At the intersection of those unique experiences lies the picture of the ideal educator. Participants were encouraged to learn from their peers and the facilitators (who were co-learners too) over the course of this workshop.

During the workshop, the participants examined the importance and benefits of student-centered learning and discussed the strengths and weaknesses of different teaching case studies. Using evidence-based research findings, they redesigned a section of their respective course contents and made improvements to it using the feedback they received from their peers. Participants also got an opportunity to develop their competencies in moderating online classes and made informed decisions on technological tools that will achieve their students' learning goals within the constraints of the local context.

The last workshop session ended on September 13th, 2021. One month later, issued certificates of completion to all participants of the workshop who were also required to meet the minimum requirements for participation (attendance of 80% of workshop sessions, engagement in the Learning Management Session, and completion of reflections/redesign of a section of their course using concepts learned at the workshop). We also issued Community of Practice Leader Certificates to 4 faculty members who went above and beyond in their commitment to furthering the propagation of the outcomes of the workshop to their colleagues at the University and were the most engaged during the workshop.

Methodology

Designing a Research Study to Investigate Culturally Relevant Engineering Education in this Context.

We treated this study as a single case study consisting of a needs assessment study, a workshop design and facilitation stage, and semester-long teaching of single courses by the workshop participants of the College of Engineering at the University of Iraq. At the start of the needs assessment, a population survey was sent out via individual links to all 161 faculty members. The needs assessment survey was modified slightly to serve as a post-workshop survey. This way, we were able to analyze changes in perceptions over the course of the study. Thus, our study data included both pre- and post-workshop surveys.

Research Questions

In the design of our research instruments, we sought to answer our research questions: What does culturally relevant engineering education look like in the context of the University of Iraq? How do engineering faculty members who participated in a focused professional development workshop provide culturally relevant support to their students at the University of Iraq?

Data Collection

During the course of the workshop, we collected data from reflection journals kept by the workshop participants. The reflection journal contained prompts after each section/module of the workshop. Participants had self-reflection prompts (to situate them in the moment reflecting on the enduring outcomes of the workshop), as well as daily reflection prompts (to identify the most challenging concept they learned during the workshop, what they believed they were doing well before, and what they could improve on). We recruited nineteen participants for the workshop through a non-randomized sampling informed by the University's administration. Fifteen participants identified as male and four identified as female. Of the nineteen participants, nine (9) agreed to participate in the qualitative research following the workshop. The post-workshop data collection consisted of semi-structured interviews and member-checking sessions.

Summarily, our data consist of semi-structured interviews, reflection journals, and pre-and post-workshop survey questions developed to investigate the three criteria (academic achievement, cultural competence, and critical consciousness) suggested by Gloria Ladson Billings in her theory for Culturally Relevant Pedagogy [22]. The collection of interview data and member-checking after the first stages of analysis continued until January 2022.

Data Preparation

We spent over two months transcribing the data collected during interviews. This was necessitated by the fact that several logistical challenges had to be overcome, the most prominent being the busy schedules of faculty members who had long since resumed teaching.

Data Analysis

Although we collected several data for this study, the research question driving this study concerns the understanding of and the approach towards culturally relevant engineering education at the University of Iraq. Consequently, we employed a deductive coding approach in the development of a codebook for the analysis of the qualitative data [26]. Deductive coding follows a top-down approach that develops pre-set codes from a review of the literature surrounding a topic of interest. Thus, we visited the literature surrounding CRP, seeking to develop not only parent codes but also a codebook that was vetted and intended for use by a group of researchers [27].

The codebook development process went through three rounds of consultations, discussions, and modifications. In the first round, we defined the three criteria of Ladson-Billings's culturally

relevant pedagogy (academic achievement, critical consciousness, and cultural competence). During the workshop session concerning culturally relevant pedagogy, we discussed these definitions and asked faculty members at the College of Engineering in Iraq to comment on them, describing how they understood them or what changes they would suggest. Two workshop participants applauded the conceptual framework surrounding CRP but cited two reasons why they doubted that their context was ideal for a study using CRP. First, they considered their classes racially and ethnically homogenous; second, they problematized the involvement of parents as external funds of knowledge in higher education within the context of Iraq. These suggestions intrigued us and are further discussed in the sections that follow.

The second stage of the codebook development process involved identifying the sub-themes of the parent codes followed by explicit definitions of their inclusion and exclusion criteria. The inclusion/exclusion criteria of the codes helped us ensure that we were not double-coding conceptually inconsistent items. In the third stage of the codebook development, we shared the codebook with a research lab consisting of researchers who had published research work on culturally relevant pedagogy, indigenous teaching, and student-centered teaching, and had several years of international engineering education research experience. The team suggested modifications to certain words leveraging their own experiences in diverse contexts using those words. For example, the team problematized the use of personal in the sub-code that stipulated "reflecting on personal cultural lens" because it could either mean another individual or the self. The use of the word "culture" was nuanced to better reflect "workshop participant's experiences". A sub-code under cultural competence was originally described as incidents where there was a recognition of the various assumptions that University of Iraq College faculty members have which can be traced to their cultural experiences. However, we modified this code because it did not specify who was doing the recognition and how they arrived at the realization. Thus, we rephrased it as incidents where faculty members recognized the assumptions that they themselves have, which they are able to trace back to their own experiences in that context. Finally, we asked the research team to suggest sample expressions that would help the two primary researchers identify each code in the analysis.

Analysis Procedure and Trustworthiness

The final thematic analysis was eventually done by the first author using NVivo. The research team met on three separate occasions to discuss the findings of the analysis. Emerging results were discussed with other stakeholders on the project as we prepared to share them with the broader research community. Three of the participants of the study were invited to provide rich contextual evidence supporting some of the findings that emanated from the study during an annual international conference.

Findings

In this paper, we were motivated to find out what culturally relevant engineering education looks like in the context of the University of Iraq. Specifically, we sought to investigate how engineering faculty members who participated in a focused professional development workshop provide culturally relevant support to their students at the University of Iraq. As our analysis of the qualitative data progressed, we debated how best to describe the findings. The deductive coding proved useful in analyzing the data for the three criteria of Ladson-Billing's CRP framework.

While these three criteria (academic achievement, cultural competence, and critical consciousness) helped organize the findings of the research, we also wished to portray some key findings with the aid of a pictorial image (see figure 2). This was deemed necessary because of the *explicit* references that faculty members made to academic achievement although cultural competence and critical consciousness were more *implicit* in their responses. We recognize the historical arguments against this approach as an existential argument against quantizing qualitative data, but felt this was the best way to communicate the findings. We also refer the reader to the specific ways that engineering faculty members at the Iraqi University described, understood, or provided evidence for each of GLB's three criteria for culturally relevant pedagogy.

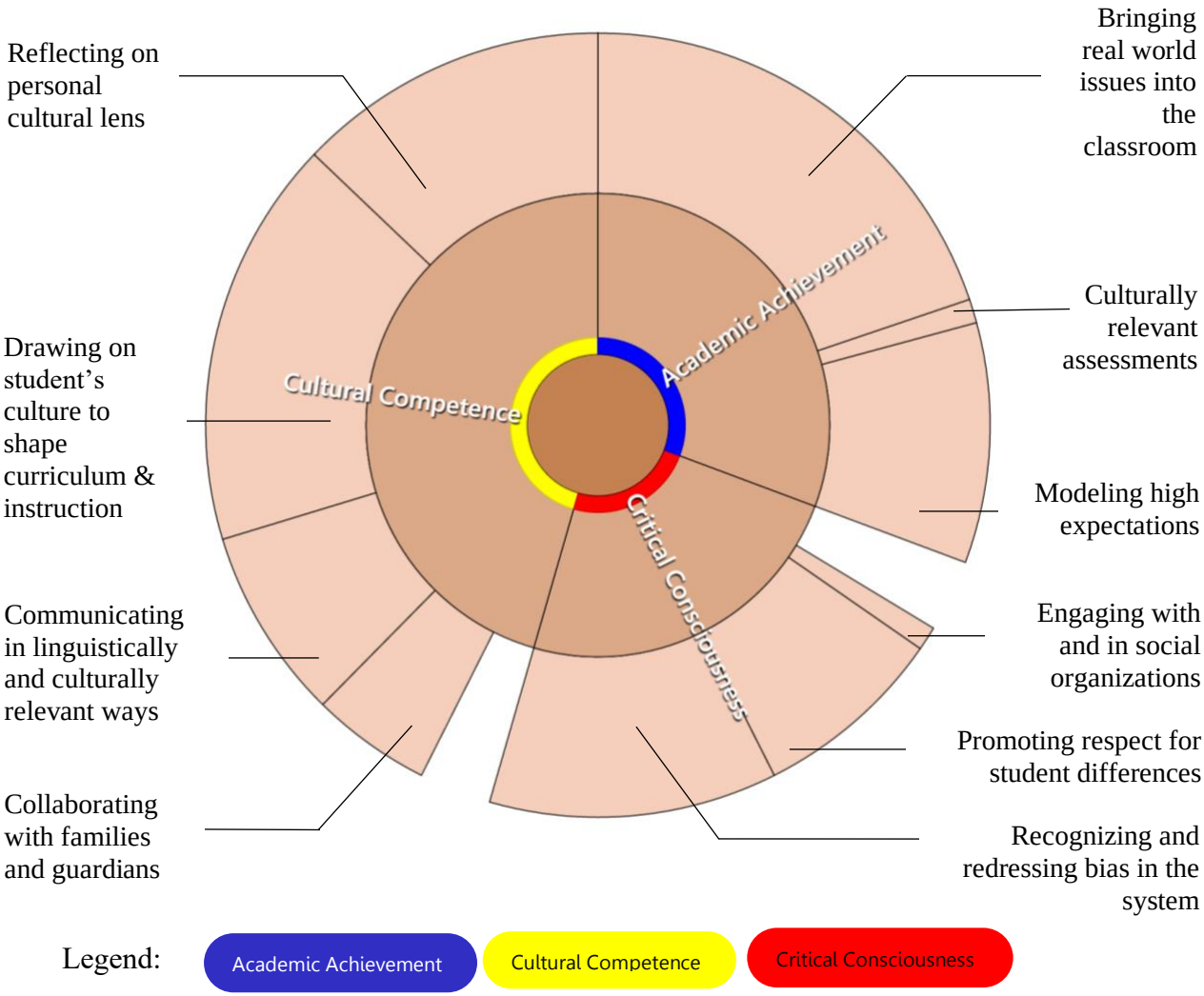

Figure 2. Three CRP Criteria Compared by Number of Coding References for Engineering Faculty at the Iraqi University

Figure 2 provides a sunburst hierarchy chart of the three culturally relevant pedagogy criteria (academic achievement, cultural competence, and critical consciousness) identified in this context. A sunburst hierarchy chart presents a pictorial image of the relative instances of occurrence for each code in the complete data analysis. Academic achievement codes were categorized under sub-codes that discussed culturally relevant assessments, high expectations of student performance, and the inclusion of real-world issues in the classroom. The last two codes were more common in the data analysis compared to the instances of using culturally relevant assessments. Critical consciousness codes were categorized under three sub-codes – engagement with social organizations, promoting respect for student differences, and recognizing/redressing bias in the system. Our analysis revealed that cultural competence codes were the most common criteria category in this study. Sub-codes under cultural competence included reflecting on personal cultural lens, drawing on students' culture to shape curriculum and instruction, communicating in linguistically relevant ways, and collaborating with external funds of knowledge such as student guardians and parents.

In summary, we came up with a listwise description of what culturally relevant engineering education looks like in the University of Iraq. We found in the responses of our participants that:

With respect to ***Academic Achievement***, culturally relevant engineering education in this context

- involves teaching engineering using a lot of real-life examples,
- is critical of traditional assessments
- recognizes the need for culturally sensitive assessments,
- tries to model high expectations from students and involve them in their academic progress.

We found in the responses of our participants that with respect to ***Cultural Competence***, culturally relevant engineering education in this context

- uses the Arabic language sometimes in open opposition to school policies that demand that all communication be in English,
- is sensitive to individual students' conditions that may impact their learning,
- often makes sacrifices of time and effort, sometimes without a promise of extra compensation, reward, or recognition,
- is fundamentally modeled by the teacher.

We found in the responses of our participants that with respect to ***Critical Consciousness***, culturally relevant engineering education in this context

- is informed by intentional perspective-taking,
- is familiar with the root cause of students' academic issues #mayIcorrectyou
- is historically familiar with and critical of unflattering elements of the education system
- is dynamic enough to find solutions to logistical problems but also conscious of the tradeoffs.

Discussion

"You don't have to say it in English, say it anyhow you want."
Iraq College of Engineering Faculty Member

The concept of culturally relevant pedagogy has been heavily researched in the United States [28]. One of the fundamental arguments against using CRP in non-US contexts is that it was developed within the context of a multiracial nation where asset-based thinking was necessary to unpack an effective pedagogical approach for minority students [29]. The same scrutiny was expressed in this study as we engaged with participants and asked questions about their culturally relevant practices in this context.

By interpreting the data and following up with participants of the study, we saw evidence of changes in their appreciation of culturally relevant pedagogy. But, it is interesting to note that there were more frequent cases of the participants of this study realizing that they had been performing what we would call culturally relevant pedagogy for years even if they did not have a name for it. In a sense, they did the act, even if they did not have the same nomenclature that we did. This goal-oriented, ends-justifying-the-means approach was seen in many instances as we engaged in discussions during the workshops and discussed during the semi-structured interviews. It ended up being the theme of this paper because we were also able to see evidence of Ladson-Billings's three criteria.

<u>"Say it anyhow you can. I just want to be sure you understand it.": Unpacking Academic Achievement in this context.</u>

Within the context of the University of Iraq, faculty members who participated in the workshop emphasized the importance of students' academic achievements. All nine participants in this study believed that they could help students actualize this by embedding their learning in real-life contexts and bringing in real-life examples that students were familiar with in their community. We asked faculty members to unpack each of these findings with examples from their lived experiences in the classroom.

One faculty member who taught in the Civil Engineering department pointed out several instances where they decided it best to situate an engineering problem within the context of Iraq. One such case is presented below as the instructor taught mathematical calculations involving engineering structures:

"*Rather than use an example of a case from the UK, I reminded my students of the Mosul Dam of Iraq, which is a very famous Dam, and is also one of the most dangerous dams in the world because it was founded on a problematic foundation of soils. And during the era of ISIS, this dam was in danger. And there was a danger of damage to this dam.*"

The context surrounding this revelation is necessary to understand how it relates to the goal-oriented, ends-justifying-the-means approach. We asked participants about challenges that they had in the classroom and how they resolved them. One of the challenges that all participants raised was that students felt that their content were disconnected from real life. The Civil engineering faculty member had asked students to differentiate between mass and weight and found that some of his 300-level students could not. At first, he confessed that he was frustrated because this was the simplest question he could have asked his students. But upon probing further, he realized that they rightly deduced that the quantity of matter in a stationary person would remain the same regardless of location. They agreed that the quantity of matter in a stationary person would be the same whether they were on earth or the moon, although the gravitational pull on them would differ.

This realization challenged the instructor to deviate from using expressions or examples that students failed to understand and base them on concepts that they did, even if it meant deviating from class materials or texts. This context gave birth to the Mosul Dam example, which he realized caught the attention of his students because it was a dam they were familiar with and one they were likely to work on after graduation. It is also interesting to point out that all but one of the participants had similar experiences where they had to sidestep to impress upon the students how relevant what they were learning was to them.

As a follow-up to this question, we asked if they felt that their assessments were accurate predictors of their students' acquired knowledge in the classroom. More than half of the participants raised skepticism over the use of English as the medium for tests of their students' engineering knowledge. While they all agreed that they modeled high expectations for their students, it was a policy to instruct and conduct all communication in the classrooms in English. However, all of the instructors agreed that they sometimes translated their notes and contents from English into Arabic for their students. One faculty member said, during his interview that he always had better results whenever he asked questions in class and his students' eyes shone with understanding but they struggled to find the words to explain, to which he often replied:

> *"You don't have to say it in English, say it anyhow you want (*قلها بالطريقة التي تريدها*). I understand. I will translate it."*

This excerpt shows the extent that faculty members go in order to achieve understanding during the regular class session. However, school policies insisted that examinations and tests had to be conducted in English language as required for ABET certification. Thus, students that might have successfully demonstrated that they understood concepts during class by explaining in Arabic were rarely as successful during examinations and tests. This problem has been extensively discussed in the literature concerning culturally relevant assessments [30]–[32] and is obviously a concern in this context. Regardless, all the faculty members insisted that conversing in English is a skill that their students will need to be competitive after school and internationally recognized.

<u>"You don't have to say it in English, say it anyhow you can. I understand. I will translate it.": Unearthing Cultural Competence in this context.</u>

While the engineering faculty members who participated in this study were explicit in their expectations of academic achievement for and from their students, they were rather implicit in their demand for cultural competence in their students. This code required several follow-up questions to understand how faculty members perceived cultural competence in an engineering classroom. We were inquisitive to know if they expected their students to demonstrate cultural awareness in their classroom engagements i.e., their interactions with one another, with the faculty, and with authorities, or if they expected them to include cultural examples in their classwork and assignment. Our finding revealed that faculty members believed that these expectations were primarily their responsibilities as instructors first and foremost rather than those of their students.

Most shared several instances where they had reflected on their own experiences and identified how those experiences shaped the way they saw the world and taught their students. Thus, although implicit in its connotation, we found far more instances where teachers attempted to model cultural competence than critical consciousness or expectations of academic achievement. Perhaps the most important finding of this research study, which ended up being the title of the paper is the approach that the instructors took to communicate in linguistically and culturally responsive ways: قلها بالطريقة التي تريدها (Say it anyhow you want)

All but one of the participants insisted that they encouraged their students to reply to their questions anyhow they could, even if that meant saying it in Arabic, and that they tried afterward to help them unpack what they were trying to communicate in English language. Gloria Ladson Billings talks about cultural competence as a demonstration of embeddedness in a community [22]. Teachers who attempted to model cultural competence and expect it from their students immerse themselves in the students' communities. They see their teaching as a calling and more than a role. They are perceived by the community as custodians of historical knowledge, members of the community whose identities were recognized.

While it is easier to assume that instructors from the same cultural context as students would naturally thrive in this criteria, studies have shown that similar racial upbringing is not a guarantee of cultural competence [33]. However, in this context, instructors were able to navigate the challenges that may have otherwise made their jobs impossible by leaning on their cultural capital, especially their language. Thus, in situations where they felt that students could see the end goal but did not know how to get there, they used their cultural capital as a bridge to chat their way forward.

In our interview, we had asked participants for the motivation behind their actions as teachers. Drawing from the literature, we wondered if teachers were motivated to teach because of the promise of recognition, awards, or extra compensation. One participant seemed almost offended by the notion, stating that their actions as teachers and their sacrifices were not motivated by personal gratification but because it was the moral thing to do. We tried to understand this response in light of the Arab culture as it relates to moral values. A recent paper discusses moral values and cultural development in the Arab world [34], suggesting that "moral values as adopted by Arabs are mainly affected by their language usage, reflecting the intellectual status of the Arab mind, and therefore affecting cultural development of the Arab world" [34, p. 185].

As we discussed this with the participant, we decided to include morality as one of the demonstrated observations in this context as it relates to the teaching of engineering students in Iraq. Although the region had seen severe cases of violence over the past decade and the destruction of properties and school facilities, instructors felt they had a moral obligation to stay to rebuild for themselves and their children even at the cost of personal gratification or reward. We learned of the predisposition of faculty members to sacrifice their time and effort, sometimes without assurance of the promise of recognition, compensation, or reward…doing the task that needed to be done regardless. This goal-oriented, ends-justifying-the-means approach is likened to that of the students who are encouraged to *say it anyhow*, regardless of grammatical correctness, until they have correctly communicated their understanding of an engineering concept.

<u>"Be proud. Say it anyhow you can. I don't blame you for not knowing how to say it in English": Recognizing Critical Consciousness in this context.</u>

In terms of the tripartite criteria for culturally relevant pedagogy, our analysis revealed that in the context of the University of Iraq, critical consciousness was the least often discussed. This was not to suggest that it was not demonstrated or modeled. Similar to the dimension of cultural competence, engineering faculty members at the University believed that this was an implicit characteristic of a culturally competent educator. It was expected to be modeled by instructors rather than demanded of students. In this study, it showed up in the ways that they respected and promoted respect for student differences, in their familiarity with the root causes of problems in Iraqi academia, and in how they attempted to address biases in the system by demonstrating a lot of perspective-taking. On one occasion in this study, participants also talked about students' activism roles as they engaged with social organizations outside of campus.

The context surrounding respect for student differences was explained by a faculty member from the Dams and Water Resources department. In response to an interview prompt asking if and how faculty members promoted respect for student differences, the faculty member explained that student differences transcended nationality or ethnicity. They spoke specifically about the gender differences, differences in socioeconomic statuses (SES), and personality types in their classrooms and how those differences translate when enforcing school policies. One such policy was that students had to leave their cameras on during online classes and exams. The faculty member went on to explain that this policy had to be relaxed because some lower SES students had problems joining class because of the bandwidth demands. Another faculty member explained how her students were constrained by resources when she said:

"The situation in IRAQ is unique: our families are big families, so they (her students) don't all have laptops. As an example, in engineering management, I have six students online. Only one of them has a laptop. So, the other five are getting the lecture from their mobile phones. It's difficult for them because they have to do reports, they have to do some research….so they prefer to come to school to do reports like that"

This excerpt describes not only the realities that the faculty members had to deal with consistent with the literature [35], but it also demonstrated their awareness of what their students' home fronts looked like. Another faculty member said that where access to a computer at home was possible, students had to share the same computer with their family members. Consequently, most students were only able to join class by using their mobile phones. For this reason, joining class by audio without turning on video cameras was considered acceptable. Also, as a matter of cultural awareness, it was considered intrusive to insist that female students open their cameras.

Another faculty member who taught engineering surveying said one of his objectives was to oppose the common narrative that girls were not enthused by engineering in this context [36]. He said he always asked them not to be shy and would probe them for answers to questions in the class and wait patiently for them to *say it anyhow they wanted* before moving on. He went on to report that he believes the strategy worked because the female students in his class, though fewer than the male students, now have a habit of speak more than the male students.

We also found through the responses of our respondents a keen awareness of the historical issues surrounding education in Iraq higher education. One faculty member explained that students spend 12 years in school, most of their lessons being conducted in Arabic. She went on to explain how, less than 5 years ago, teaching in Arabic was also a school norm. But, the interest for international recognition and ABET requirements influenced the school's policy to communicate in English. Another faculty member discussed the national education policies that had just been relaxed by the Ministry of Higher Education and Iraqi Scientific Research, which allowed students without some prerequisite knowledge to join the higher education programs. He went on to express that students being expected to automatically communicate in fluent English was unrealistic, which was why he would encourage them to *say it anyhow they could,* because he understood they were not at fault. Through these responses, we observed the faculty members to have a keen awareness of the sociopolitical issues surrounding engineering education in their institution and in Iraq.

Conclusion

In this evidence-based research paper, we designed a professional development workshop using a participatory approach that involved engineering faculty members and administration personnel in an Iraqi University. The project was predicated on a conscious effort to use engineering education

as a tool to improve the path of the republic of Iraq toward reformation by equipping students with the skills to positively contribute to national development. Our workshop design procedure was introduced using backward design to develop the modules of the workshop. Of the 19 participants of the workshop, 9 agreed to participate in the qualitative research aspect of the study. The research team was interested in understanding what culturally relevant engineering education looks like in this context. We were able to collect interview data, pre- and post-workshop surveys and reflection journals for analysis. Using deductive coding, we developed a codebook which guided our analysis to unpack the three criteria suggested in the CRP literature.

Our findings suggest that engineering faculty members in this context discuss academic achievement in explicit terms although they address cultural competence and critical consciousness implicitly. Further, the participants of the study express academic achievement as an expectation for their students but see critical consciousness and cultural competence as criteria that they as instructors have a responsibility to model to their students. Consistent with the literature surrounding indigenous pedagogies in non-western concepts, some instructors in this context perform several good instructional practices even though had no names for them. Finally, our research finds strong evidence of cultural competence manifested in the ways that instructors navigate the challenges in their classroom by leaning on their cultural capital.

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