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# DR+MATH TOOLKIT MEMO

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## STUDY CONTEXT AND LEARNING QUESTIONS

Relationships build a foundation for learning, especially in the space of math learning. Contrary to assumptions of many, math is not a neutral subject-- it is a field with stark disparities and prevalent stereotypes, for example along gender and racial/ethnic lines. Relationships can be a critical asset in countering the systemic inequities that limit certain groups of youth's access to high-quality math resources and make them feel less belonged in math. To truly make headways in educational achievement and promoting a healthy sense of belonging in the math learning space, Search Institute and the Gates Foundation have identified a significant need for math educators and tutors to have tools that can help build their competencies in culturally relevant relationship building.

To meet this need, Search Institute is developing a Developmental Relationships in Math (DR+math) Toolkit aimed to support math tutoring programs and educators in building culturally responsive relationships using Search Institute's Developmental Relationships Framework. Taking lessons from Culturally Responsive Relationship Building (CRRB) in the space of math tutoring, this study aims to better understand what practices can be translated into the math classroom. In this insights work, ResultsLab facilitated focus group discussions with members of the Math Educators Panel to learn more specifically about what culturally responsive relationship building means to them, what it looks like in a math classroom, and what a resource must include to help math educators build competencies in culturally responsive relationship building.

The purpose of this study is to elevate community insights regarding designing a practitioner-oriented toolkit for culturally responsive relationship building in math spaces by adapting the five dimensions of the [Search Institute Developmental Relationships framework](#). Insights from the middle school math teachers will be used to inform our development of the Developmental Relationships in Math (DR+math) toolkit. Insights from the community will also be used to further refine the K-12 Team's Math Strategy, and to further flesh out informal research on CRRB promising practices and applications within the Enabling Conditions Team of the foundation.

### **Learning Questions:**

1. From the perspective of teachers, what does culturally responsive relationship building in the **math space** look like in practice?
2. From the perspective of teachers, what **barriers** prevent or hinder efforts to build culturally responsive relationships with students in math spaces?
3. Search Institute is working to build a toolkit that can support teachers in efforts to build culturally responsive relationships in the math space. What resources or supports would be most **useful** for teachers to develop competencies in culturally responsive relationship building in the math space?

# INSIGHT SUMMARY: KEY LEARNINGS

## DEVELOPMENTAL RELATIONSHIPS IN MATH CLASSROOMS

### KEYS TO BUILDING CULTURALLY RESPONSIVE RELATIONSHIPS IN MATH



#### AFFIRMING IDENTITIES

- Approach learning through a meaningful, relatable cultural lens.
- Celebrate unique experiences.
- Foster a sense of belonging.



#### LET THE "WHO" COME THROUGH

- Tailor content and engagement approaches to align with students' experiences.
- Create a classroom culture that makes students feel comfortable to engage in the ways that make sense to them.



#### FACILITATING A SENSE OF AGENCY

- Gather and trust in student feedback.
- Empower students to co-teach by relating their experiences, explaining concepts to peers, or helping craft questions.

### BARRIERS TO BUILDING CULTURALLY RESPONSIVE RELATIONSHIPS IN MATH



#### LACK OF BANDWIDTH

- Large classrooms and/or several competing practitioner responsibilities
- Time pressure due to math's pacing and sequential curriculum



#### CHALLENGING MATH MINDSETS

- Prevalent negative math stereotypes
- Student fear of failure and/or success
- Teacher tendency toward linear or traditional (rather than responsive) engagement



#### OTHER BARRIERS

- Continued COVID implications
- Lack of support for training, translators, and student/teacher relationships
- Lack of tools for overall student literacy and math language attainment

Culturally responsive relationships help students from diverse backgrounds experience success in math by recognizing student cultures and fostering inclusive spaces.

### TOOLKIT RECOMMENDATIONS

#### STRUCTURE

Ensure elements are presented as overlapping and building upon one another rather than siloed.

#### tone

Emphasize teacher's own growth mentality and creativity, and encourage adjusting to each classroom, culture, and age group to meet students where they are.

#### FRAME

Acknowledge real-world constraints and provide suggestions for addressing them or right-sizing use.

#### FORMAT

Make it accessible, customizable, and ready to implement, with layers of short and in-depth information. Include short videos of specific practices in a real math classroom and provide a scenario/role play practice component.

#### COMMUNITY

Provide learning community resources and ways to get help or peer coaching.

# METHODOLOGY

In May of 2021, Search Institute began its collaboration with the Bill and Melinda Gates Foundation (the Foundation) on a project focused on math tutoring programs. Building upon this work, Search Institute sought to support math tutoring programs in facilitating culturally responsive relationships in math spaces. This study aimed to provide context and guidance of math teachers themselves necessary for Search Institute to build a useful toolkit by facilitating a space where math teachers can explore ideas around culturally responsive relationship building and the real-life barriers that prevent its implementation. To support this work, ResultsLab facilitated a [Design, Measure, Act process](#) with Search Institute to ensure the activation of collected insights.



**Design:** Co-created learning questions and study plan with Search Institute. Recruited and selected study participants with diversity of lived experiences and professional experiences in mind and invited them to engage in a way that fit within their already busy lives and long list of obligations. Aimed for a majority of participants that are middle school math teachers.



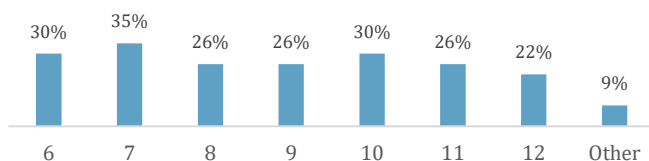
**Measure:** Facilitated engaging discussion around Culturally Responsive Relationship Building (CRRB) that elevate new insights while also championing equitable engagement of participants by offering a number of different activities and ways individuals can engage in discussions including verbal engagement, engagement by chat, and activities using Google Jamboard.



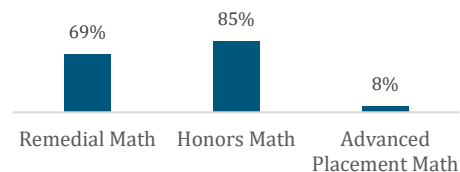
**Act:** Distilled the perspectives, preferences, and needs of math educators in the space of CRRB and the tools that will help them build competencies, so the resultant toolkit is most beneficial for the individuals it intends to serve.

For this study, ResultsLab engaged 23 math teachers in four focus group discussions that took place on Zoom between February 14th and February 23<sup>rd</sup>. Study participants included individuals from 16 states who teach English and language arts, social studies and history, special education, science, and technology in addition to math. Most of these individuals also teach remedial or honors math courses. Beyond their roles as teachers, many individuals also serve as department or grade level chairs, technology specialists, instructional specialists or coaches, committee or club chairs, and mentors to other teachers. Over the course of focus group discussions, ResultsLab and Search Institute explored what culturally responsive relationship building looks like in the math classroom, barriers to culturally responsive relationship building, and what makes resources on this subject most useful in the math classroom.

For what grade(s) do you teach math? (n=23)



I teach ... (n=13)



*\*Other includes coach and college-level instructor. Responses total more than 100% because several teachers taught multiple grades and subjects.*

For more information on the design of this study and the demographics of participants who engaged, please see [Appendix A](#). The focus group discussion materials can also be found in [Appendix B](#). Detailed findings around what emerged from these discussions are outlined in the next section.

## OUTCOMES AND INSIGHTS: DETAILED FINDINGS

This study explored whether the approach and frameworks of the toolkit resonate with the practitioners' lived experiences and that perspectives on what makes resources useful, applicable, and easy to implement are taken into consideration when developing the toolkit.

### Defining Culturally Responsive Relationship Building



**Learning Question:** *From the perspective of teachers, what does culturally responsive relationship building in the math space look like in practice?*

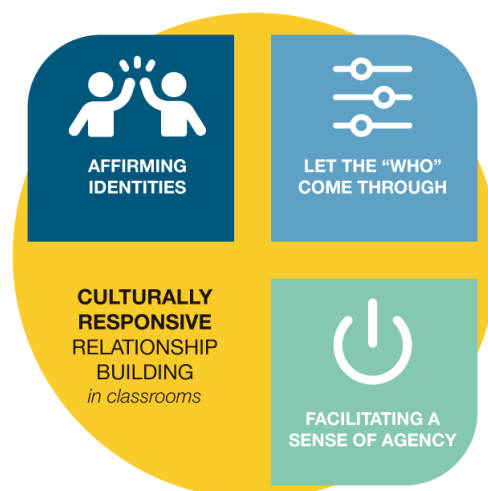
According to math educators who engaged in the CRRB focus group discussions, relationship building is fundamental to effective instruction in any classroom, but especially so in the math classroom. Activities that build relationships may include getting to know your students' names and encouraging your students to get to know their peers as well, understanding the personalities and learning styles of individual students, or elevating strengths and tapping into interests when diving into curriculum. Relationship building is broad in what might count as efforts to get to know students in the math classroom, but the goal is always to improve relationships between the student and teacher and ultimately improve math learning outcomes.

According to teachers of this study, CRRB is just one form of relationship building. This approach towards relationship building involves more specific activities with the explicit goals of helping to truly understand student needs, make the math space comfortable for their learning goals, and help individuals coming from diverse lived experiences experience success in math. Practicing CRRB is core to good teaching practices and is fundamental to relationship building overall. As one math educator explained, "I think it's what we should always be doing as we build relationships with students and gauge their knowledge/understanding."

Participants were specifically asked to describe what it looks like when CRRB is taking place in the classroom. Emerging themes from qualitative analysis include the following approaches as key for building CRR in the math classroom.



*Culturally responsive relationship building is getting to know everybody in their own space meaning such things as identity, cultures, ethnicities, etc. It really is just an addition to relationship building in general.*



Key Approach for Building CRR in the Classroom	Further Details on CRBB Strategy
<p><b>Affirming Identities</b></p> <p><i>Culturally responsive relationship building involves respecting and getting to know the cultures of other people. It does not necessarily involve assimilating the culture or identities of others, but if done well will foster new relationships that transcend current problems. It differs from regular relationship building because it does not force someone to bury their identity.</i></p>	<p>The most common emerging theme around what it looks like when CRRB is being done well relates to affirming student identities. According to math educators, this could include acknowledging students’ cultures and unique lived experiences as an asset or building connections in a way that affirm those identities. The CRRB approach focuses on affirming different identities by approaching learning through a cultural lens by “tapping into [students’] experiences and background to make learning more meaningful as well as relatable.” Rather than focusing on the way that students are all the same, highlighting differences is a key approach for making students feel validated in their identities and that they belong in the math classroom. Finally, by fostering inclusive spaces by acknowledging cultures in curriculum engagement, playing diverse music in the classroom, or hanging pictures of minority mathematicians, students will be able to see the math space a one where they belong.</p>
<p><b>Let the “Who” Come Through</b></p> <p><i>“A lot of my kids call me mom ... or some of them will call me sis, but not in a negative way. It’s because that’s how they feel about me and that they can really talk to me. In a traditional sense, it would be disrespectful. But we call it “knowing your who.” Know what to expect so you can accommodate or kind of cater to the different classroom because depending on where you are, it’s a totally different field.”</i></p>	<p>Another common theme emerging what CRRB looks like in the math space includes paying close attention to who is in your math classroom and tailoring content and approaches to those students. Rather than teaching to the general student, CRRB involves, “seeing and teaching the students WE HAVE.” This can include becoming more aware of cultures, nuances, and communication styles of different student demographic groups. As one math educator explained:</p> <p>Understanding students in a specific classroom may also include developing a sense of empathy for where specific students are coming from. Knowledge about homelife, interests, and strengths can be key in understanding individual barriers to learning. Once a math educator better understands where their students are coming from, their values, and their preferred ways of engaging, he or she can be better prepared to develop activities and classroom culture that makes students feel comfortable and ready to engage. This is key in shifting away from student deficits and underperformance to collaborating together on how to overcome and learn together.</p>
<p><b>Facilitating a Sense of Agency</b></p> <p><i>I love collaborative learning a lot ... If you can explain something better to someone else and I can, I’m not going to get mad at you. I’ll celebrate that. I’ve had to learn more and more about student choice and student voice, so I’ll ask, “Did that make sense? What can I be better?”</i></p>	<p>Although math educators did not explicitly discuss the concept of student agency in the classroom, many sentiments expressed aligned with CASEL’s framework for Advancing Social and Emotional Learning. This framework <a href="#">centers self-awareness student voice</a> by encouraging educators to gather student perspectives, facilitate student-led advocacy, and foster student-centered classrooms. Some recurring examples of facilitating student agency included asking students for feedback on how lessons went or what can be modified to improve their learning experience. This also includes messages of respect being multi-directional. Students must respect the teacher, but the teacher must respect the student and see his or her experiences as valid for learning to be done well. Another includes allowing students to co-teach by relating their real-world experiences to the material, explaining concepts to their peers, or allowing them to help craft questions that will eventually be on a unit test.</p>

## Barriers to Culturally Responsive Relationship Building



**Learning Question:** From the perspective of teachers, what **barriers** prevent or hinder efforts to build culturally responsive relationships with students in math spaces?

As part of the focus group discussion, teachers were asked to discuss the barriers they experience when trying to engage in Culturally Responsive Relationship Building with their students. The following table summarizes emerging themes, with the most common and prevalent barrier being a lack of bandwidth, followed by challenging math mindsets and math identities.



*I think sometimes because of our pacing and because math is so sequential, it's like, 'OK, if I don't cover this by this time, then we're not going to get to this by that time.' And so, I think that kind of sometimes rush nature doesn't give kids the time and the space that they really need to become better mathematically. And as teachers, sometimes that puts a little pressure on us too, because we don't have the time to spend on some of the relationship.*

Barrier	Further Details on CRBB Barriers
<b>Lack of Bandwidth</b>  <i>"It is the number of students that we have. In some of my classes, I have like 30 students. Each of them have different identities and being able to validate and affirm every identity every day, that is a really big task."</i>	<ul style="list-style-type: none"> <li>Many teachers reflected on the challenges of having 30 students per classroom, many classes in a day, and trying to affirm the individual identities of all students.</li> <li>Teachers wear many hats (coach, parent, big brother, therapist ...) and are pulled into so many directions and tired from doing so much for their students.</li> <li>Math educators indicate a significant portion of this pressure comes from pacing guides and curriculum that makes it hard to reserve time for relationship building</li> </ul>
<b>Math Identities and Mindsets</b>  <i>"It is how interwoven racism is and sexism and lots of isms are in our society. From a historical perspective, but also to right now where we're at. It's not like we all start equal and have equal opportunities ... And math is just another example of that. [Math] is a field where kids don't some see themselves in it. And disproportionately kids of color."</i>	<ul style="list-style-type: none"> <li>Teachers commonly struggle with narratives that students tell themselves that they are not math people (often coming from hearing their parents say they are "not a math family.") These narratives and low expectations shut down students' willingness to try and make a growth mindset where failure and learning is ok quite challenging to foster.</li> <li>Students also seem to be hindered by low self-concept when it comes to math either from not wanting to show they are smart due to peer pressure, having a fear of failure, or not wanting to share in a group setting or ask for help. Here, math educators require the bandwidth and tools to push back on these mindsets.</li> <li>Many students do not see themselves in the math they are doing and, therefore, do not see math as a space they are capable of occupying. Similarly, they struggle to see how math relates to their world or how it will be of use. Additionally, based on specific identities, some math educators may not see students as capable of doing a specific kind of math and lower their expectations for the students.</li> </ul>



<p><b>Ongoing COVID implications</b></p> <p><i>"The COVID pause really put a dent in our foundations. On average, [students] who were one year behind on math, now they're a year and a half two years behind. And I think also the other aspect is we have some kids who are just disconnected. They haven't found their way. Their social networks have been broken up."</i></p>	<ul style="list-style-type: none"> <li>• Math teachers in particular continue to be effected by the learning loss experienced by students due to the Covid-19 Pandemic. Due to the sequential nature of math, many teachers are having to re-teach content before being able to get to their curriculum, which leaves little time for relationship building.</li> <li>• Student attendance continues to waiver with the ongoing pandemic due to quarantines and switching between in-person and online learning. Effective relationship building requires students be present. With teachers supporting their students in so many more ways during the pandemic, coaches and department leads are struggling to get teachers to be responsive to student needs, let alone offering the attention that CRRB requires.</li> <li>• We are only now beginning to understand the trauma and Social Emotional Learning implications that students are facing due to the pandemic and maintaining classroom control is a reported challenge.</li> </ul>
<p><b>Low Level of Teacher Cultural Competency and Finding Safety in Routine</b></p> <p><i>"[Many teachers], I think they get hung up in the way they've always done things and they get hung up in teaching the curriculum and not the students. They're teaching things, but not the people in front of them."</i></p>	<ul style="list-style-type: none"> <li>• Some teachers pointed out that to facilitate CRRB, they needed to have a strong understanding of the cultures and lived experiences their students come from. Additionally, several teachers mentioned that they feel their colleagues are lacking in cultural awareness and could benefit from training.</li> <li>• Teachers in rural states expressed challenges of coming from low-diversity communities and now needing to support the needs of refugee families. With no budgets for translators, these teachers struggle to communicate with students and lack cultural awareness needed to best meet their needs.</li> <li>• Many teachers spoke about the challenges they face regarding respect and learning. Disrespect between the student and the teacher kills collaboration and makes problem-solving challenging. Here, teachers must be willing to build bridges and break down areas of disconnect.</li> <li>• Some individuals expressed that they see their colleagues struggling with moving beyond teaching the curriculum to teaching the students. Some teachers are more traditional in their instruction of math and are less open to or comfortable with listening to student needs and finding creative pathways forward.</li> </ul>
<p><b>Math Language Attainment and Student Literacy Challenges</b></p> <p><i>"Bilingual teachers don't exist for us ... I'm a math person. I did not have formal training on teaching literacy with older students. I don't know things about foundational literacy, phonemic awareness. I'm... realizing that [there] are... rich curriculums with word problems. It means that I need to start learning some literacy protocols to help... the math side of the house."</i></p>	<ul style="list-style-type: none"> <li>• To help their students, math teachers need more tools to support student literacy. Word problems are a perpetual struggle for students in the math learning space in that students not only have to be literate to engage in the word problem, they must also be literate in the appropriate math language. To perform well on tests, students must be able to read, sift out non-relevant information, and know the appropriate terms that relate to the math context.</li> </ul>

## Informing Toolkit Construction

In reviewing domains for developmental relationships, many educators were eager to move beyond problems and start discussing solutions. Here, many panelists shared the specific things they are doing to build culturally responsive relationships and how they saw these actions overlapping with the provided framework. We heard suggestions on classroom activities and approaches related to:

- Getting students into positive math mindsets and finding their own math identities,
- Finding ways to make content relatable and help students see themselves in math,
- Setting an international classroom vibe as one of exploration and encouragement, and
- Equitable instruction through awareness of backgrounds and experiences.

The following table summarizes feedback teachers offered around each DR+Math element, as well as some ways that they put each element into practice within their own math classrooms.

DR+math Element	What Resonated?	Potential Challenges?	Element in Practice
<b>Express Care</b> <i>"Getting to know them first, and letting them know that I'm there to make math easy for them and that I have the confidence that they can do it. I'm not just going to give up on them."</i>	Recognize the fundamental need to build caring, trusted student-teacher relationships.	Time for individualized student attention and addressing student issues or concerns that go beyond the classroom and lesson.	Offer personalized notes of encouragement that acknowledge capabilities and champion their hard work.
<b>Provide Support</b> <i>"Allowing kids to make mistakes and understanding that making mistakes helps them to grow [is] a big thing, because when they make a mistake, they don't want to keep trying. But I've started using the acronym MATH: Mistakes Allowed To Happen"</i>	Seen as a building block for student confidence. Essential for experiencing success in the math space, especially at the high school level.	Time for individualized student attention  Lack of cultural awareness among colleagues or an ability to offer translation support	Encourage students to work hard, stay longer, or ask for help by offering incentives that are appealing to specific student interests or likes.  Offer word problems in multiple languages so students can focus on the math while building their English literacy
<b>Challenge Growth</b> <i>"If you set high expectations, most of your kids will rise to that challenge."</i>	High expectations and genuine belief in capacity for growth in all students drive effortful learning.	Adjusting expectations to meet students or groups within the classroom or grade level	Emphasize that not everyone has to like doing math, but that everyone, with hard work and open minds, can do it.  Encourage problem-solving mentalities and growth mindset mentalities where failure is necessary for learning, not inherently bad.
<b>Share Power</b> <i>"In a math classroom, sharing your math knowledge... Is sharing power."</i>	Acknowledging student voice and choice.	Letting go of control  Addressing tensions between student learning/content preferences vs. district &	Pull statistics that are relevant to them, make lessons about current events, and, include different cultures, experiences, names of students, backgrounds in word problems.



		state curriculum requirements	Normalize peer-to-peer instruction for hearing content multiple ways to improve understanding.
<b>Expand Possibilities</b> <i>"[It's] my job to teach kids what they could be, and to give them the tools to be what they want to be"</i>	Demonstrating the relevance of math in students' lives and aspirations.	Scheduling & structuring opportunities outside the classroom.	Take students on field trips, to visit colleges or technical programs, or have guest speakers.  Include math problems and resources that allow students to "see themselves" in the math work they are doing by including content that relates to their personal experiences.

## Toolkit Recommendations



**Learning Question:** Search Institute is working to build a toolkit that can support teachers in efforts to build culturally responsive relationships in the math space. What resources or supports would be most useful for teachers to develop competencies in culturally responsive relationship building in the math space?

**Structure:** Ensure elements are presented as overlapping and building upon one another rather than siloed.

- Educators see the cultivation of respectful, caring, affirming learner relationships as building blocks for boosting student confidence and a willingness to improve their math skills. Several panel participants suggested the possibility of using some of the DR+ model elements - especially expressing care, providing support, and sharing power - as scaffolds to build on when considering the other elements.

*Providing support and sharing power are both really important, and in some ways, go hand-in-hand as building blocks of what needs to happen every day for students to be able to feel comfortable and successful and [feel] like they're making*

**Tone:** Emphasize teacher's own growth mentality and creativity, and encourage adjusting to each, classroom, culture, and age group to meet students where they are.

- Our panelists also recommended emphasis on adaptability and creativity, but with intentionality around meeting the changing needs of different learner levels and cohorts. By challenging stereotypes about learners' abilities and expectations, educators also expressed hope that the toolkit could serve as a set of resources to help individual learners overcome personal barriers and persevere through difficult math concepts.

*We're educators, but at the same time, they're experts on themselves and they know how they learn best.*

**Frame:** Acknowledge real-world constraints and provide suggestions for addressing them or right-sizing use.

- Panelists noted that the toolkit should acknowledge common contextual barriers to implementation that many programs face. In the current K-12 educational landscape, chief among them being limitations on time with individual learners, local/district bureaucracy, curriculum constraints, and digital vs. in-person classroom transitions. Additionally, our panelists anticipated that the toolkit may be more likely to overcome initial resistance or inertia by framing it as a set of resources to complement rather than replace existing programs and practices already being implemented by individual educators or school districts.

**Format:** Make it accessible, customizable, and ready to implement with layers of short and in-depth information. Include short videos of specific practices in a real math classroom and provide a scenario/role-play practice component.

- Given that K-12 educators are not generally allotted much time for their own professional development, our panelists recommended a utility-focused approach to toolkit content. Whether the format is written or multi-media, our panelists emphasized the need for materials broken down into brief, incremental learning units, orienting educators on where to start as well as what may be possible with more experience. Video / multi-media content should be set in realistic math classrooms and should include realistic math problems and math language. Scenario-driven role-play activities with gamification elements were mentioned as a way to motivate educators to move from passive observation to active demonstration of new strategies and concepts. Learning activities should also be layered to allow for quick uptake of major concepts, with links to more detailed resources for those who want a deeper dive into best practices or the scholarship behind toolkit content. Finally, many panelists also called out the necessity of offering different recommended activities and approaches that can be adapted to different cohorts or learner groups.

**Community:** Provide learning community resources and ways to get help or peer coaching

- Foster a sense of community around the toolkit by offering ways for educators to connect with their peers, as well as to engage with thought leaders and share tips on overcoming challenges bringing the content into the classroom. Whether through virtual chat boards, structured speaker series, or recurring newsletters/vlogs, efforts to build sustainable, inclusive communication channels for educators to exchange ideas and challenges may also serve as a springboard for additional innovations to the toolkit itself.

*I also like a chat board to chat back and forth when I need help. And basically seeing who else out there, The camaraderie in it kind of makes me feel better to see I'm not the only one struggling.*

### ***Next Steps for The DR+Math Toolkit***

This study has aimed to help improve both Search Institute and the field's understanding of culturally responsive relationship building in math during middle school years. The end goal is to build a toolkit focused on using Search Institute's developmental relationships framework as a means for educating teachers on how to build culturally responsive relationships in the math classroom. Through the process of gathering feedback from math teachers themselves, the toolkit that Search Institute produces will encapsulate an improved understanding of culturally responsive relationship building in math and will more likely be used by practitioners (e.g., math tutors, instructional coaches, math content developers). In thinking through implementation of the feedback elevated in this memo, the toolkit developers may also consider the following reflective practices in effort to continue building the utility of the DR+math Toolkit.

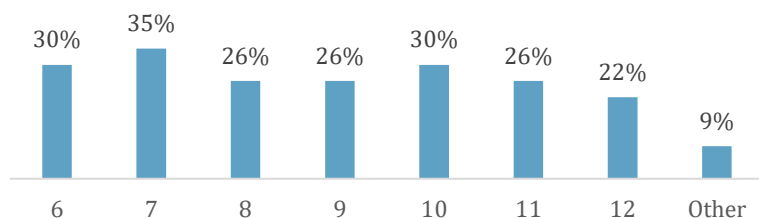
Reflective Practice Question	Evidence of Need	Suggested Next Steps
<p>How successful is the DR+math toolkit at clarifying for educators the difference between providing relevant and relatable content for students versus providing culturally responsive content?</p>	<p>In several instances, focus group participants seemed to conflate the two concepts of making learning relevant or relatable with the content being culturally responsive. While culturally responsive content is a form of applicable or relatable content, they are not interchangeable. For instance, a math teacher may use Ferris wheels to teach about circumference.</p> <p>While the intention is to make the concept approachable for all students, not all students may have been to a fair or seen a Ferris wheel. When considering who is in the classroom and their points of reference, teachers can better tailor content to specific students. To do so, however, teachers will likely need additional coaching on the different ways content can be tailored to ensure it is relevant and relatable to students in <u>their</u> classroom.</p>	<p>Once completed, ask a few teachers to intentionally review the toolkit to see if this differentiation was apparent and that the toolkit offered clarification. Ask teachers to flag places where a "one size fits all" mentality may be conveyed in the toolkit.</p>
<p>To what extent may efforts to build student agency through the DR+math toolkit use be in direct conflict with the need to correct students, thereby potentially causing students to shut down?</p>	<p>During focus group discussions, teachers emphasized that being able to recognize, understand, and implement the correct vocabulary is a key skill in math success, especially as students move into word problems and standardized testing. While there is a need to correct students and help them attain the correct math language and skills proficiency, efforts to correct students may also be in direct contrast to efforts to build student agency, encourage their participation, and develop their math proficiency.</p> <p>During focus group discussions, there seemed to be an emerging dichotomy between wanting to build student confidence in math but also needing to correct the student's language use. To enable confident and proficient math learners, teachers are likely to need coaching around ways to correct students that doesn't send them into "shut down mode" where they are not willing to engage for fear of being wrong.</p>	<p>Engage a few math instructional coaches to assess where the suggested efforts for building student agency may be in conflict with common methods for correcting students. These individuals may then be able to offer ideas on how to teach these conflicting concepts to teachers.</p>
<p>How effectively does the DR+math toolkit provide opportunities for other areas of wraparound support for math teachers and students?</p>	<p>Through focus group discussions, teachers reflected on how the challenges that students face in school are magnified in the math classroom. In addition to the challenges that come with the narratives math is hard and thus not worth doing, students can experience other learning struggles even more acutely in the math classroom where curriculum builds on itself. To learn math, a student must also be able to read and write well in English as well as maintain proficiency in past skills acquired.</p> <p>Focus group discussions revealed that teachers especially struggle to deliver curriculum when students are behind and topics must be retaught. They also struggle in spaces where students are lacking in literacy proficiency. Therefore, teachers in the math classroom need support in how to manage time between reteaching topics and covering new material as well as how to support the literacy of their own students even though they may not be ELL certified.</p>	<p>Provide a supplemental section for the toolkit specifically geared towards teachers who work in the remedial math space or whose students have low English language proficiency. These teachers could use assistance on how to best support student catch-up, including using the math space to support student literacy.</p>

# APPENDICES

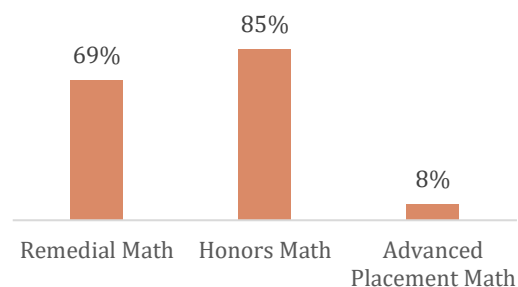
## Appendix A. Experience and Demographic Data of Study Participants

Grade-Level	Content Covered by Educators of Middle School Math by Respective Grade-Level Classrooms
6th Grade Math (n=7)	<p>All Georgia standards;  Fractions, decimals, percents, ratios, variables and unit rates;  Multiples, factors;  Numbers and operations, ratios and proportions, coordinate system;  Nvacs utilizing Carnegie Learning;  Ratios, proportions, expressions, equations, numbers and operations, statistics, and probability;  Wisconsin Common Core State Standards</p>
7th Grade Math (n=10)	<p>7th grade common core;  CCSS for 7th Grade;  Percents, ratios, proportions, 2d and 3d geometry, probability;  Pre Algebra;  Proportional relationships, percentages, positive and negative integers, linear equations with one variable, geometry, probability and statistics;  Proportional relationships, rational numbers, equations;  Ratio/proportions, percents, expressions, equations, inequalities, probability, geometry;  Rational Numbers, Ratio and Proportions, Geometry;  Real number system, equations, proportional reasoning;  Solving equations</p>
8th Grade Math (n=8)	<p>8th gr common core;  CCSS for 8th Grade;  Common core standards for math 8 and Algebra;  Functions, Slopes, Systems of Equations, Pythagorean Theorem, Number Systems, Geometry;  Linear relationships, multi-step equations, inequalities, Pythagorean theorem, exponents and scientific notation, transformations;  Number &amp; Operations, Algebra, Measurement, Geometry Operations with integers, equations and inequalities, functions;  Solving equations, functions, slope</p>

## For what grade(s) do you teach math? (n=23)

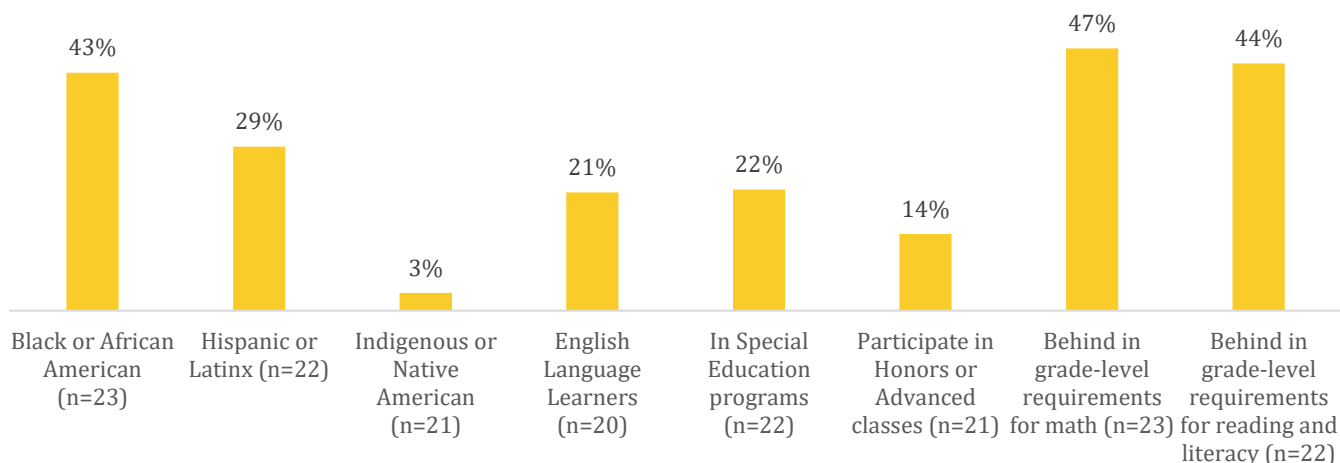


## I teach ... (n=13)



\*Other includes coach and college-level instructor.

## Across all of your math students, approximately what percent are ...



## Gender Identity of Study participants (n=23)



■ Male ■ Female

## Racial Identity of Study Participants (n=23)



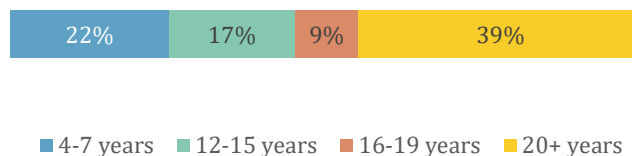
■ Asian ■ Black/African-American  
■ White ■ Prefer not to say

\* According to [2017-2018 federal data](#), U.S. teachers are 23.5 percent male and 76.5 percent female, indicating that focus groups for this study had an oversampling of male participants.

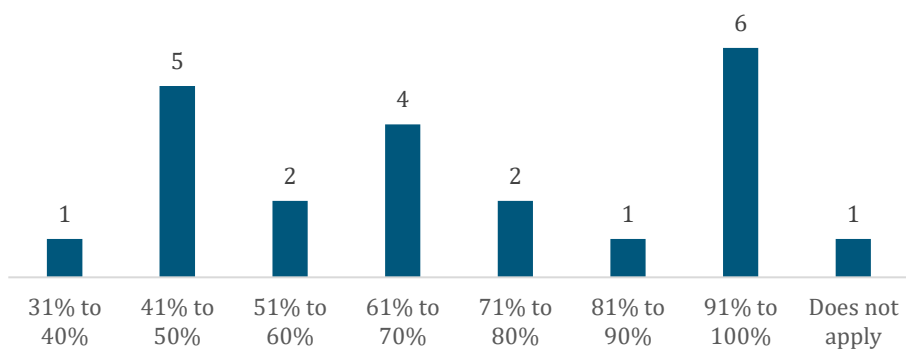
\* Ethnic Identity of participants is 100% Non-Hispanic as no Hispanic individuals applied to participate in this study, which may have something to do with historic [low access to math and science classes](#) and thus STEM related career opportunities among Hispanic individuals.



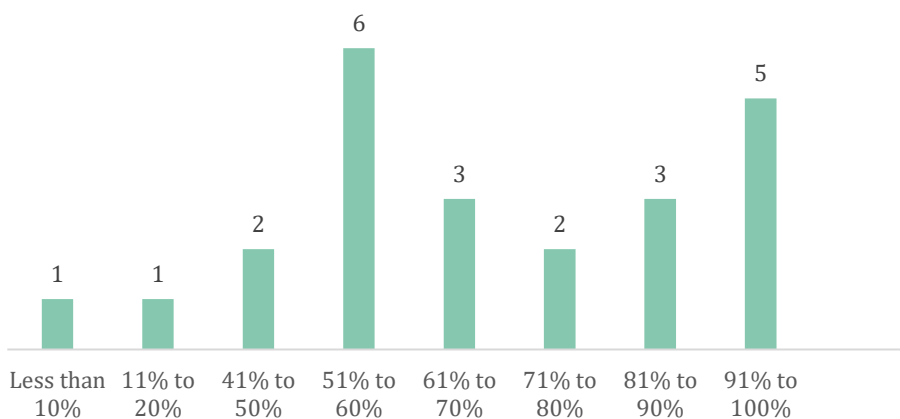
How many years have you been teaching? (n=23)



### Percent of Students at School who Qualify for Free or Reduced Lunch (n=22)



### Percent of Students at School who Identify as Black or Latinx Students (n=23)





## Appendix B. Focus Group Discussion Materials

### Handout Received by Participants Prior to Engagement



#### Culturally Responsive Relationship Building and Math Adapting the Developmental Relationship Framework to math spaces

##### Introduction

According to Search Institute's Developmental Relationship Framework, developmental relationships (DR) are close connections through which young people discover who they are, cultivate abilities to shape their own lives, and learn how to engage with and contribute to the world around them. The framework specifies five essential dimensions for building developmental relationships—Express Care, Provide Support, Challenge Growth, Share Power, and Expand Possibilities. For this project, we aim to adapt the DR framework to math spaces, with particular focus on incorporating culturally responsiveness. Our hope is to support math educators in building culturally responsive relationships, using the DR framework as a guide.

The document below is our preliminary outline for how each of the DR dimensions manifest in math. The outline is informed by insights from research literature and discussions with math tutoring program leaders and tutors. To continue to build this outline, we are seeking math educators' perspectives— How culturally responsive relationships look like in math classrooms? What are unique opportunities and challenges for building culturally responsive relationships in math classrooms? In what ways does our preliminary outline resonate, or not resonate, with the lived experiences of math educators?

##### **Express Care** is showing youth that they matter to you.

Express Care includes *being dependable*; the stability and consistency of relationships are core to expressing care. Express Care also involves *listening*, really paying attention when you are together with the youth, as well as *making youth feel known and valued*, *showing youth that you enjoy being with them*, and *encouragement*. It is important to note that expressing care in math spaces often goes beyond math. It is helpful to allocate time for casual conversations and playing games so that youth can know that you care about who they are holistically, rather than just how they are doing in math.

##### Example practices in math spaces:

- Regular, frequent, individual check-ins
- Allocated time for informal conversations
- Get-to-know-you activities
- Tailored encouragement
- Active listening

##### **Provide Support** is helping youth complete tasks and achieve goals.

Provide Support includes *guiding youth through hard situations and systems*, and along the way *empowering and building their confidence*. For example, break down a challenging math problem into small steps starting with ones that the youth already mastered. *Provide* support also includes *advocating* for the youth; for example, communicating their strength to other people who are also involved in youth's learning. Lastly and importantly, providing support also involves setting boundaries, so that educators don't feel pressured to provide support that is beyond their comfort level.

- Scaffolded instruction to strategically build youth's skills and confidence.
- Small instruction ratio.
- Responsive goal-setting that meets youth's individual needs.
- Clear responsibilities and boundaries for educators.
- Communication with people who are also involved in youth's learning.

### **Challenge Growth** is pushing youth to keep getting better.

Challenge Growth includes *expecting youth their best*, and *holding them accountable to live up that potential*. It looks like setting high expectations for all youth because you genuinely believe that no one is innately inferior in math. For example, educators could check our own potential bias for who we consider as typical 'math people'. Stereotypes about math ability that favor boys and White and Asian youth, while marginalizing girls and Black and Latina/o youth, are prevalent in many places. Those stereotypes, although untrue, are often insidiously planted in our minds (e.g., through the media). Challenge growth also involves *helping youth learn from mistakes*, which are natural and inevitable on everyone's math learning journey. This looks like curating a growth mindset culture and setting assessment standards accordingly that values youths' improvement over their absolute performance.

- Expand learning resources to cover a range of difficulty.
- Prompting youth to solve the same problem in multiple ways.
- Setting high expectations for everyone, but tailoring guidance and pace to meet individual differences.
- Activities and assessments that prioritize learning from setbacks over summative scores.
- Encourage/incentivize youth to try out progressively harder tasks.

### **Share Power** is treating youth with respect and giving youth a say.

Share Power is about recognizing and celebrating youth's autonomy and the *funds of knowledge* that they already possess. That is, respecting the assets that each youth brings into the classroom/program and centering their voices, instead of treating youth as passive receivers of knowledge. Share Power is also about providing youth with *leadership opportunities*, such as peer teaching. Another important aspect of Share Power is making sure youth has a say in the program—building *feedback* infrastructure where youth can comfortably voice their concerns and suggestions. Regardless of how big or small those feedbacks are, it's important to let youth know that they are heard, that concrete actions will be taken based on their feedback, or explanation as to why their feedback could not be addressed in the meantime.

- Feedback system that youth can comfortably voice their suggestions.
- The *Choose Your Challenge* principle: value youth voice in designing the curriculum, pace, and goals.
- Peer teaching and discussion opportunities.
- Various leadership positions for youth.

### **Expand Possibilities** is connecting youth with people and places that broaden their world.

Expanding possibilities is about *building capital*; for example, having role models to look up to and having resources to help achieve whatever goals that youth decides to pursue. Often, being connected to a math educator is by itself an act of Expanding Possibilities, as educators might be able to inspire students and broaden their horizons by introducing them to new things, people, and places. Expand Possibilities in math spaces could be particularly important because the historical, institutional, and still prevalent inequities in math (e.g., disproportionate access to advanced math opportunities, colorblind curriculum, discrimination, and implicit biases) means that not all students were at an equal playing field for math to start with. Expanding Possibilities could be especially important and valuable for marginalized youth to see themselves in math and find a sense of belonging in math.

- Guest speakers from various walks of lives.
- Field trips.
- Broadening the educator and student relationship beyond math learning
- Clear and easy access to resources outside of the classroom/program
- Pointing out ways that math is present and useful in youth's lives.

## Focus Group Discussion Guide

### Welcome & Logistics (~10 mins)

#### Caitlin

Hi! My name is **Caitlin**, I use she/her pronouns and I'm joined today by **Diane of Search Institute**. It's nice to see you all today you! We know everyone is busy and we really appreciate your making time to join today's discussion.

- **Overview of the study:** The purpose of this study is to elevate community insights regarding designing a practitioner-oriented toolkit for culturally responsive relationship building in math spaces.
- Overview to today's conversation:
  - We will begin with intros; give an overview to the study, and go through some housekeeping items
  - From there we will dive into three different segments of focus group discussion activities
  - Finally, we will wrap with any closing thoughts and final details
  - **Focus Group Goals/Norms:** There are no wrong answers; this is a safe space. Please know that your name will not be associated with any results or information that we share outside of this call today, and we ask everyone on the call to observe the confidentiality of other teachers here today.

**Equitable Approaches:** We acknowledge that the focus group discussion format makes for an intense and fast-paced process that might not leave you with the space to process or contribute as fully as you may wish.

- To help create space for meaningful processing and sharing, I will be putting our discussion questions in chat.
- If you feel more comfortable engaging in discussion in written format or want to contribute a thought while someone is speaking, I encourage you to use the chat feature on Zoom. You are welcome to include any comments in the chat if you'd prefer to share thoughts in writing or simply don't want to interrupt someone who is talking. You're also more than welcome to share any additional thoughts after the focus group.
- Also, to create a space of comfortable engagement, I will be available to stay on the call after our official group closes in the event that anyone wants to keep chatting. I am also more than happy to schedule 1:1 time together to discuss further if you'd like.
- Finally, if you have other thoughts that "land" once you leave this group, please feel free to send them along to me by email. I will be sure to include your reflections in our analysis.
- If there is anything else that I can do to make this a space where you feel comfortable to engage, please let me know.

#### Housekeeping:

Finally, before we proceed, we want to express our sincerest thanks for your input via today's conversation. We appreciate the time and thoughtfulness you are contributing to the Math Educator Panel.

- **Notes / Roles:** We want to make sure we capture what we learn today. **Caitlin** will be facilitating our full group conversation today, and **Diane** will help take notes as well as asking probing questions and elevating any trends in the chat.
- **Record:** We would also like to record our conversation so we can reference it after our call and make sure we're accurately representing your experiences and voices. Only the evaluation team will have access to the recording, and it will be securely stored. **Do we have your permission to audio record?** Please type yes or no in the chatbox — or say "yes" or "no" if you're on the phone.
- **Confirm Incentive:** As a thank you for sharing your voice and time, we will send you a \$75? Amazon or PayPal gift card (whichever you indicated your preference would be) by the end of this week.
- **Take-away:** A few months after our conversation, we'll share a high-level summary of what we learned from our conversations with you.
- **Questions:** Does anyone have questions before we get started?

### Introductions:

- Now, so we can all get a sense of who is with us today/tonight, we will go around and do introductions. Please share your name, the grade or math curriculum you teach, and use **one sentence** to describe the vibe of your math classroom.
  - I will start and give you an example. I am **Caitlin**, I don't teach math but my relationship with math has most always been a positive one. I had good teachers who taught me to be excited about it and now I use it in my profession!
  - I am **Diane**, thanks for having me here. I have a complicated relationship with math, growing up my dad loves math and pushed us a bit too much, but over time I came to appreciate it and now I am studying how students get motivated in math.
  - **Other participants: Round robin**

### Discussion (~45 mins)

#### Section 1: Defining CRRB, what it looks like in practice, and identifying barriers [15 min]

- **[Jamboard Slide 1: Individual reflection; Group Discussion]**
  - How do you define culturally responsive relationship building? What makes it different from relationship building in general?
    - What does it look like when culturally responsive relationship building is happening in your math classroom? How do you know it is happening? How do you know it is being done well?
    - How do you acknowledge and/or celebrate your students' cultural background inside and outside of your classroom?
  - What opportunities, if any, do you have to build culturally responsive relationships that teachers of other subjects might not have? How might culturally responsive relationship building look different in the math classroom?
- **[Jamboard: Slide 2: Group Share-Out / RL Capture Sentiments]**
  - What **barriers** prevent or hinder efforts to build culturally responsive relationships with students in math spaces?
    - What about math makes it particularly hard for you to connect with your students?
  - What strategies do you use to shape your students' math identity (how they see themselves in math)?
    - How do you support your students in reaching their (math-related or not) academic and career goals?
    - What do you do to push your students to do their best when they feel scared, frustrated, uninterested, or otherwise unmotivated to learn math? What role do culturally responsive relationships play in these efforts?

#### Section 2: Dimensions in the Math Space [15 min]

Intro [Diane]

- Search Institute is a research non-profit organization that focuses on positive youth development and relationships. We focus on not just good and strong relationships, but good relationships that help youth grow, or what we called developmental relationships. For this project, we are learning to adapt our developmental relationship framework into math contexts, with a particular focus on culturally responsiveness. By the end of the project, we hope to be able to articulate how those culturally responsive relationships look like in math spaces, and we also want to produce some activities that can concretely support educators in building culturally responsive relationships with their students in math.
- So far in the project we have been learning alongside math tutoring programs, now we want to hear from math teachers' perspectives. So I am so grateful to be here today and to learn from y'all.
- What we are seeing on the slide right now, which was also on the document that we circulated as pre-read, is our preliminary outline for how each of the developmental relationship dimensions manifest in math space. Note though, this outline is informed by insights from research literature and discussions with math tutoring program leaders and tutors. Here we'd love your insight and critical feedback because we want to build out this outline to incorporate math educator perspectives. We are interested in learning what resonated with you, what jumps out to you? What are not applicable or not feasible given your classroom context

- **[Jamboard Slide 3]**
  - o Which dimension is the most salient for CRRB in your math classroom? Which dimension is the least salient for CRRB in your math classroom?
- **[Present Discussion Handout]**
  - o In what ways does our preliminary outline resonate, or not resonate, with the lived experiences of math educators?
    - What do you think of the specific actions associated with each dimension?
    - These actions come from an existing math tutoring program but are they feasible in the classroom setting? Will they translate well into this context? Do you have alternative suggestions if not?
  - o What, if any, challenges do you anticipate teachers will have achieving these outcomes and implementing these approaches? Why?

### **Section 3: Resources and Supports [15 min]**

As we gain a better and more comprehensive understanding of what culturally responsive relationships look like in math spaces, we are also working on building a toolkit that contains activities to support educators in building such relationships. The idea is that we want to provide not only conceptually *what* culturally responsive relationships is in math, but also tangible resources that help with the *how* of building those relationship

- When working to build culturally relevant relationships, what do you think would make a resource useful for you? What would make it easy to use?
  - o EX: online versus hard-copy, interactive website versus series of brochures, texts and figures versus videos
- What are markers of a quality resource for teachers? How does a resource successfully embody these markers of quality?
  - o EX: clarity, ability to implement, increased knowledge around a subject or topic
- What resources or supports would be most **useful** for teachers to develop competencies in culturally responsive relationship building in the math space?
  - o What kind of formats would be helpful for such resources? How should the resources be structured?

### **Section 4: Discussion Close [2 min]**

- As one last question to close out our discussion today, please reflect in chat about one thing that stood out to you from today's conversation or one thing that you are taking away

### ***Closing (~3 mins)***

**Caitlin**

We are nearing the end of our time together. Thank you so much for your time.

We have a few **closing notes** for you now:

- Just a reminder that as a thank you for sharing your voice and time, we will send you a \$75 Amazon or PayPal gift card by the end of the week.
- If you happen to have additional written feedback or annotations, please feel free to share them with [caitlin.mcateer@resultslab.org](mailto:caitlin.mcateer@resultslab.org).
- Please also feel free to send any other thoughts as they pertain to our discussion today if they happen to come to you after we close our group. I will be sure to include them in our analysis.
- If there was anyone on the call you want to have further conversations with, we encourage you to share contact information or find one another on Slack
- For anyone who has remaining thoughts or just wants to take a few more minutes to process and close out, I will stay online as long as you will like.

For those ready to go, thanks for joining us!