Enhancing Cultural Responsiveness in Afterschool STEM Programs

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Out-of-school time (OST) science, technology, engineering, and math (STEM) programs have gained recognition for their potential to enhance youth engagement, motivation, and skills by addressing young people's needs for autonomy, competence, and connection (Faust & Kuperminc, 2020; Hoffman et al., 2021; Mulvey et al., 2023; Yu et al., 2022; Yu et al., 2020). These programs, particularly when they combine academic and social focuses, can significantly impact student interest in STEM, with middle school being an optimal stage for intervention (Young, Ortiz, & Young, 2017).

OST STEM learning has been linked to improved attitudes toward STEM fields, increased knowledge and skills, and a higher likelihood of pursuing STEM education and careers (Afterschool Alliance, 2011). Consequently, OST activities have the potential to address the opportunity gap faced by underserved communities in STEM. However, creating truly inclusive environments requires the adoption of culturally responsive practices (Simpkins et al., 2017).

Culturally responsive teaching (CRT) leverages students' diverse cultural backgrounds and perspectives to enhance learning experiences, making educa-

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tion more meaningful and engaging for students, thus ultimately leading to improved academic performance (Gay, 2002). CRT has been implemented primarily in traditional classrooms; its potential in OST STEM programs remains largely unexplored (Dodo Seriki, 2018).

Researchers argue that integrating culturally responsive practices in OST STEM programs can enhance both social and academic outcomes for youth (Simpkins et al., 2017; Soto-Lara et al., 2021; Yu et al., 2021). Key practices include centering youth experiences, challenging traditional STEM representations, fostering critical STEM agency, and valuing diverse identities (Archer et al., 2020). Additional strategies have been identified as crucial to foster and maintain positive STEM dispositions among girls of color in OST programs, including integrating "productive struggle" activities, contextualizing STEM in everyday experiences, and emphasizing community and social impact (Young, Young, & Pauffler, 2017).

Designing culturally responsive OST activities requires a holistic approach, integrating cultural responsiveness into all program components (Shivers et al., 2011). This approach involves defining culturally responsive practices for program structure and for staff training (Simpkins et al., 2017), as well as developing contextualized curricula that connect participants' learning experiences to their "funds of knowledge" and "funds of identity" (Llopart & Esteban-Guitart, 2016).

This article presents a case study on enhancing cultural responsiveness in an afterschool STEM program serving marginalized youth from groups that are underrepresented in STEM. The program fosters both academic and social growth through a framework called the Math CEO CRT framework, which consists of six key dimensions (see Figure 1). Each dimension is detailed with pedagogical practices, implementation examples, and potential impacts on students. By examining the integration of these dimensions into the program's curriculum, staff-youth interactions, and program structure, this study offers valuable insights to inform future STEM program design and practical implementation strategies.

Math CEO Program Overview

Math Community Educational Outreach (Math CEO; Pantano, 2024) is a partnership between the University of California (UC) Irvine and low-income families in Southern California. Founded by university math faculty in 2014, it provides weekly 90-minute afterschool math enrichment for middle schoolers (grades 6–8) from Title I schools in Santa Ana, California, along with STEM-focused field trips to UC Irvine. Teacher liaisons promote the program, and participation is voluntary. Each quarter, about 27 UC Irvine undergraduate mentors and 130 youth participate, with an average of 20 mentors and 80 youth per meeting. Mentors receive four hours of training before the program begins, along with two hours of coaching before each session, learning to blend innovative math content with culturally responsive pedagogy. As leadership team members, we organize STEM meetings; develop curriculum activities; and train mentors in content, pedagogy, and cultural aspects.

At Math CEO's core is a strong sense of community. Mentors act as friends and role models, nurturing an inclusive environment where young people feel appreciated and connected. Throughout 23 annual sessions, middle schoolers work with the same mentors each quarter, collaborating in small groups on mathematical explorations designed to enhance understanding and appreciation of mathematics, as well as social interaction.

Math CEO provides an intergenerational learning experience. Through informal investigations, mentors and students engage in mutual learning, sharing ideas in a joyful, exploratory environment. Mentors strive to enhance reasoning and critical thinking, exemplifying persistence and a growth mindset.

Figure 1. The Six Dimensions of the Math CEO CRT Framework

The Six Dimensions	
1.	Students at the center
2.	Interpersonal relationships and well-being
3.	Deep critical and logical thinking
4.	Relevance, friendly language, and representations
5.	Promoting social justice
6.	Equity through embracing cultural diversity

The program is hosted primarily at UC Irvine, with a new branch at California State University, Dominguez Hills. Students therefore gain firsthand exposure to university life. The program is academically challenging and aims to empower students with the confidence to choose a college path if they so desire.

Math CEO creates a culturally responsive curriculum that uses math to explore themes including geographical equity, global warming, urban planning, health choices, social justice, and cultural expression. These resources are available online to foster equitable informal learning environments. The program serves a diverse population, reflecting Southern California's rich cultural tapestry: Participants are approximately 92 percent Chicanx/Latinx, 4 percent White, and 3 percent Asian. Mentors are about 56 percent Chicanx/Latinx, 30 percent Asian, and 5 percent White. This diversity promotes cross-cultural understanding and collaboration, enriching the learning experience for both mentors and participants.

Pre- and post-implementation surveys of Math CEO mentors and young people have demonstrated statistically significant impacts on students' mathematical dispositions, college knowledge, and social-emotional skills, as well as mentors' relational and teaching self-efficacy, interest in STEM and teaching careers, and sense of community contribution. In-depth interviews have linked these impacts to culturally responsive practices at Math CEO (Pantano, 2024; Soto-Lara et al., 2021; Yu et al., 2020; Yu et al., 2021; Yu et al., 2022). As a result, enhancing cultural responsiveness has become a priority for our team.

A Framework for Cultural Responsiveness

Researchers advocate for intentional and thoughtful approaches to designing afterschool programs that respect, reflect, and leverage participants' cultural diversity (Simpkins et al., 2017). This practice-based article outlines a framework created by an exemplary high-quality afterschool STEM program to guide its efforts in becoming more culturally responsive.

We developed the CRT framework shown in Figure 2 to structure our efforts to make Math CEO more culturally responsive while ensuring accountability. Enhancing cultural responsiveness in an afterschool program is a complex endeavor. However, this framework identifies dimensions and spheres of action that can be addressed individually while acknowledging their interconnectedness within a larger system.

The CRT framework evolved from an earlier model our team used to train mentors (Pantano et al., 2024). Each coaching session typically focused on one component of the framework, corresponding to a specific skill set deemed crucial for mentor development. The previous framework focused on enhancing mentors' skills in student-centered pedagogy and relationship building, but it was limited to pedagogical practices without addressing program structure or curriculum. It also lacked substantial connections to culture or social justice. This new CRT framework expands upon and enhances these elements, providing a more comprehensive approach to culturally responsive mentoring.

Our CRT framework was developed through a four-step process:

1. We identified key aspects of our program's structure, curriculum, and pedagogical practices that led to a successful implementation of CRT.
2. We examined various CRT rubrics to identify additional components previously outside our scope, using them to build a working version of the framework.
3. Through observations in both coaching and mentoring sessions, we analyzed expected outcomes and intended mentor actions for each component, generalized effective strategies, and refined categories for greater clarity.
4. We revised our language to enhance accessibility and integrated the dimensions into a coherent, easily understandable structure for mentors.

Teaching mathematics is a key goal of Math CEO. However, its ultimate aim is to foster personal growth and development, symbolized by the core of the diagram shown in Figure 2 (next page). The six hexagons around the core represent the dimensions of CRT that guide students' positive development; they are essential for meeting students' diverse needs. Three concentric rings—program structure, curriculum, and pedagogical practices—surround the core, representing the domains in which the CRT dimensions are applied. An effective program integrates all six dimensions across all three domains, ensuring a comprehensive approach to culturally responsive informal STEM education.

Three Domains of Cultural Responsiveness

Here we outline the three domains of cultural responsiveness illustrated by the concentric rings in Figure 2.

Figure 2. The Math CEO CRT Framework

Program Structure

The program structure domain covers the program's organization and design, including meeting location, frequency, and participant and staff decisions. Math CEO, for example, serves Chicanx/Latinx middle schoolers from a local low-income community. Hosting the sessions at UC Irvine allows undergraduates to mentor young people while exposing them to a college environment, subtly but strongly promoting higher education. Program structure also includes nuanced elements that shape student experience. For example, mentors stand and circulate during meetings, rather than sitting behind a desk, in order to engage with multiple students and foster a sense of community; they also encourage participants to speak in more than one language. These intentional choices enhance both program effectiveness and cultural responsiveness.

Curriculum

A core element of an afterschool program, the curriculum domain includes content, learning objectives, pedagogical guidance, and other specifics of activity implementation. Enhancing cultural responsiveness in the curriculum requires reviewing mathematical and social-emotional outcomes, along with activity relevance, complexity, and engagement. Well-designed activities set the foundation for each session. The curriculum must be adaptable, with ongoing adjustments based on past successes and challenges, to keep activities dynamic, student-centered, and aligned with CRT practices.

Pedagogical Practices

Although program structure and curriculum form the foundation of an afterschool program, mentors bring cultural responsiveness to life through their teaching practices. As the key link between design and implementation, mentors work directly with students; they therefore must be trained in culturally responsive strategies, such as building positive relationships and teaching mathematical content in ways that honor and reflect students' diverse backgrounds. These practices are key to achieving the program's goals of positive youth development in the context of culturally responsive informal STEM education.

Aligning the Three Domains

A truly effective culturally responsive afterschool program seamlessly integrates all six CRT dimensions across program structure, pedagogical practices, and curriculum. For example, an activity aimed at strengthening cultural connections may fail without proper mentor training. Since these domains are interdependent, a successful implementation of CRT practices requires careful and ongoing alignment across all three.

Six Dimensions of Cultural Responsiveness

This section outlines the six dimensions of the culturally responsive framework and the corresponding benefits for students. Included for each dimension is a box

Dimension 1: Students at the Center

Encouraged Mentor Practices
Encourage students to collaborate on problem-solving tasks and explain concepts mutually.
Foster an environment where students are central to discussions and encouraged to answer questions.
Motivate students to ask questions and share their ideas.
Provide students with ample time to think and reflect.
Allow students to steer activities based on their interests.
Design activities with themes that are relatable to students.
Intended Student Outcomes
I actively participate in the activities and can share my ideas and ask questions.
I both help and receive assistance from my fellow students.
I have some control over what I learn.
The activities are engaging and align with my interests.

detailing encouraged mentor practices—specific actions to activate each dimension—and intended student outcomes—how students ideally will experience each dimension and their expected responses during meetings.

Dimension 1: Students at the Center

This dimension prioritizes youth-driven learning by tailoring activities, teaching methods, and pacing to students' needs while promoting active participation. Mentors empower students to guide their learning, balancing independence with collaboration. Peer-to-peer knowledge sharing strengthens teamwork, as students benefit by explaining concepts to each other, often finding peer explanations more relatable and engaging than those of adult mentors. Encouraging peer support before mentor intervention helps students engage deeply, fostering both mathematical and social skills in an interactive learning environment.

Dimension 2: Interpersonal Relationships and Well-Being

This dimension emphasizes building strong connections between mentors and students, as well as among peers. Mentors foster a safe environment for building relationships, embracing a "more than a tutor" philosophy and actively engaging with students on a deeper level. Afterschool programs uniquely allow mentors to see young people beyond academics. Mentors offer both instruction and affective support while modeling social-emotional skills. Strong relationships help students embrace academic challenges and feel comfortable sharing personal concerns, enabling mentors to provide well-rounded support.

We prioritize this dimension at the beginning of each year, as trust and rapport lay the foundation for the rest of the dimensions.

Dimension 3: Deep Critical and Logical Thinking

This dimension sets high expectations for curriculum and mentors, challenging students to develop deep content knowledge, logical reasoning, and critical thinking through thought-provoking questions. To address negative self-perceptions, mentors must express genuine belief in students' abilities. High expectations encourage confident engagement,

Dimension 2: Interpersonal Relationships and Well-Being

Encouraged Mentor Practices
Listen to and value students' ideas.
Respond to students with care, respect, and compassion.
Be mindful of students' situations outside of the program.
Be curious about students' life experiences, and demonstrate that you care about them.
Check in with students about their progress.
Model appropriate behavior and responses to challenges.
Share your college experience with students.
Intended Student Outcomes
I feel safe and respected, and I have people to turn to when I have problems.
I can share my interests and experiences.
I feel that my mentors care about me.
I feel that my ideas and suggestions are valued by everyone.

Dimension 3: Deep Critical and Logical Thinking

Encouraged Mentor Practices
Apply mathematical concepts to real-world situations to develop modeling skills.
Encourage students to justify their answers and explore abstraction and generalization.
Promote multiple reasoning paths to justify solutions.
Pose questions that challenge students' understanding.
Demonstrate belief in students' ability to expand their understanding.
Encourage students to persist through challenging problems.
Intended Student Outcomes
I feel challenged by the activities.
I can solve problems and explain my answers.
I feel capable of completing activities with support.
My mentor asks me for my reasoning.
I believe my math skills are improving.
I persist after encountering difficulties.

pushing learning beyond traditional boundaries. This attitude among mentors builds students' confidence, resilience, ability to persist through challenges, and capacity to learn from mistakes.

Dimension 4: Relevance, Friendly Language, and Representations

This dimension makes math meaningful by connecting activities to real-life experiences and using diverse mathematical representations such as manipulatives, diagrams, tables, pictures, and abstract expressions and formulas. Mentors build on students' prior knowledge, tailoring explanations to their backgrounds and interests. Individual differentiation may not always be feasible, but mentors can enhance relevance for small groups by incorporating student interests, surveying or polling students, allowing students to modify an activity in reasonable ways, having students explain to each other, and presenting multiple problem-solving approaches.

Mentors use both formal and informal language, along with various mathematical representations, to enhance understanding and engagement. Although precision matters, introducing concepts in relatable language can aid comprehension, with students gradually adopting formal terms. Encouraging familiar language, including slang or non-English languages, makes math more accessible and affirms students' cultural identities.

This dimension makes activities accessible and relevant to students with varied experiences, meeting them where they are and building skills from there. Showing multiple problem-solving methods cultivates critical thinking and caters to different learning styles, enhancing overall understanding.

Dimension 5: Promoting Social Justice

This dimension fosters awareness of social justice issues through mathematical activities that include analyzing problems and exploring solutions. It begins with personal stories from students and mentors, expanding to families, communities, and global contexts. Activities highlight connections between

Dimension 4: Relevance, Friendly Language, and Representations

Encouraged Mentor Practices
Relate concepts to students' real-life experiences.
Provide multiple ways for students to understand and solve problems.
Help students connect different mathematical representations (like manipulatives, diagrams, tables, graphs, expressions, and equations) to advance understanding.
Allow students to use informal language in discussions, and use it yourself.
Use simple language to explain complex topics.
Provide differentiated support and scaffolds for all students to succeed.
Intended Student Outcomes
I can solve problems in my preferred way.
I relate to the activities we do.
I use comfortable language when discussing problems.
I feel supported in solving problems my own way.
My mentors use language I am comfortable with.

Dimension 5: Promoting Social Justice

Encouraged Mentor Practices
Educate students about fairness and social justice.
Help students empathize with others' struggles.
Demonstrate how math can address social justice issues.
Encourage students to consider how they can improve the world around them.
Intended Student Outcomes
I know more about global issues.
I understand how social justice issues impact individuals.
I feel capable of making the world a better place.
I can apply my math knowledge to understand social justice.

math and social justice, incorporating students' interests and cultural backgrounds. Although this approach is not feasible for every activity, it deepens students' understanding of the world and of the relevance of math. It also reinforces high expectations, empowering students to believe in their ability to create positive change.

Dimension 6: Equity Through Embracing Cultural Diversity

This dimension honors culture by integrating students' and mentors' cultural knowledge to create an equitable community. The curriculum fosters cultural exchanges; celebrates diversity; and addresses biases, inequities, privilege, representation, and cultural appropriation. It focuses on affirming the cultural identities of students—especially marginalized youth—and exposing them to diverse cultures. In contrast to traditional math activities, which often reflect mostly dominant groups, Math CEO activities intentionally validate students' identities and incorporate a variety of ways to approach concepts. Cultural exposure promotes appreciation; however, mentors must learn deeply about cultures to avoid appropriation and to promote a relevant, inclusive, and culturally sensitive learning environment.

A Case Study

It is challenging to successfully activate all six dimensions of our framework in a single curriculum activity. We therefore provide an example of how our program works toward this goal. The Four Friends activity exemplifies how our curriculum aligns with CRT practices.

Four Friends is a logic puzzle that teaches combinations and counting techniques using multiple mathematical representations. Students discover there are 24 (that is, $4! = 4 \times 3 \times 2 \times 1$) different ways to assign four hobbies to four friends, assigning each hobby only once. Each assignment is called a "world" because it reflects a possible real-life scenario for the four friends. Students learn to create and read counting trees and tackle new counting challenges. The activity also seeks to facilitate open discussions about potential biases and stereotypes related to how hobbies are associated with people of various genders and ethnicities.

Dimension 6: Equity Through Embracing Cultural Diversity

Encouraged Mentor Practices
Encourage students to explore and discover cultures that are unfamiliar to them.
Learn about and celebrate each student's unique cultural identity.
Share aspects of your own culture, including personal stories.
Create a safe space for all students to learn and share, validating multiple cultures.
Teach students to discuss differences of opinion respectfully.
Ensure that students are valued and represented in activities.
Provide positive cultural role models for students.
Intended Student Outcomes
I have learned about cultures other than my own.
I feel proud of my cultural identity.
I feel comfortable sharing about myself and my opinions.
I see people like myself represented in the activities.
I know about people like me making a difference in the world.

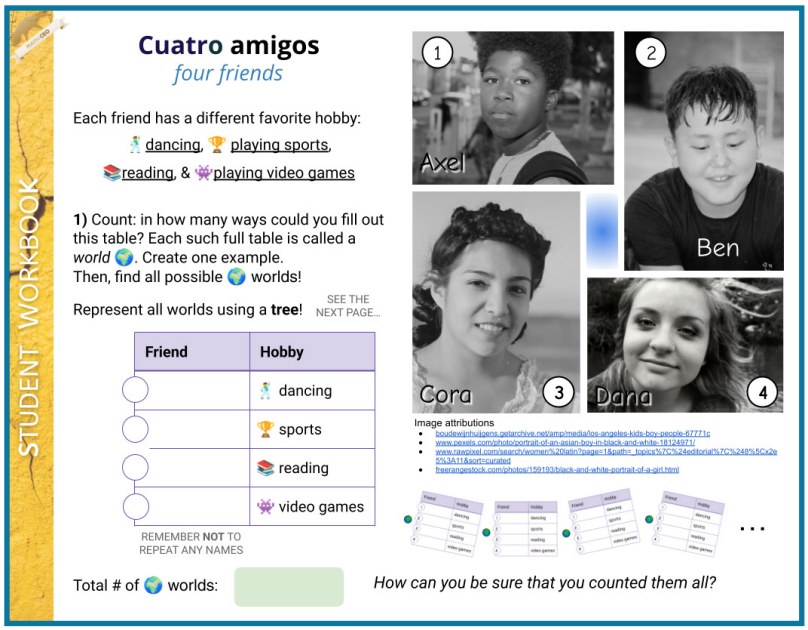
The activity opens with students imagining a world for four friends and imagining their story by investigating questions such as:

- How do they know each other?
- How did they meet?
- What do they like to do together?
- What else do you want to add to their story?

Using fictional friends reduces pressure while allowing students to share indirectly their own interests and experiences. This process helps establish interpersonal relations (Dimension 2). Mentors encourage detailed storytelling and share their own perspectives, strengthening mentor-student bonds and creating a safe space for personal sharing.

Students then have just 15 seconds to match the four friends with four hobbies: dancing, sports, reading, and video games (Figure 3). A class tally is performed to reveal collective unconscious biases about gender and ethnicity. Typically a large proportion of students see Ben as a gamer, Cora as a dancer, Axel as an athlete, and Dana as a reader. Seeing this congruence leads to a student-centered (Dimension 1) social justice discussion (Dimension 5). Rather than lecturing about stereotypes, we let students observe biases firsthand. Through group reflection on their own assumptions, students naturally explore social justice issues without formal terminology. Math plays a key role: By analyzing all possible worlds, students come to recognize how stereotypes limit options. Mentors are prepared to guide this sensitive conversation, helping students identify and address implicit biases.

Figure 3. Matching Friends to Hobbies



Matching Friends to Hobbies

This activity employs a learn-by-doing approach, centering young people in their learning experience (Dimension 1). Instead of listening to a lecture on the factorial formula, students explore hobby assignments for the friends to count combinations, creating various combinatorial worlds as tables (Figure 4, next page). We then introduce counting trees to check whether all possibilities were considered. Using "take turns" routines, students match their tables to tree branches, naturally driving their own learning process.

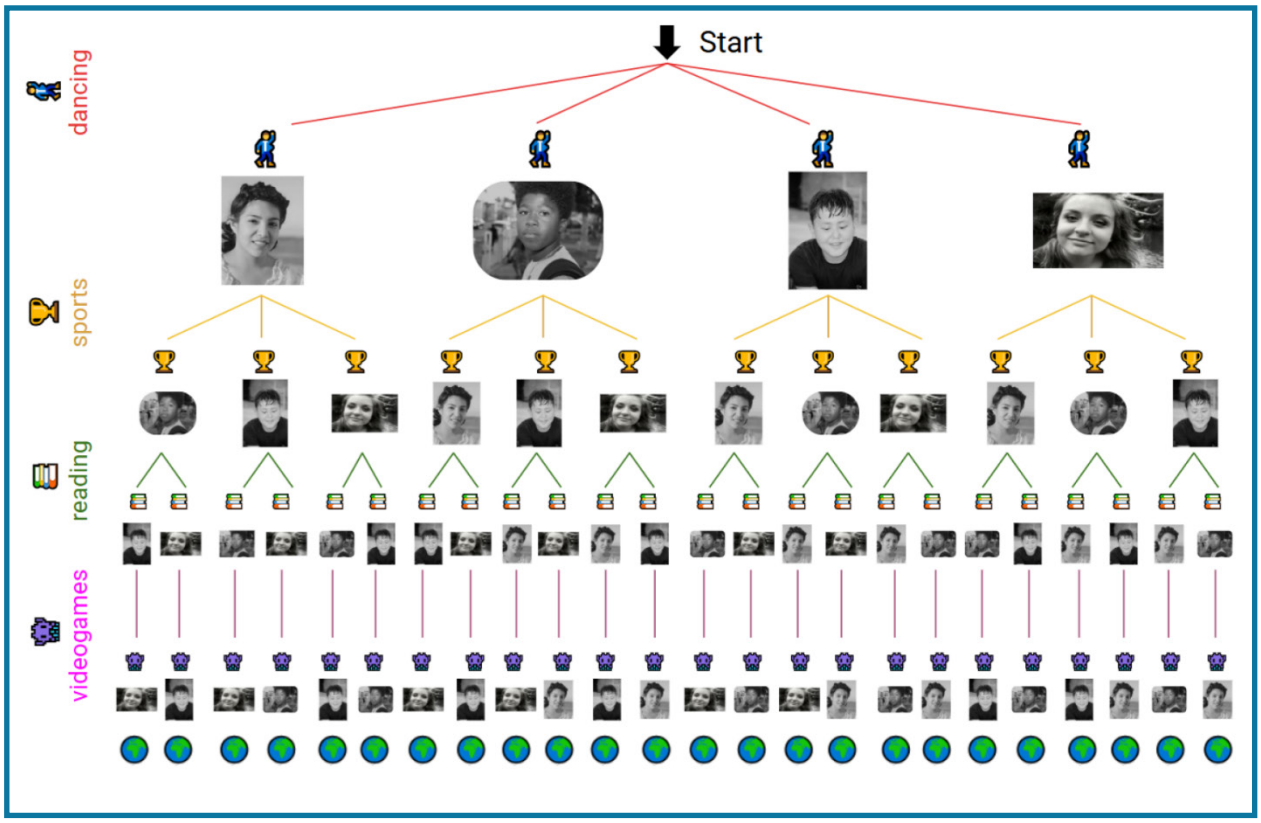
Four Friends Counting Tree

This method fosters deep critical and logical thinking (Dimension 3), enabling students to understand the reasoning behind the 24 combinations, rather than simply counting them. A series of increasingly challenging questions helps students discover the factorial formula and analyze tree structures:

- Look at each level in the counting tree. What do you notice?
- How else can we organize the tree? Is it equivalent to the original?
- Are there more worlds in which Ben dances or worlds in which Ben reads? Why?
- In how many worlds does Ben *not* play sports?
- There is a new hobby. How many worlds are there now?
- What if people *can* repeat hobbies? How many worlds are there now? How many times is that compared to the original problem?

The activity focuses on friendship to make it relevant to young people (Dimension 4). Students select hobbies for fictitious friends whose stories they've created, increasing engagement and investment in the mathematical task. Technical terms (*permutation*, *transposition*, *combinatorial object*, *equivalence*, *decision tree*, *factorial*) are minimized, leaving room for more friendly language (*counting all possible worlds*). This strategy engages middle schoolers in mathematical discourse without intimidating them. Multiple mathematical representations are provided to

Figure 4. Four Friends Counting Tree



enhance understanding and problem-solving skills, including friends and hobbies cards for students to match, table templates to complete, counting trees, diagrams, and expressions (Dimension 4). Counting trees are particularly crucial, as they connect trial-and-error methods with systematic approaches. We present two tree-building methods, starting with either friends or hobbies, and challenge students to explain why these approaches yield equivalent results (Dimension 3).

In this activity, we take a nuanced approach to incorporating cultural contexts into mathematical activities. Instead of explicitly linking culture and math, we center the activity on a universal topic—friendships among young people from diverse backgrounds and ethnicities. This approach allows cultural exchanges to emerge naturally while students discuss the friends' hobbies and personal stories, aligning with Dimension 6 of our CRT framework.

In summary, this mathematical activity is thoughtfully designed to be relevant and accessible to students while fostering deep mathematical reasoning and critical thinking. Its student-centered approach encourages active participation and exploration, allowing students to build stories that gradually unpack various aspects of culture. Mentors contribute their own cultural perspectives, strengthening bonds with students and creating a supportive learning environment. The activity effectively exposes biases and raises awareness of equity issues, demonstrating how mathematics can be used to address social justice concerns. Through friendly language, multiple representations, challenging activities, and exploratory tasks, the activity gives students voice and ownership in their learning.

Ongoing Challenges in Implementing the CRT Framework

Based on our experiences, we pinpoint in Table 1 (next page) several ongoing challenges in implementing this CRT framework in an afterschool STEM program and share solutions we have attempted. Each challenge relates to one or several dimensions in the framework.

To address ongoing challenges faced by college mentors, we implemented a weekly coaching program with five key components:

1. **Teacher guide:** Online resource packet, distributed before each session, offering activities, solutions, strategies, illustrative videos, and suggestions for incorporating CRT practices

Table 1. Ongoing Challenges and Potential Solutions

Ongoing Challenge	Potential Solution
Supportive Environment & Relationships	
Mentors unprepared for students' diverse needs and life circumstances	Provide training in cultural awareness and trauma-informed pedagogy.
Risk of triggering trauma when discussing social justice issues	Train mentors to be sensitive to students' backgrounds; model safe learning environments.
Trouble navigating the political climate of associated organizations	Make efforts to align program goals with broader institutional values.
High student-to-mentor ratio with college volunteers	Focus on the quality (versus quantity) of mentoring relationships; coach mentors on cultural humility and relationship building.
Curriculum Design	
Imbalance between accessibility and challenge in activities	Coach mentors on appropriate scaffolding while maintaining high expectations.
Risk of unintentionally appropriating cultural elements	Ensure genuine, respectful inclusion of cultural elements in the curriculum.
Difficulties in creating deep cultural connections	Celebrate diversity meaningfully and respectfully; consult with cultural community members.
Student-Centered Pedagogy	
Difficulty in using open-ended questions or allowing student choices	Coach mentors to ask deeper questions; provide sample prompts in materials.
Premature intervention that limits productive struggle	Let mentors experience struggle during coaching to model best practices.
Reverting to lecture-style teaching	Run exploration-based activities during coaching for mentors to experience.
Content Knowledge	
Fear of exposing mentors' own misunderstandings	Destigmatize mistakes during coaching; create a supportive environment for intellectual risks.
Limited content knowledge, hindering differentiation	Provide additional online teaching resources for mentor support.
Imbalance between technical and informal language	Recommend starting with informal language, then transitioning to technical terms.

2. **Weekly homework:** Online assignments to familiarize mentors with math content and pedagogy, emphasizing the importance of productive struggle and centering youth in the learning process
3. **In-person coaching sessions:** Weekly workshops focusing on key mathematical concepts and CRT practices, including activity practice and engagement strategies
4. **Reflection assignments:** Weekly prompts encouraging mentors to connect coaching insights with their mentoring experiences
5. **Follow-up meetings:** As-needed sessions providing individualized feedback based on observations

Additionally, we involve mentors in co-developing curriculum activities that integrate culture or social justice into mathematical tasks.

Culturally Responsive Teaching for Youth Development

This article outlines a framework to enhance cultural responsiveness in high-quality afterschool STEM programs. Anecdotal evidence suggests that implementing this framework leads to positive outcomes for mentors and youth alike. To quote one mentor:

> I loved and cherished this program, and I hope to be back in Spring! This program exudes with passion for educational equity, culturally responsive learning, and care. The students are always first, and always valued in every aspect of the lessons. This really resonated with me, as an aspiring teacher with similar values!! The staff are absolutely wonderful, encouraging, extremely helpful, and always looking to improve to be the best they can be. I am so so grateful I participated in this program, for the connections I made with the students and staff, and for my own growth as a future educator :) THANK YOU!

Math CEO was developed as a university-community partnership focused on mathematics. However, the CRT framework can be applied broadly to increase social-emotional learning support in informal STEM education. We are currently working to assess its effectiveness more rigorously.

We conclude with recommendations for successfully implementing the CRT framework across its three domains:

- **Program structure.** Make efforts to support CRT unequivocally through organizational principles and actions. The organization should clearly communicate expectations and provide comprehensive support through coaching materials, training, and informal interactions.
- **Curriculum design.** Incorporate and clearly describe CRT practices within the curriculum. This approach ensures that culturally responsive experiences are built into activities from the outset, rather than relying solely on mentors to activate them.
- **Pedagogical practices.** Regularly observe mentors' interactions with young people to identify emerging CRT practices. Integrate exemplary practices into future curriculum and program structure modifications.

Successfully implemented, this CRT framework has the potential to make afterschool STEM programs more relevant, meaningful, and respectful of historically marginalized young people, fostering positive youth development.

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