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Culturally Responsive Pedagogy in an Engineering Summer Intervention Program (Research)

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Culturally Responsive Pedagogy in a Summer Intervention Program (Research)

Introduction

Structured informal (out-of-school) programming has been growing rapidly over the past two decades, especially in the form of after-school science, technology, engineering, and mathematics (STEM) programs [1] and STEM intervention summer programs [2]. These structured out-of-school STEM learning experiences have been shown to play an important role in supporting STEM engagement and learning [3], including developing children's exposure to STEM based experiences and career pathways [4]. Further, out-of-school learning environments offer one means to bring to life ideas of great school reformers and educational theorists (e.g. [5], [6]) who stress the importance of deep, experiential, and participatory learning. These environments present a very unique context for youth to engage in STEM as they offer these types of conditions for learning with small groups, voluntary participation, opportunities to experiment continually with new content, materials and approaches, and opportunities to form strong interpersonal relationships among participants (e.g. [7] - [9]). When such out-of-school learning contexts are designed to allow for participants to draw on their linguistic and cultural toolkits to develop STEM thinking, educational experiences become more meaningful, especially for children whose linguistic and cultural resources have not traditionally been recognized as resources for academic learning. Participation in such out-of-school STEM learning contexts in particular, has shown to contribute to the achievement of underrepresented groups in education and their expanded participation in STEM fields [10].

In the current study, we incorporated culturally responsive pedagogy in the training of mentors who would work with the students in the STEM learning context, referred to hereafter as a summer intervention program. The purpose of this study was to describe the culturally responsive training model applied within a summer intervention program. The research questions that informed this study were: 1) What are the elements applied in a culturally responsive training model within a summer intervention program? 2) How does the implementation of a culturally responsive training model prepare program mentors to engage with culturally diverse students in intervention programs? 3) What lessons learned can be translated to similar intervention programs?

Relevant Literature

STEM Intervention Programs

STEM intervention programs (SIPs) integrate student culture and curriculum by designing interventions that focus on aiding the non-dominant cultural groups in "catching up" [11]. SIPs are structured in many ways, they vary in their purpose, curriculum focus, and academic level; regardless, SIPs work on building student strengths by encouraging and setting high expectations for their students. As such, these programs have been identified by researchers as an answer to improving issues of inequity and underrepresentation in schools in the United States [12]. Specifically, SIPs are designed to support the recruitment and retention of underrepresented students in the STEM fields [13].

Culturally Responsive Pedagogy

Culturally responsive pedagogy is known as an "asset-based pedagogy" [14] in which it uses "the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively" [15, p. 106]. Specifically, CRP is the methodology of teaching practices that focus on students' cultural characteristics, meaning that the pedagogical practices are unique to students' cultural, religious, demographic, and gender differences. These characteristics set students apart from one another and their educators. Therefore, when a teacher's instructions reflect characteristics of only one group of students, the other students are denied an equal opportunity to learn [16]. Using CRP takes into consideration a student's traditions, linguistics, value and ethical systems. CRP provides teachers with empirical and theoretical constructs that support their efforts to lower existing barriers and opportunity gaps [17] - [19] for the increasingly diverse public-school student population in all educational platforms.

CRP's objective is to support students in obtaining the highest level of educational outcomes possible. To achieve these outcomes, CRP utilizes effective and reflective teaching knowledge so that learning occurs in a culturally encouraged, student-centered context [16]. The strengths of the students are identified, nurtured, and utilized to promote student achievement through cultural awareness. CRP constitutes three elements: (1) institutional, (2) personal, and (3) instructional. The institutional aspect addresses the administration's policies and values. The personal aspect addresses the cognitive and emotional progression: educators must immerse themselves in order to develop cultural responsivity. The instructional aspects include the materials, modifications, accommodations, strategies and activities that compose CRP instruction. These three aspects must be present and revolve within each dimension of the learning process for teachers. These three aspects are critical to the comprehension and efficacy of culturally responsive pedagogy [16].

Culturally Responsive Pedagogy and the Engineering Design Process

In the effort to broaden participation in engineering, underrepresented minorities (URMs) benefit from learning environments where relevance, supportiveness, critical thinking, and inter/intra-personal skills are important [20]. Engineering design may be particularly important for learning involving URMs in that: (1) engineering can be introduced as a profession that helps the community, (2) design teams benefit from cultural diversity and are cooperative in nature, (3) engineering problems can be open-ended and rely on inquiry and critical thinking skills and (4) engineering design teams often support the development of critical life skills. The values of culturally responsive engineering design might have an even more fundamental benefit to learning for URMs. All of the culturally responsive learning traits- "ethnic identity, cultural competence, academic skills, and community allegiance and service" [20, p. 203]- can be reflected fairly organically in the engineering design process. Thus, a culturally responsive approach to engineering design may provide a counter-space for a more fruitful learning environment. The inquiry-based nature of engineering design projects also lends itself to "topic-chaining" instruction which has been found to be particularly effective for URMs [21] -[25]. Topic chaining pertains to the need to build towards complex topics by relating previous learning experiences to future ones while also introducing relevant context.

Methods

The current case study is part of a larger National Science Foundation (NSF) grant funded (1734878) study concerning engineering identity development among middle school youth and postsecondary engineering students in a summer intervention program. The study also investigates how early-career math and science teachers draw upon content learned in the program to adopt culturally responsive STEM pedagogy for application in their local classroom contexts. The larger 3-year longitudinal study uses a mixed-methods concurrent triangulation research design including surveys, focus groups, and interviews [26]. The data presented in the current study centers data generated from observations, document analysis, and mentor focus groups. The unit of analysis was the training situated within the summer academy.

Program Context

Bulls-Engineering Youth Experience for Promoting Relationships, Identity Development, & Empowerment (Bulls-EYE PRIDE or Bulls-EYE) is a project funded by the NSF Broadening Participation in Engineering program.The curriculum was created and first piloted during the 2014-2015 academic year and spends equal time on technical skills, engineering design, and interpersonal skill development. During the first year, the program used a robotics-based curriculum to administer a 6-week summer academy. Three populations were targeted in the academy's implementation:

1. **URM mentees:** Underrepresented minority (URM) middle school students from the surrounding area of USF that participated in the program as rising 7th or 8th graders;
2. **Engineering mentors:** Students that participate in the program in the early years of their matriculation in their undergraduate engineering programs in need of leadership development experience;
3. **NMST mentors:** Novice Math or Science Teachers (NMST) that participate as experienced pre-service teachers or early in-service teachers with a need for professional development experience.

During the first year, the program selected, trained, and hired a cohort of 21 mentors—16 Engineering Mentors and 5 NMST Mentors. During the first week of the program, a 16-hour training was administered for mentors only that focused on culturally responsive mentoring. This was immediately followed by an induction ceremony and five-week summer academy where both mentors and mentees participated. Within the summer academy, each mentor was matched with two mentees and asked to complete program activities as a design team. At the end of the program, all participants engaged in a rites of passage ceremony.

Participants

The participants that inform this research paper include engineering mentors and NMST mentors. An overview of their demographic information is provided below.

Engineering mentors. The average age of the engineering mentors was 20 years old. Participants self-reported the following racial/ethnic groups: Asian (3), Black or African American students (2), White (5), Hispanic or Latino (2), and multiracial (4). There were two first year students, seven second year students, three third year students, and four fourth year students. The group was comprised of eight female mentors and eight male mentors.

NMST mentors. Of the five NMST mentors, three reported being Black, and two reported being White. There were three female mentors and two male mentors. Regarding their years in the profession, two were recent graduates, the remaining three mentors had two, three, and four years of experience, respectively. Two teachers taught middle school mathematics, one teacher taught middle and high school mathematics, one teacher taught kindergarten, and another teacher taught second grade.

Data Collection

Data for this study were collected from observations, document analysis, and focus groups. Mentors participated in two focus groups. Observations included research team members attending training sessions and using a protocol to take notes on the activities and interactions within the training. The protocol included open-ended questions based on the training curriculum such as (1) describe the lesson being shared, (2) describe how mentors respond to the training, and (3) describe the receptiveness or resistance to topics being presented.

Document analysis entailed reviewing PowerPoint presentations and curriculum used for the training. Team members looked for connections between the stated curriculum and how it aligned with the lessons shared with the participants.

Focus groups took place during week 2 and the conclusion of the program. Focus group interviews lasted for 28-75 minutes with an average of 51 minutes. NMST mentors participated in focus groups separate from engineering mentors due to capacity and group-specific questions. The focus group protocol entailed questions about the mentor training, culturally responsive pedagogy, strengths and weaknesses of the program, and recommendations to improve the program.

Data Analysis

Data analysis began with the research team reading all the transcripts once to get the gist of the participants' perspectives. Next, research team members coded one transcript from each focus group using open coding and a priori coding techniques [27]. These codes were placed into a codebook containing the code, a definition, and exemplar quote. After several rounds of discussion, codes were reduced into the finalized code book. The codebook was then entered into Dedoose, a qualitative data analysis software used for all subsequent data analysis for this project. Each researcher independently coded the transcripts from each group. As transcripts were coded, team members met regularly to discuss any discrepancies. Transcripts were re-coded to increase agreement among team members. We triangulated focus group data with that found in the observations and document analyses.

Results

The researchers found three emergent themes: (1) culturally responsive training, (2) mentoring culturally diverse students in an intervention program, and (3) lessons learned after the program was completed. The first theme describes the culturally responsive training model that prepared mentors for the five-week program. The second theme highlights how the training equipped mentors to build relationships with culturally diverse middle school youth and their perceptions about the nexus of CRP and the engineering design process. The third theme illuminates some lessons learned concerning how training in summer intervention programs can be improved.

Culturally Responsive Training Model

The 16-hour, Week 1 of the six-week intervention is dedicated to training mentors based on the NSF STARS Alliance Thomas Principles [28]. Only mentors were present for training during the first week with mentees starting in Week 2.

The STARS Alliance Thomas Principles training leverages the ethnic-based mentoring model created by Dr. Nathan Thomas. For this program, it was adapted for the purpose of improving computing identity and thereby increasing underrepresented minority participation in computing fields. The PI was familiar with the Thomas Principles through his previous involvement with the STARS Alliance program. The Thomas Principles were thought to be a great fit for the Bulls-EYE PRIDE training program because both programs focus on identity development of students in STEM contexts. The STARS Alliance Thomas Principles has six core tenets: identity development (ID), social support (SS), psychological support (PS), academic support (AS), sense of belonging (SB), and leadership development (LD). Table 1 summarizes each tenet's meaning, and identifies the label given to each tenet.

Table 1: The six Thomas Principles, Definitions, & Labels

Lbl.	Thomas Principle	Concepts Students Encourage
ID	Identity Development	1. Promote cultural values
SS	Social Support	1. Promote attending social activities, relationships with others, relocation, and being away from home
PS	Psychological Support	1. Promote Psychological Well-being: addresses anxiety, stress, loneliness, depression, hopelessness, self-esteem, and confidence.
AS	Academic Support	1. Motivation - attitude towards academic class work. 2. Application - translating motivation into actual academic effort. 3. Performance - translating academic effort into academic success.
SB	Sense of Belonging	1. Strengthening feelings about being at the university and in their fields
LD	Leadership Development	1. Model the way - finding your voice and setting the example 2. Inspire a shared vision - envisioning the future and enlisting others in a common goal 3. Challenge the process - searching for opportunities and experimenting and taking risks 4. Enable others to act - fostering collaboration and strengthening others 5. Encourage the heart - recognizing contributions and celebrating values and victories

All of the activities in the Bulls-EYE PRIDE mentor training can be mapped to one of these six tenets. Table 2 summarizes all of the activities of the four-day training program. The labels from Table 1 are used here to map each of the activities to the framework provided by the STARS Alliance Thomas Principles.

Table 2: The Bulls-EYE PRIDE training schedule mapped to Thomas Principles

		Training Activity			Training Activity
Day 1	SS	Introductions	Day 3	ID	Personal Unfoldment
	SB	What is Bulls-EYE?		LD	What is Cultural Responsiveness
	LD	Mentor Tenets: Leadership & Closeness		PS	Mentee Tenets: Potential & Humility
	SB	Mentor Tenets: Community & Legacy		SB	Mentee Tenets: Empowerment & Growth
Day 2	ID	Empathy Activity	Day 4	SS	Basic Mentoring Skills
	AS	Hardware Introduction		PS	Mental Health Skills for Mentors
	SS	Hacker Card Game		SS	Afternoon Social
	PS	Art of Listening		SS	Afternoon Social

The training delivered by the Bulls-EYE PRIDE PI. Each day of the training program and its usefulness to culturally responsiveness is described as follows

Day 1: The first day of the training begins with introductions. Mentors mention what major they have declared and do brief, simple icebreakers to get to know each other better (SS). The general structure of the program is described. Program staff emphasize that Bulls-EYE mentoring is a family, and they will need to rely on each other to do well in their new mentor role (SB). Discussions also entail that all Bulls-EYE mentors must embody four tenets: (1) leadership, (2) closeness, (3) community, and (4) legacy. Leadership is defined as the art of making others better. Closeness is defined as the need to develop quality one on one relationships. Both of these tenets are connected to leadership development (LD). Community is defined as the need to invest in developing a collective group identity. Legacy is the desire to establish a culture that makes an impact over time. Both of these tenets are connected to belonging as a member of a group (SB).

Day 2: While the first day is about the group dynamic, Day 2 focuses on interpersonal and intrapersonal growth. Mentors participate in an activity that focuses on empathy and are told that empathy can be learned. The activity requires them to share biographies of themselves. The importance of diversity is emphasized along with the value of each person's personal background and experiences (ID). The training emphasizes that each person brings certain skills to the proverbial table. The project build system, a base platform of hardware, is introduced to help the group leverage the skills of individuals and identify opportunities for growth during the program (AS). A game called hacker is introduced that relies on strong persuasive skills (SS) in order to complete the tasks in the game. Program staff share that both mentors and mentees will need technical skills and non-technical skills to complete design projects. Mentors then participate in an activity that emphasizes listening as an important non-technical skill. Mentors are required to consider how they have persevered in a particularly challenging time in their lives (PS). Their partner is challenged with the task of listening for two minutes straight without interruption. The day ends describing the importance of identifying and encouraging what skills mentees have both technical and non-technical and what they do well during the program.

Day 3: After the second day is reviewed, program staff inform mentors that the third day has a focus on how to build strong, meaningful relationships with others. Mentors write a short essay about themselves. They are then put into groups of three and asked to share their essays with their fellow mentors. The essay topic asks mentors to explore something that happened in their lives that molded them into the person they are today (ID). These small groups also discuss commonalities and differences with an emphasis on the importance of diversity. Cultural responsiveness is then introduced with a review of the Thomas Principles and how those principles might lead to leadership development during the program (LD). Mentors are told that strong relationships are key in any leadership role like the role they have as a mentor. The mentee tenets, derived from the interpersonal strengths tenet of the Thoms Principles, are then introduced: potential, humility, empowerment, and growth. Potential is defined as the ability to persevere and understand one's strengths and weaknesses. Humility is the courage to ask for help. Both of these tenets are discussed as important for intrapersonal strength (PS). Empowerment is defined as leadership that exists to provide someone else with skills. Growth is observing a positive change over time. Both of these tenets are related to the Bulls-EYE community and working together (SB).

Day 4: The final day of the training begins with a recap by the PI of the previous 3 days. Mentors that have been part of the program previously typically take a lead role on the last day. First, these mentors share strategies that have worked for them in the past in working with mentees (SS). Then they transition to discussing what resources are available to help if and when their fellow mentors encounter problems, strategies for maintaining their composure in tense situations, and procedures for looking out for everyone's health and well-being (PS). All of the mentors then spend the afternoon block of time participating in a social to help strengthen their bonds as a cohort (SS).

Mentoring Culturally Diverse Students in an Intervention Program

The impact of the training on their overall mentoring experience was elicited and documented through focus group interviews. The purpose was to understand how mentors applied culturally responsive training in their everyday interactions with URMs. The mentors reflected on their experiences in the community and shared positive outcomes of the training on their mentoring abilities.

Fostering Relationships. Some mentors felt the training prepared them to naturally engage with students and build meaningful relationships and connections. One mentor indicated, "the training does help because of being able to talk with them on a personal level gets them more connected to you and they wanna open up more to you and ask for your guidance…" Others felt the training prepared them to use empathy to understand their mentee's background and perspectives in order to build meaningful relationships. One engineering mentor stated:

> [What] I found most important was during the training, exposing us to being empathetic and sometimes even emotional, and especially to kids. A lot of the time their ideas can be overlooked because they're younger or

> overshadowed, and they may not feel as important contributing to a certain task with engineering since it seems so mature and abstract and complicated. That was really important to me.

This mentor showed how much he valued the opinions of his students and desired to make engineering more accessible to them in an age appropriate way. This mentor's approach demonstrates a culturally responsive strategy to empower students intellectually and socially, especially those who may be disenfranchised in other educational contexts. Engineering mentors also believed in the principles of the program to foster family-like relationships with their mentees. One engineering mentor explained this belief in the following way:

> When we were doing our week of training, one of the things Dr. Gaines said was, we're supposed to be more of a big brother/big sister. That's what you have to be, is you have to be more like, you're there, and you know a little bit more, and you know a little bit more than they do, but you don't need to do everything.

Mentors also reported that the training was instrumental to aiding them in developing relationships among other mentors. This finding seemed to be an important precursor to the collaborative work that would ensue over the course of the 5-week program. One NMST mentor noted "I think the training helped us mentors get to know each other a little bit more". The mentors needed to work as a team to execute a successful program and support the mentees' in planning for and developing the robots. If the training did not allow for team-building among the mentors, the goals of Bulls-EYE PRIDE may not have been realized.

Another aspect of the culturally responsive training entailed understanding stereotypes. Such training is important because the Bulls-Eye PRIDE program draws a significant number of URMs and students from lower income communities. To this end, a NMST mentor recounted "we did focus a lot on building respect and rapport". Because relationships are critical for engaging in culturally responsive pedagogy, the training provided knowledge and skills about how to cultivate such relationships, particularly with URMs who express a range of cultural and linguistic diversity.

CRP and the Engineering Design Process in Bulls-Eye PRIDE. The NMST mentors pointed out having reservations about engaging in a learning space where solving ill-defined problems would be a part of the tasks assigned to them. Specifically, the NMST mentors who were less familiar with such concepts expressed a concern about surrendering control over how the robotics building would be executed. However, having spent so much time building relationships with the middle school youth and engineering mentors, they soon overcame their fears and leaned into this experience. One NMST mentor explained:

> More than I thought I would, I liked not going in knowing everything. You know what I mean? I thought it was gonna be a source of anxiety for me. It kinda was a little bit, but at the end of it I can see the benefit of doing that, and I really enjoyed learning with the kids, and figuring it out with them, and having ah-ha moments that are aligned with their ah-ha moments. It was interesting, and not something I

> get to experience often as a teacher cuz I'm usually instructing something that I already know really well, so that was cool.

The CRP framework illuminates that environments that value culturally responsive pedagogy support youth "prior experiences" and "forms of reference" [20, p. 31]. As such, teachers in this environment did not have to concern themselves with being the expert or a traditional instructor *who knows it all*. This environment allowed for more freedom to explore and engage in co-constructed knowledge and competency development. Another NMST mentor noted:

> Like you said, we had ah-ha moments. We were able to laugh at puttin' on gears backwards cuz now we actually know how to put it on and stuff like that. I just think that was really, really powerful cuz if I would have got a manual and stuff like that, or if I would have been taught how to do it during' that little week training', just my teacher, I would have been like, "No, you gotta do this, this, this." That's not the purpose of this program. It's to learn together, grow together, get to know each other together and stuff.

As the NMST mentor posited, the aforementioned process of working through an ill-defined problem together resulted in forming critical life skills specific to cooperation and collaboration. To this end, learning and growing took precedence over accuracy and proficiency because those skills would be learned as the program progressed. Because engineering problems may be open-ended, the mentors and mentees could focus less on getting everything correct the first time and rely more on their analytical and critical thinking skills as well as their group synergy to solve the tasks given to them. A belief in these students' individual abilities coupled with the levelled playing field, provided by NMSTs' lack of training on design processes and informed expectations about the results of these projects, also influenced how the groups cooperated to solve the problems. Another NMST mentor recounted learning to fly a kite without specific instruction. He explained:

> Even with the kites, one day we flew kites, and all I remember is [the program coordinator] gave us the kite thing and then was like, "Okay." Then we had to put the kite together. I've never flown a kite a big kite like that, in my life, none of my students did, but here we are trying' to put the stuff in and figure it out just to even get the kite to fly. It was something else that we worked through together. We were laughing' once we put the things in the wrong way and stuff like that. I just feel like it was more—like I said, it was more impactful for not only me, but the students. I feel like we made a bigger—we had a stronger relationship because of those moments.

Again, the NMST mentor illustrated how experiential learning has affective and cognitive qualities. These kinds of experiences deepened their relationships and created more trustworthiness in the learning process. As the projects in the program became more intellectually demanding, risk-taking and trust in the team was important for developing the robots. For this reason, ample time was spent in training on strategies for building closeness and empathy as well as creating a sense of belonging.

Lessons Learned

While the training substantially focused on CRP, more content could have been dedicated toward pragmatic and logistical aspects of the program. Some of the areas for improvement suggested by the mentors included more training on safety procedures, behavior management, and logistics. Though some of these recommendations are consistent with what one should find in summer intervention program, perspectives advanced by the NMST mentors on behavior management may be grounded in expectations to make out-of-school contexts resemble in-school environments. However, out-of-school contexts have the flexibility to experiment with pedagogy and spontaneous play [29], [30] in ways that in-school contexts may not be able to. Perceptions about horse playing and loudness may also be grounded in deficit notions typically associated with URMs, which is the predominant group of this program [31]. Concerns about behavior management derived mostly from the NMSTs. One focus group participant stated:

> We're teachers. We know how to manage a group of middle schoolers. You know what I mean? We have those skills from whatever training we had to become teachers to manage a room full of middle schoolers. We can do that. We do it for a living. Not everybody is a teacher.

While the NMST mentor felt empowered to manage the program context, her statement suggested that she was hired to engage in the same kinds of tasks as her traditional teaching position. However, teachers in the context of this program were invited to be learners, facilitators, and mentors, not enforcers of behavioral management. Given this dynamic, one lesson learned from the implementation of this program is future iterations should set expectations with teachers about their role in the program.

Another lesson learned is related to time management. A number of mentors were concerned that there was either too much time or too little time designated to certain activities. One engineering mentor explained:

> We've all been doing robotics for usually the last two hours of the day, and it just seems like we get open our stuff, get started, and then maybe 40 minutes later, it's time to pack up. To get all the thoughts going, it'd be nice if I had to be able to keep going for a little longer, because they'll be able to think a little longer. If they don't get on it right away, sometimes it might take a little longer to be able to have ideas, and have things processed in their heads. Not everybody can think of stuff like that really fast. It takes time for some people.

This observation is important because for novice learners (i.e., mentors or mentees), the cognitive acumen necessary for engaging in the design process may take longer than an individual who has had more experience. The program emphasizes solving ill-defined problems; hence, participants need to be able to get the gist of the problem in the pre-planning stage prior to engaging in building and using the robots. As such, program coordinators should reverse engineer tasks and times allotted to each phase of the engineering design.

Lastly, several mentors pointed out that program administrators should expand the program activities to expose the middle school youth to other areas within the STEM fields. For example, one mentor stated:

> expand more on the STEM aspect. Because it's heavily [focused on] engineering and maybe mathematics, but less towards technology and science. Because we're mainly doing robotics. Even in engineering, that's very specifically a mechanical engineering aspect, [but] there's tons of engineering disciplines. You probably don't have to do a project on every single engineering aspect, but just maybe tiny ones that just gets the kids exposed to certain engineering fields.

This recommendation is especially poignant because youth will gravitate to different areas within STEM. While the program may not have the capacity to focus on all areas of STEM, concepts and projects that overlap do exist within the STEM fields. These overlapping components should be capitalized upon to maintain the attention and interests of individuals at a time in their life where they are open to exploring all areas of STEM

Future Directions for Research

Future research should investigate how youth in summer intervention programs experience culturally relevant mentoring. In the current study, mentors shared how they benefited from such mentoring approaches and how it aided them in developing relationships with mentees and other mentors. Yet, the perspectives of mentee experiences were not reported in this study. Evidence in the form of mentee perspectives will be important to determining the efficacy of culturally relevant mentoring practices prior to full-scale adoption and implementation of these practices.

Future research should also examine culturally relevant approaches to behavior management in formally structured programs. The NMST teachers, who were comprised of current K-12 teachers, expressed concerns about the behavior of some of the students and how it impacted their ability to engage in some of the program activities. While the literature suggests that structured informal programs should not necessarily resemble the environmental components and behavioral management structure of a traditional classroom setting, program coordinators should still be equipped with a variety of approaches to managing behavior in summer intervention programs. Practices that allow mentors and mentees to establish ground rules and expectations may be among these approaches that should be investigated further.

Conclusion

The purpose of this case study was to illuminate the elements of a culturally responsive training model incorporated within the Bulls-EYE PRIDE program; a summer intervention program designed for a culturally diverse group of middle school youth. Using the STARS Alliance Thomas Principles training, an ethnic-based mentoring model created by Dr. Nathan Thomas, and tenets of Gay's culturally responsive pedagogy, the PI implemented a training model to cultivate relationship development and team-building as well as support effective engineering design. Program mentors agreed that the specialized training better prepared them to foster relationships with the middle school youth within the program. Mentors also noted the efficacy of working with ill-defined problems as a way to the level the playing field between mentor and mentee. This practice intersected with culturally responsive pedagogy allowing mentors to empathize with mentees who may struggle with developing engineering skills and competencies, as they also had to gain confidence to build robots with little to no instruction. Finally, the study generated lessons about mentor expectations with managing behavior in summer programs, time management, and recommendations for incorporating more aspects related to various disciplines found in the STEM fields. We conclude the paper with future directions for research such as centering mentee voices and exploring culturally relevant approaches to behavior management.

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