



Relevance & Belonging in Math

Online Journal Emergent Findings
Fall 2023



OVERVIEW

STUDY PURPOSE & CONTEXT



This study will build on understanding of motivation, engagement, and persistence by exploring one of the domains of the CMEP framework of quality for curriculum and supplement design: **relevance and belonging**.

[ResultsLab](#), [MissionWired](#), and [BUILD](#), also known as the **Insights Confab**, began working together on ways we may engage in **collaborative study** execution. With goals to synthesize [findings on CMEP work to date](#), the Insights Confab developed an [executive summary synthesis memo](#) to align key insights collected across our respective CMEP studies.

Findings and remaining gaps in knowledge from this synthesis were used to propose a **shared set of goals** and learning questions. **Each Confab partner** proposed a **particular methodological approach** address those goals and learning questions elevating students and teachers' experiences and perceptions.

The following slides outline **ResultsLab's findings** from an Online Journal focused on relevance and belonging with **math practitioners**.

CMEP domains of quality for curriculum and supplement design

 Standards alignment Materials are aligned to the Common Core State Standards, as codified by EdReports	Relevance and Belonging Materials help teachers create a classroom environment in which students develop healthy identities, find their voice, feel a sense of belonging, receive feedback for growth, do meaningful work, and feel cared for by their teachers
 Language acquisition Supports that simultaneously develop English learners' disciplinary knowledge, language, and literacy <i>Current Guidelines developed by ELSE</i>	 Social-emotional learning (SEL) Guidelines in progress through collaboration between CASEL and WestEd  Cultural responsiveness and sustainability <i>Draft guidelines developed by WestEd</i>
 Teacher digital experience How easy a curriculum is to use, including the difficulty of implementing it in the classroom for teachers and the difficulty of navigating the content and learning from it for students <i>Teacher Ready framework developed by SEI</i>	 Student digital experience The degree to which students' interactions with digital products or tools provide meaningful experiences that reflect their particular needs and enhance learning.

*Please see [Appendix](#) for additional methodology details and participant demographics and the [study plan](#) for more details on how this study was developed to build on exiting CMEP understandings.

PHASE II ENGAGEMENT



Who was eligible to participate and how many engaged in Phase I of the study?

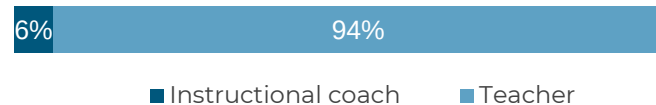
This study began with an exploration of practitioner perceptions of relevance and belonging in **two Slack questions** in mid-July of 2023. Practitioner responses were used to inform the design of an **Online Journal**, with categorical and open-ended questions.

Math practitioners, teachers and coaches, **serving** the foundation's **priority students** from all grade bands and states, were invited to complete the journal in late July of 2023.

Of the 133 people who expressed interest to participate in the online journal, 101 participants were eligible to participate and submitted online journal responses.

Online journals took participants approximately 30 minutes to complete, for which they received an incentive of \$50 to Amazon or PayPal. The following slides detail qualitative and quantitative findings from the online journal analysis.

What role do study participants have at their school? (n=101)



**Please see [Appendix](#) for additional methodology details and participant demographics and the [study plan](#) for more details on how this study was developed to build on exiting CMEP understandings.*



Key Takeaways: Many practitioners lack access to materials and the time it takes to facilitate relevance and belonging in math. While more practitioners identify SEL as an avenue for relevance and belonging than CRSE, many see potential of DLPs for supporting relevance and belonging by facilitating SEL and CRSE in math.

1	2	3	4
Practitioners cite that the top barriers to supporting relevance and belonging practitioners are 1) lack of access to high-quality materials that are culturally responsive and that support SEL, and 2) Time constrains due to curriculum fast pace and rigidity and standards requirements.	There is a strong buy-in among practitioners around the importance of infusing relevance and belonging to enhance MEP and learning outcomes/ Many see SEL and CRSE as frameworks for building relevance and belonging even if many resources for such do not currently exist. While practitioners are resourceful at implementing strategies that infuse SEL in the math classroom, they could use more training and institutional support around integrating CRSE in math.	Practitioners utilize DLPs to enhance relevance and belonging and to provide practice opportunities and differentiated support. However, practitioners were more wary of DLPs' ability to facilitate SEL and CSRE with key concerns including the risk of diminishing the human connection and the challenges of adequately representing student diversity.	Despite concerns, practitioners remain optimistic regarding developers' ability to enhance DLPs and open to leveraging DLPs to support SEL and promote CRSE in the math classroom by promoting interpersonal connections and closing the gap between the perceived importance of CSRE and its limited implementation in students' learning. Integration however will require training in the use of DLPs to integrate CSRE, support SEL, and promote relevance and belonging in math.



DETAILED FINDINGS



INFUSION OF RELEVANCE AND BELONGING IN THE MATH CLASSROOM

“Relevance is obvious when it is really there - students volunteer more readily and start trying new ways of doing things. Belonging comes through the discussions students have and also valuing everyone's input.”

-High School Math Teacher, Virginia

The Following Section Highlights:

- Practitioners' perceptions about relevance and belonging in support of MEP and learning outcomes.
- Belonging of SEL and CRSE in the math classroom
- Use of DLPs to foster relevance and belonging
- Examples of relevance and belonging
- Barriers to supporting relevance and belonging

Key Take-Aways:

1. There is strong buy-in among practitioners around the:
 - o Importance of infusing relevance and belonging to enhance MEP and learning outcomes
 - o Belonging of SEL and Cultural Responsiveness in the math classroom, with limited capacities to promote Cultural Sustainment.
2. Top barriers to supporting relevance and belonging practitioners are:
 - o Lack of access to high-quality materials culturally responsive and that support SEL
 - o Time constraints due to curriculum fast pace and rigidity and standards requirements.
3. Despite the concerns expressed, practitioners remain optimistic regarding developers' ability to enhance DLPs and open to leveraging DLPs to support SEL and promote CRSE in the math classroom.



Most math practitioners believe that math instruction should focus on relevance and belonging as it improves Motivation, Engagement, and Persistence (MEP) and learning outcomes in the math classroom.

R&B in support of student MEP and learning outcomes	R&B in support of student MEP	Pressure-Testing Inverse Opinions
• 88% of practitioners believe that integrating relevance and belonging in the math classroom improves MEP in the math classroom. • 82% of practitioners believe that integrating relevance and belonging in the math classroom improves math learning outcomes. • 79% of practitioners believe that integrating relevance and belonging in the math classroom improves both MEP and learning outcomes.	• 88% of practitioners believe that integrating relevance in the math classroom improves MEP. • 86% of practitioners believe that the sense of belonging in the math classroom improves MEP.	• 64% of practitioners disagree with the statement “Relevance and belonging have <u>no impact</u> on student MEP or math learning outcomes.” • 77% of practitioners disagree with this statement “Math instruction should focus just on math instruction and not focus on relevance and belonging.”

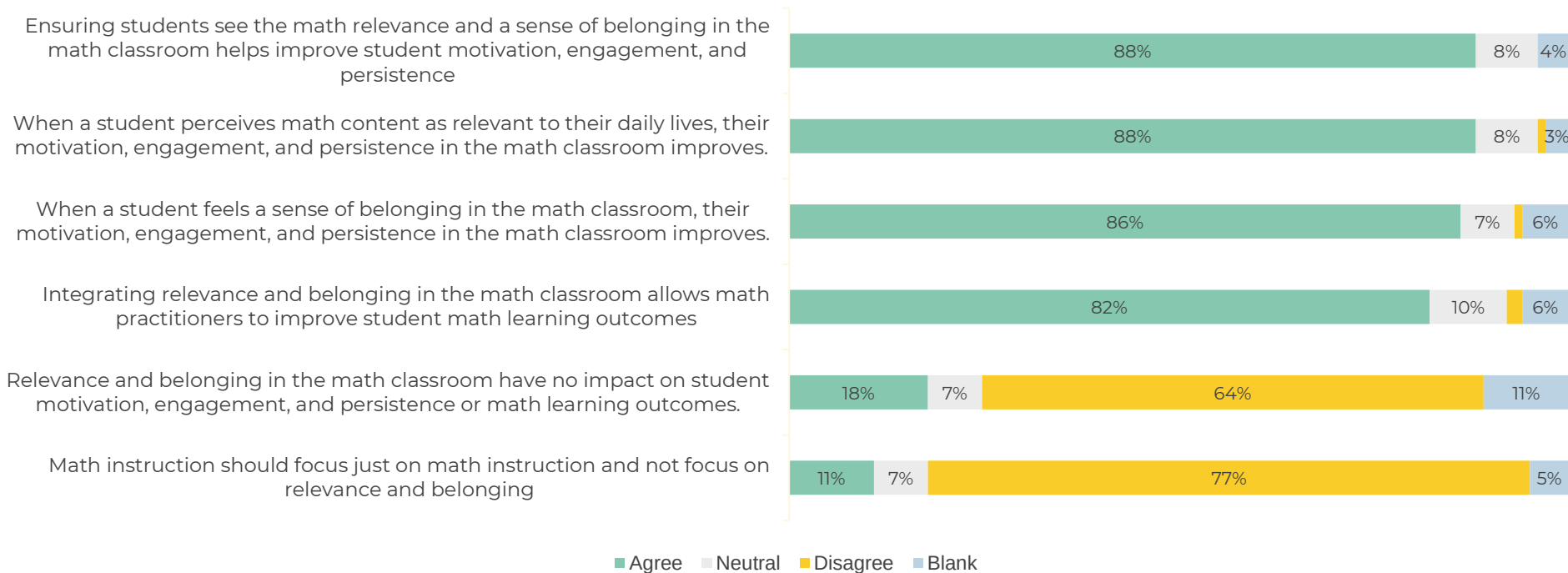
** See the next slide for findings in chart format.*





The positive feedback from math practitioners regarding the importance of relevance and a sense of belonging in enhancing motivation, engagement, persistence, and ultimately learning outcomes predicts a potential high level of acceptance and enthusiasm for digital learning products that incorporate these elements into math instruction.

Practitioners' perceptions about integrating R&B in the math classroom to support of MEP and learning outcomes (n=101)





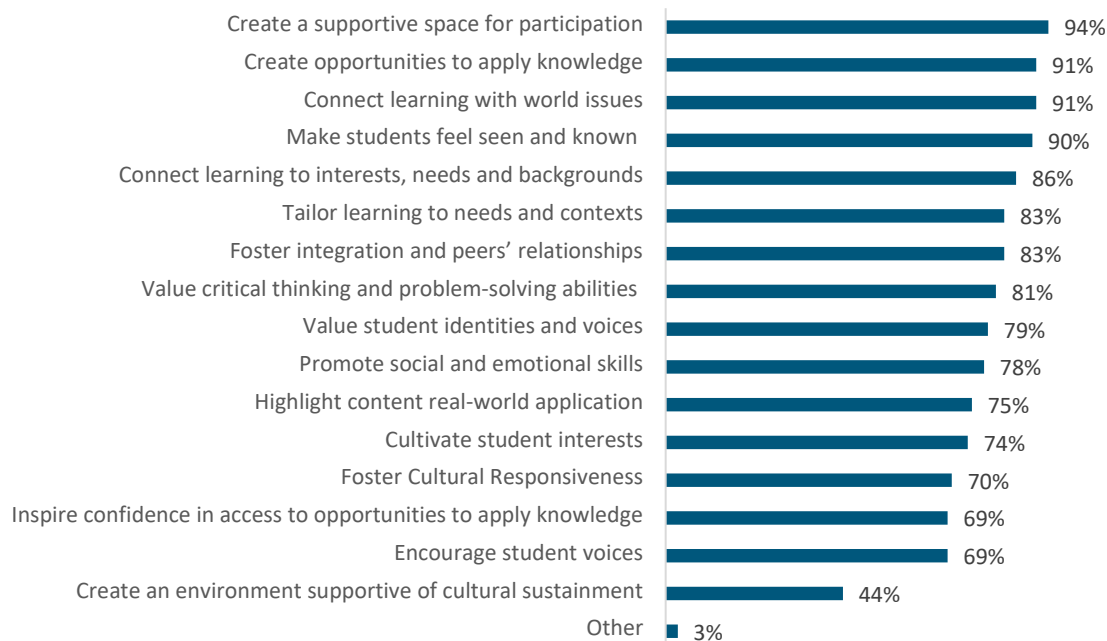
In line with their views on the importance of relevance and belonging in the math classroom, practitioners resourcefully create and implement activities to foster these feelings.

Activities to Infuse Relevance	Activities to Infuse Belonging	Activities to Infuse SEL	Activities to Infuse CRSE
• Provide students with opportunities to apply what they learned (n=92) • Make connections with world problems or situations (n=92) • Show value in strengthening students critical thinking and problem-solving abilities (n=82) • Discuss the importance and potential applications of content (n=76) • Infuse confidence about their access to opportunities to apply what they learned in class (n=70)	• Create a safe and supportive space where students can participate, ask, and try with confidence (n=95) • Make students feel seen and known (n=95) • Foster integration and peers' relationships (group projects, activities, games) (n=84) • Show acceptance and value in students' identities, expertise, voice, mindsets, and agency (n=80)	• Promote the development of social and emotional skills, such as decision making, emotions management, self-efficacy, mindset growth and agency (n=79)	• Be responsive of and relevant to students' cultural experiences and practices (CR) (n=71) • Support your students in sustaining the cultural and linguistic competence of their communities while simultaneously offering access to dominant cultural competence (CS) (n=44)
• Make connections with students' interests, experiences, needs, perspectives, goals, knowledge, and personal backgrounds (n=87) • Tailor learning experience based on your knowledge of your student/s' needs, capacities, possibilities, contexts (n=84) • Provide students with opportunities to cultivate and share their personal interests (n=75)			



Top strategies for facilitating a sense of relevance and belonging in the math classroom include creating a safe and supportive space, helping students make connections to real-world situations, aligning instruction with students' interests, experiences, and backgrounds, and promoting SEL. To a lesser extent, they support students' cultural responsiveness and sustainment.

Activities performed by practitioners to facilitate relevance and belonging in the math classroom (n=101)



"Having students share out and feel safe enough to share their struggles and what they see in the real world. Feeling safe and accepted is perhaps the most important aspect to promoting relevance and belonging."

-Elementary School Teacher, Illinois, Public School

** Other responses included cross-curricular integration, opportunities to show what students have learned, student agency, connecting with families, and encouraging student creativity.*



Evidence of relevance and belonging include student engagement, application of content, persistence, collaboration, and mastery of content. Examples of what these look like in practice are detailed in the table below.

When an activity is working to improve relevance and belonging, practitioners see students...



Engaging	Applying	Persisting	Collaborating	Mastering	Growing confidence & enjoying	Being motivated	Exerting agency
53%	36%	21%	18%	18%	16%	13%	5%
• Trying • Participating • Doing work • Wanting to continue • Talking • Sharing thoughts • Opposite to bored, disinterested	• Using on own • making connections • Engaging in discussion • Talking about lesson afterwards	• Having a sense of purpose • Willing to take risks • Growing mindset • Failing and learning • Willing to ask questions	• Feeling part of a community • Helping others • Willing to answer questions • Listening to peers	• Improving test scores • Growing skills • Achieving more	• Willing to participate, try, ask and questions and share out • Comfortable asking for support • Smiling • Confident in their skills • More excitement and less anxiety • Persevering	• Participating • Asking questions • Showing interest and excitement • Learning routines and trying new things	• Providing feedback • Elevating their voice • Taking ownership of learning



Practitioners note that an activity is improving relevance and belonging because students are not afraid of being wrong, see how a concept relates to their lives outside of school, and are excited to share their knowledge or support their peers.

*"(...) students are **eager to participate and are not afraid to be wrong**. They understand that we can learn even more from the wrong answers than we can from the right ones. **They understand that failure is a part of learning and are eager to redo assignments** and assessments that they don't do well on."*

-High School Teacher, Illinois

*I think **when a student can apply a concept to their personal life then I have improved the relevance of the topic**. For example, in learning multiplication last year, one of my students drew a picture of Minecraft swords with diamonds and multiplied to find how many in all. He was **using something he cared deeply about and applying it to his new learning**.*

-Elementary Math Teacher, Tennessee

*"I see students getting more **excited about math** by welcoming our math block rather than dwelling on it; **less anxious** behavior about math; better **confidence**; **volunteering to teach to the class or a peer**; **willing to explain their strategies** with the class or a peer; **wanting to play math games in their free time**. The **outcomes are proficient math scores**."*

-Elementary School Math Teacher, Montana

*"way to observe students' engagement in the activity to know this; **Are they actively participating? Are they asking questions? Are they showing signs of interest or excitement?** If students are engaged in the activity, it is more likely that they are finding it relevant and that they feel a sense of belonging."*

-Middle School Math Teacher, Texas



Top barriers to infusing relevance and belonging include time constraints, limited training, access to pertinent resources, and resistance infusing instruction with relevance and belonging. Enhancing practitioners' access to culturally responsive instructional materials that resonate with students' interests and experiences, while promoting SEL, could address the obstacles to relevance and belonging in math.

Top 10 barriers to supporting relevance and belonging in the math learning context according to practitioners (n=101)

Access to instructional materials	Practitioners working conditions and professional training	Instructional context	Students' mindsets and instructional level
1. Math practitioners lack access to supplemental supports to infuse R&B (87%) 5. Math practitioners do not have a high-quality instructional material that are culturally responsive and support student SEL (82%)	2. Math practitioners do not have the time / bandwidth needed to infuse relevance and belonging while also delivering curriculum and meeting standards (85%) 3. Math practitioners struggle to find enough opportunities to connect math students learning to real-world scenarios or to other subjects they are learning (85%) 9. Math practitioners lack professional learning on how to infuse relevance and belonging (76%) 10. There is not buy-in among practitioners for how infusing relevance and belonging through mechanisms like SEL and CRSE can improve math learning outcomes (75%)	4. Math instruction is driven by standards, standardized testing, and unreasonable pacing so there is no time to focus on relevance and belonging in the math classroom (84%)	6. Students don't believe they are "math people"; and see something they cannot do or are afraid to try and be wrong (79%) 7. Practitioners struggle to build buy-in among students around why learning math matters and its importance for their futures (79%) 8. Students are behind in their mastery of math skills or reading comprehension, which limits the types of math questions that can be asked or explored (79%)



Most practitioners lack access to or are not aware of DLPs that support relevance and belonging through math instruction. In a context of time constraints and limited training to infuse relevance and belonging, DLPs could offer a solution to practitioners' demand for culturally responsive, high-quality materials that support SEL.

"I can't tell you how many sites I come across that I'd love to try but can't because they aren't purchased by my school or district."

-Elementary School Teacher, Tennessee,

"I don't really see a lot of SEL application in math since I haven't gotten much training in using SEL in math - I've had tons of professional development on using it in English, History, and Art but zero for math / science."

-High School Math Teacher, Virginia

*"The struggle is very real for educators. The **standards and the curriculum drive all of the instruction**. Educators are NOT encouraged to be creative or expand on the lessons concepts."*

-Elementary School Math Teacher, Iowa

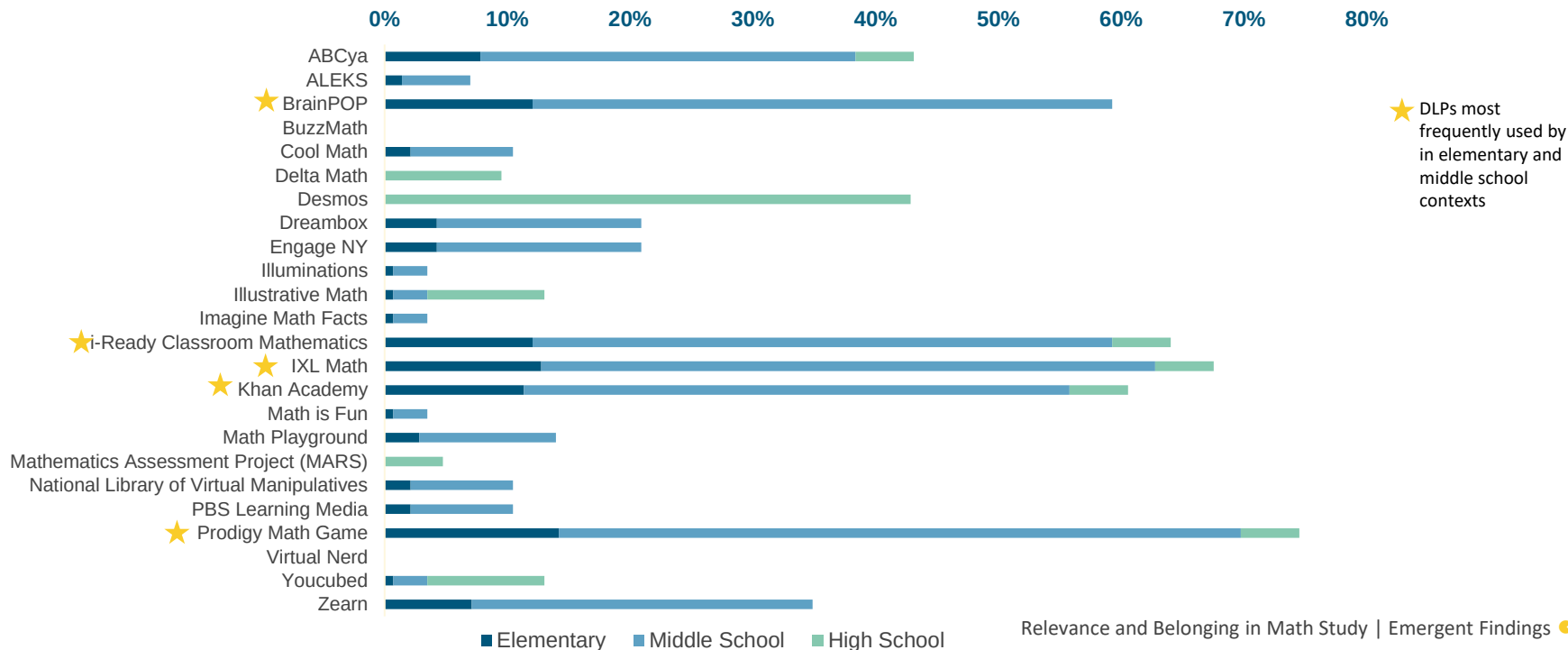
*[CRSE would help supporting students in feeling more motivated, engaged, and persistent] "(...) but **in the math class there is not much room for this with so much math content to teach.**"*

- Elementary School Math Teacher, Texas



When asked which DLPs they use to foster relevance and belonging are IXL Math, Prodigy Math Game, BrainPOP, Khan Academy, and i-Ready Classroom Mathematics were the top five most referenced.

DLPs Used by Practitioners to Foster Relevance and Belonging by Grade Band





The most common applications of DLPs for enhancing relevance and belonging includes reinforcing learning, providing individual and group-based differentiated support and practice, and relating learning with real-life situations. See table below for DLP uses for infusing relevance and belonging.

DLP	How Practitioners <u>Use or Could Use</u> DLP to Support Relevance and Belonging	Illustrative Quotes
	• Fun, engaging, games to practice at school or at home • Reinforce learning and offer extra practice • Collaboration and sharing skills with one another • Differentiated supports by learning level • Standards-aligned supports	"Use as supplemental activities. Students enjoy the game aspect since many of them like video games. Students can work together/talk about which activities they like and how the activities help them enhance their math skills." – Elementary School Teacher, South Carolina "Students get to work at their own level, but the game looks the same nonmatter what, so students don't feel judged for the work they are doing." – Elementary School Teacher, Ohio
	• Diagnostics • Reinforce learning and individual practice • Students work towards individual goals • Differentiation based on student knowledge and expertise • Standards aligned • Real-world problems	"Students work at their own paces depending on their diagnostic results. Everyone is working on something, so no one is singled out." – Middle School Math Teacher, Oklahoma "I could group students together based on a skill they need reinforced. Then, students would realize they aren't the only one who may be struggling with a specific concept." – Elementary School Teacher, Ohio
	• Diagnostic data to identify remediation or acceleration needs • Support differentiation by assigning skills work to meet student gap areas or needs • Core instruction integrated with independent practice • Several indicated they are not sure how it supports Relevance and Belonging • Additional practice through online manipulatives and printables • Small-group work assigned by common areas of concern • Setting individual goals	"We used iReady for assessment and also there is a component in there to differentiate and intervene for students who may have difficulty. This allows students to show strengths, but also address any deficits that they may show in their math skill ability. Students have an opportunity to feel some level of success in the area of math." – Elementary School Teacher, North Carolina "I use iReady math lessons to differentiate levels. All students can achieve even though they are not on the same level. I reward them for making their goals." – Elementary School Teacher, Mississippi



The most common applications of DLPs for enhancing relevance and belonging includes reinforcing learning, providing individual and group-based differentiated support and practice, and relating learning with real-life situations. See table below for DLP uses for infusing relevance and belonging.

DLP	How Practitioners <u>Use or Could Use</u> DLP to Support Relevance and Belonging	Illustrative Quotes
	• Math in real-life situations • Introduce topics and motivate students • Make math relatable, engaging, and interactive • Reinforce topics or offer additional support • Foster agency – student rewatching topics or working on a concept • Facilitate discussion	“Math in real-life situations Introduce topics and motivate students Make math relatable, engaging, and interactive. Reinforce topics or offer additional support. Foster agency – student rewatching topics or working on a concept. Facilitate discussion.” – Elementary School Teacher, Texas “Brain POP shows how math is used in real life situations. It shows kids critically thinking to solve problems..” – Middle School Math Teacher, New Mexico
 Khan Academy	• Engaging, interactive, showing math in the real-world • Videos to reinforce learning or present content in a different way than the teacher • Built-in differentiated supports for intervention that enable agency and assistance without having to ask the teacher for help • Introduce concepts / pre-teaching • Small group work to support one another • Independent focus time	“Students are able to access videos that reinforce materials taught in class. Videos and activities are especially helpful when they present strategies and information in a different way than the classroom teacher. Students recognize that other kids are working on the same concepts across the country and around the world.” – Elementary School Teacher, Florida “ I use Khan Academy videos to introduce new concepts as it has many high-quality videos that can be used to introduce new math concepts. These videos are engaging and interactive, and they can help students see how the concepts can be applied in real-world contexts.” – Middle School Math Teacher, Texas



Math practitioners are open to and familiar with the integration of SEL in the math classroom but expressed concerns about the potential adverse effects of DLPs replacing the human interaction and connection. While there is strong buy-in around CSRE's importance, many practitioners conveyed their insufficient training and experience in promoting CRSE and pointed the limitations of DLPs in representing their students.

Pertinence of CRS and SEL in the math learning context	Adequacy of digital learning products to infuse CRSE and SEL in the math learning context
- Most practitioners believe that SEL and CRSE belong in the math learning context, but more practitioners perceive SEL as belonging in math learning (85%) than CRSE (n=58%) 97% of practitioners implement at least one of the CASEL SEL's framework core competencies into their learning experience. 48% of practitioners reported implementing CRSE practices in their math learning context.	36% of practitioners believe that digital learning products can help infuse SEL in the math learning context. 45% of the practitioners believe that digital learning products can help infuse CRSE in the math learning context.

"The product itself does not do that [infuse SEL]... we need to teach teachers how to do that with the digital learning products."

-Elementary Math Teacher, New York

"At this time my impression of digital learning products is that they are very surface level for "culturally responsive teaching." In other words they might include pictures/characters of diverse people, but it doesn't really have any 'teeth.'"

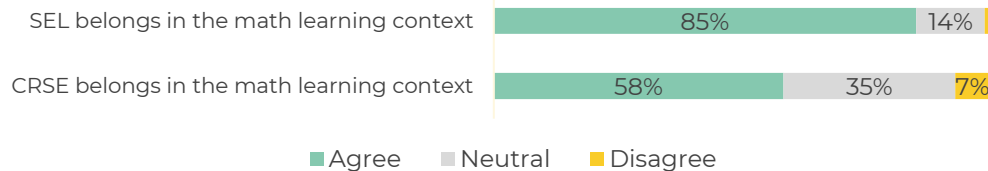
-Elementary Math Teacher, Wisconsin

* It is important to note an emerging contrast between strong beliefs that relevance and belonging support math learning outcomes (slide) and less strong alignment with the idea that CRSE belongs in the math classroom or concrete examples of how CRSE supports relevance and belonging.

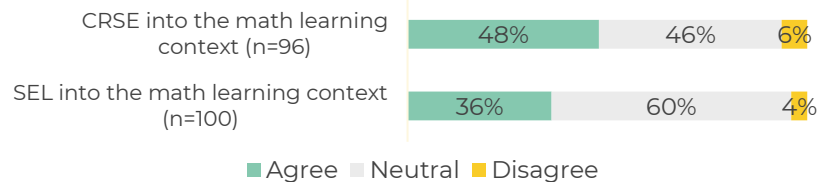


Despite the concerns regarding the use of DLPs and the limitations of the existing DLPs, practitioners were receptive to leveraging DLPs to promote SEL and CRSE in the math classroom. Practitioner optimism regarding potential for DLPs suggests there may be demand for CRSE & SEL-infused product features.

Practitioners' beliefs about the belonging of CRSE and SEL in the math learning context (n=101)



Practitioners that believe that digital learning products can help infuse...



"I feel working with other students is generally more beneficial for building SEL skills. However, you can build teamwork and challenges to complete activities and students can build persistence through digital activities."

-Elementary Math Teacher, Florida

"Not so sure students can put SEL into real life practice on a computer program, but I am willing to try!."

-Elementary Math Teacher, California



PERCEPTIONS AND USE OF SEL IN THE MATH CLASSROOM

"I see all kids as unique individuals with potential to excel. The more we interact with our students in daily conversations, not necessary with math and in math class, but as individuals, the more trust, cooperation, and engagement is evident. Getting to know our students personally first, builds the foundation to future relationships."

-Middle School Math Teacher, New Mexico

The Following Section Highlights:

- Practitioners' perceptions about SEL in the math classroom
- Practitioners' implementation of SEL core competencies into their learning experience
- Practitioners' perceptions about the helpfulness and effectiveness of DLPs in support of SEL

Key Take-Aways:

1. There is strong buy-in among practitioners about Importance of SEL in the math classroom.
2. Teachers demonstrate extensive implementation of core competence of the CASEL SEL's framework in the math classroom.
3. Activities implemented to develop SEL core competence skills and improve relevance and belonging include:
 - o **Relationship skills:** Group and partner work to promote collaboration and belonging
 - o **Social awareness:** Classroom checks to promote belonging, emotions awareness and relationship building
 - o **Responsible decision-making and self-management:** Projects to foster motivation, relevance and agency
 - o **Self-awareness:** Time to digest concepts and formulate answers to build confidence
4. There is an opportunity for enhancing DLPs designed to support SEL by aligning them more effectively with SEL's core competencies and the approaches employed by practitioners to promote SEL.



85% of practitioners believe SEL belongs in the math classroom, with a majority of these being elementary school teachers. Although there was an acceptance of SEL in the math classroom, few practitioners could point to specific products that are explicitly facilitating SEL in the math classroom .

Practitioners' beliefs about the belonging of SEL in the math learning context (n=101)

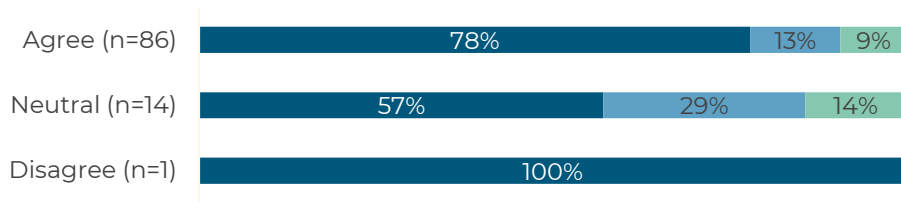


■ Agree ■ Neutral ■ Disagree

"Some digital learning platforms might make students feel more calm and easier to access but they don't necessarily have a SEL component embedded."

-Middle School Math Teacher, Michigan

Practitioners' beliefs about the belonging of SEL in the math learning context by grade band



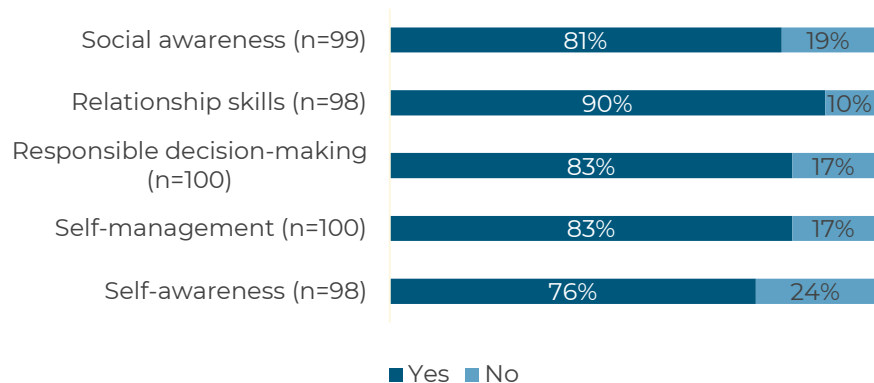
■ Elementary ■ Middle School ■ High School

Note: Participants who responded neutral were from CA, CO, FL, GA, MI, NM, NY, NC, TN, TX, VI, WA, and WI. The participant who disagreed was from TX.

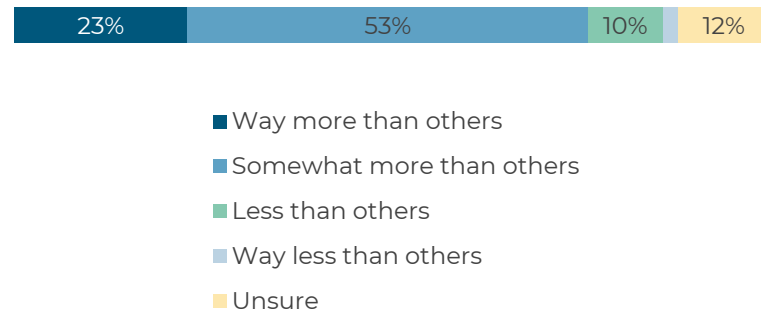


97% of practitioners implement at least one of the CASEL SEL's framework core competencies into their learning experience. Most common competencies practitioners implement include relationship skills, responsible decision-making, and self-management. Generally, practitioners report they infuse SEL more than their peers, demonstrating a potential need for training and support structures for math practitioners.

% of practitioners who reported implementing the following CASEL SEL's framework core competencies into their learning experience



In comparison to fellow math educators at your school, practitioners perceive that they infuse social-emotional learning (SEL) practices into the math learning context... (n=100)





Most math practitioners believe that SEL is a fundamental cornerstone for learning and academic achievement in the math learning context and beyond. SEL is a gateway to building healthy relationships, feel confident and create environments where all feel seen, heard, valued, respected and included.

SEL creates the preconditions for students to express themselves, collaborate efficiently, persist and ultimately succeed in the math classroom and plays a key role in building positive learning environments and busters R&B, MEP and academic performance.

SEL is Foundational for Learning and Beyond	What is special about SEL in the Math classroom	Activities math practitioners use to develop SEL skills and Promote R&B
• When students feel seen, cared-for, safe, secure and confident they are more engaged, motivated and persistent • A better behavior and emotions management help them perform better academically • Relationship build trust, decrease anxiety, promote reciprocity and engagement. • SEL helps build respectful environments • Showing that you welcome different perspectives help them listen to others' ideas • Building relationships with students, promoting good peers' relationships and a sense of belonging give students the confidence to learn.	• Feeling safe, and belonging are preconditions to share and collaborate with others, take risks, feel OK making mistakes, ask questions and ask help. • SEL help students to be patient while understanding concepts and confidence to struggle and persist.	Collaboration and belonging • Group work • Work with partner Belonging, emotions awareness and relationship building • Classroom checks Motivation, relevance and agency • Projects Relevance and engagement • Resources sharing Confidence • Time to digest concepts and formulate answers



Only 36% of practitioners believe that DLP can infuse SEL in the math classroom. The 60% who remained neutral explained that DLPs cannot replace a teacher's responsibility of ensuring that their students feel seen, heard, cared for and connected with others, and should not be designed with this goal in mind. Adequate DLP use to infuse SEL will require training and access to the right products.

% of practitioners that believe that digital learning products can help infuse SEL into the Math Learning Context (n=100)



Reasons Practitioners Agreed (n=21)

- DLP can bring students together to develop interpersonal skills, while creating bonds and a sense of community
- Gaming and competition help students deal with mistakes, defeat and success.
- DLPs help students build confidence, promote independence and agency, persistence and perseverance
- Customization and immediate feedback help student feel seen and heard.
- In favor of DLPs for other reasons: digital environments engage students.

Reasons Practitioners Remained Neutral (n=39)

- SEL requires interpersonal connections and experiences between teachers and students, and among student. DLP can prevent students from making connections with others (self-guided environment) and can lead to distractions **(n=12)**
- Only teachers trained can infuse SEL, DLP are only tools they might use **(n=6)**
- Depends on the product used and the student's personal characteristics and access to technology **(n=12)**
- Skeptical about their effectiveness. Haven't seen DLP successfully used for SEL or haven't used them, by might **(n=8)**



Math ES educators' see avatars and gaming as the most effective feature of DLPs for enabling R&B by supporting SEL. However, many HS and MS practitioners were unable to point effective features to support SEL. Across grade bands, there is a call for more content grounded in students' lived experiences, context, preferences and identities as well as more customization by learning levels and interests.

DLP Featured	Features Most Effective for Facilitating SEL	Desired Features to Support SEL
Relevant and representative content	Content grounded in students' experience, life and world + cultural representation for relevance and belonging (n=7)	+ Concerns, topics that affect students or they care about, more/better representation of diverse races, backgrounds and abilities and youth digital world (n=26)
Avatars	For representation, inclusion, identity affirmation, agency, expression, engagement, motivation + teachers looking like students. (n=13)	Same as "Most effective" row (n=6)
Gaming	To foster connections and collaborations among students, engagement, motivation, perseverance, relevance and belonging. (n=12)	Mainly for engagement and motivation (n=8)
Customization	Based on interests, abilities, learning level; competence each at his/her own level (n=9)	+ Same as "Most effective" row (n=11)
Activities to build and strengthen connections	Collaborative activities, games, competition, group work to develop communication and collaboration skills (n=9)	+ Foster solidarity among students + create connections with the here and now (n=7)
Reflective feedback	Like self-assessments to improve progress awareness and management (n=4)	+ Importance of encouragement, learn from mistakes (n=8)
Interaction	Like choices and rewards, videos with questions, explanations after mistakes, relaxation (n=4)	See different results based on scenario chosen (n=1)

* Practitioners' responses exhibit DLP features that are more closely associated with MEP and/or R&B within younger students. This could indicate a potential misalignment between DLPs, CASEL SEL core competencies, and the type of activities implemented by math practitioners to foster SEL among older students.



CRSE AND MATH LEARNING CONTEXTS

"CRSE helps students see themselves as mathematicians.

Through vicarious experience of seeing people from backgrounds that are similar to them who have succeeded in math, they can boost their own self-efficacy and belief that they can be successful in math, too, thereby increasing their motivation and persistence. I will always remember when I played a video by Neil deGrasse Tyson in class and one of my Black students exclaimed in surprise, "Hey, he's Black!" ... as if it hadn't occurred to him that Black people could be in STEM. By using problems that are relevant to their communities and inequities they are facing, students see math as a useful tool, which increases their motivation and engagement.

- High School Math Teacher, California

The Following Section Highlights:

- Practitioners' perceptions of CRSE in the math classroom
- Practitioners' implementation of CRSE
- Practitioners' perceptions about the helpfulness and effectiveness of DLPs in support of CRSE

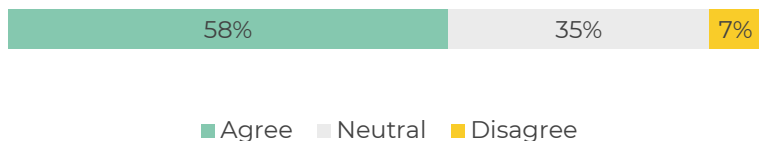
Key Take-Aways:

1. There is buy-in CRSE importance but a limited perception of CRSE benefits due lack of institutional support or resources for implementation.
2. Limited implementation of CRSE principles likely due to "boxed" curriculums and state education policies constrains, lack of resources, lack of CSRE awareness within math, concerns about its suitability for the younger students and time limitations.
3. Activities implemented to develop CRSE principles include infusing literature, student spotlights, building lessons around student interests, Incorporating other languages and diverse perspectives, highlighting diverse mathematicians and math in other cultures.
4. DLPs have a huge opportunity to close the gap between the perceived importance of CSRE and its limited implementation in students' learning and the need for more awareness and skills among practitioners.
5. DLPs effectiveness and acceptance will depend on developers' ability to enhance the expression of diversity, make the content more relatable to students' experiences and identities and be more responsive to language diversity.

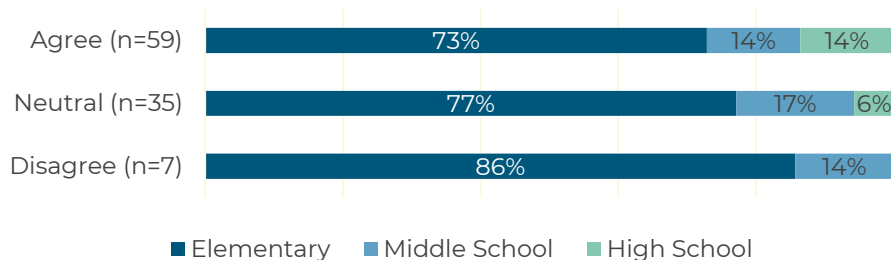


Although 58% of practitioners believe that CRSE belongs in the math classroom, disagreement comes most strongly among those working with elementary and middle school students. This may suggest a need for buy-in among and advocating for the use of CRSE with practitioners and intuitions working with these grade bands.

Practitioners' beliefs about the belonging CRSE in the math learning context (n=101)



Practitioners' beliefs about the belonging of CRSE in the math learning context by Grade band



Participants who responded neutral were from AZ, CA, CT, FL, GA, ID, IL, IO, KY, MA, MI, MS, MN, NY, NC, OH, OK, PN, TN, TX, WA, and WV.
Participants who disagreed were from CO, GA, IL, KY, MI, NM, and TX.

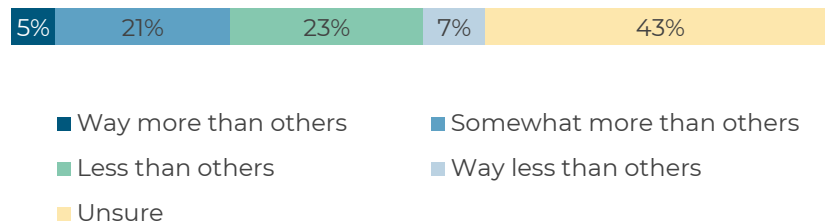


The top reasons for the limited implementation of CRSE principles in the math classroom include constraints due to standardized curriculum and state education policies, lack of resources, lack of CSRE awareness within math, concerns about its suitability for the younger students and time limitations.

% of practitioners who reported implementing the following CRSE practices in their math learning context



In comparison to fellow math educators at your school, I perceive that I infuse culturally responsive and sustaining education (CRSE) practices into the math learning context... (n=94)





When asked what prevents practitioners from implementing and seeing CSRE belonging in the math classroom, common responses included challenges with the curriculum materials, lack of institutional support, the need for professional development, or a lack of exposure.

"Our scripted curriculum does not cover these topics."

-Elementary School Math Teacher, Iowa

We can't even get to this because of the boxed curriculum."

- High School Math Teacher, Tennessee

"This is above my student's cognitive level."

-Elementary School Math Teacher, Arizona

"Learning materials are vetted by our state level leaders and state curriculum designers"

-Elementary School Math Teacher, Florida

"I don't know how to incorporate this into my already tight instructional schedule. I would welcome some professional development on the topic."

-High School Math Teacher, Virginia

"I have not done as much. I'll work on this".

-Elementary School Math Teacher, New York



Practitioners reported seeing positive trends between CRSE principles in action and students' motivation, engagement, and persistence. Although practitioners were willing to discuss the challenges with implementing CRSE in math, there is buy-in for the importance of cultural responsiveness for facilitating student relevance and belonging.

CRSE Plays A Key Role In Facilitating A Sense Of Belonging	CRSE Limitations	Activities Math Practitioners Use To Facilitate CRSE And Promote R&B
Practitioners often reported a direct connection between CRSE and student motivation, engagement, and persistence in that students seeing people like themselves in their math materials and succeeding at math makes them feel like they have a chance at success as well. By bringing in culture, practitioners can make content more relevant to students and help them feel valued in the math classroom. When students can see themselves in math, they are more likely to feel empowered and inclined to engage with the content.	While many teachers expressed CRSE as an avenue for helping motivate students, engagement, and build persistence, many elementary school teachers in particular explained that concepts of CRSE are big and entrenched, which can make them difficult to tackle with little ones. They did, however, explain the value of diversity of representation and contexts in math, even if things like equity and justice may be a bit more advanced. Practitioners also indicated that while it is important to infuse CRSE in the classroom experience, this is not easy to do, and they need professional development to learn how to do it well.	• Infuse literature • Student spotlights • Building lessons around student interests • Incorporate other languages and diverse perspectives in problems • Highlight diverse mathematicians and math in other cultures • Establishing relationships with families and businesses in the community • Culture of collaboration in the classroom, equity vs equality • Hot topic and current event discussions with a math lens

* It is important to note that fewer practitioners were able to identify features to facilitate CRSE compared to features to facilitate SEL, potentially indicating lower levels of exposure to the CRSE framework or concrete examples of this in practice.



There is a polarization between practitioners who see the potential of DLPs in helping to infuse CRSE and those who are skeptical, likely due to limited experience with DLPs featuring CRSE content and lack of institutional support for infusing such practices in the math learning space.

% of practitioners that believe that digital learning products can help infuse CRSE into the Math Learning Context (n=96)



Reasons why practitioners agreed (n=36)	Reasons why practitioners remained neutral (n=39)	Reasons why practitioners disagreed (n=3)
- I saw or I'm confident that DLP can create CRSE content and have positive effects in students (such as feel represented, embrace diversity, create a sense of belonging and relevance) (n=22). - To be effective and prevent adverse effects, educators needs to be trained in the use of CRSE DLPs. - In favor of DLPs for other reasons: DLPs are valuable tools to support and customize learning, create autonomy, infuse relevance, digital environments engage students (n=8) .	I'm not aware it's being used, have not seen it yet (or seen it beyond highlighting cultural figures and events or featuring diverse people) or too often. Not sure it's possible, how it would work or its effects. Curious about it. (n=33) More personal interaction is needed, digital environments can disconnect us	
	- Depends on who makes the product or how the product is made and used - Unable to teach CRSE due to State policies for education (FL)	



CRSE and thus R&B can be enabled in the math by enabling the expression of diversity, grounding the content in students' lived experiences, and providing inclusive language options. To educators, DLPs effectiveness and acceptance will depend on developers' ability to enhance expressions of diversity and make the content more relatable to students' experiences and identities.

DLPs features	Features Most Effective for Facilitating CRSE	Desired Features to Support CRSE
Relevant and representative content	For relevance, inclusivity and belonging content, characters, problems, names and situations featuring diverse races, cultures, ethnicities, lifestyles and places; Content grounded in students' lived experiences and backgrounds, tutors looking like students, linguistic alternatives and (n=22)	+ More/better representation, diversity, linguistic options, content relatable to interests and inclusive, real life/world situations (n=35)
Avatars	For infusing belonging, relevance, representation, agency and motivation (n=11)	Same as “Most effective” row (n=9)
Customization	Allow teachers greater customization, provide different learning pathways, more language options and customization based on students' cultural background and experiences (n=7)	+ To tailor learning to students learning needs + better representation (ex. students names identified, written and pronounced as in their own language) (n=11)
Gaming	For engagement, motivation and relevance in terms of being responsive to youth preferences (n=8)	Same as “Most effective” row (n=2)



PATHWAYS FORWARD

Practitioners asks to product developers to:

Start: *“Infusing culturally relevant and sustaining education (CRSE) practices into the design of their products. This means incorporating content and pedagogy that is aligned with the cultural values of the students who are using the product.”*

Stop: *“Creating products that are one-size-fits-all. No two students are the same, so it is important to avoid creating products that are one-size-fits-all. Instead, products should be designed to be flexible and adaptable to the needs of different students.”*

-Middle School Teacher, Texas

The Following Section Highlights:

- Barriers to facilitating relevance and belonging in the math classroom and those which practitioners feel are the most important and feasible to address
- Practitioners asks to product developers to facilitated SEL and CSRE.

Key Take-Aways:

1. Practitioners perceive the lack of access to supplemental supports as the most important and feasible barrier to address to progress in infusing relevance and belonging in the math classroom.
2. Practitioners want developers to continue creating engaging DLPs that offer customization capacities. There is a call for more and better representation of students' identities, content more adjusted to their needs, preferences and interests as well as activities and content that activate students critical thinking.



Practitioners believe that enhancing access to supplementary support is the actions with the greatest impact and feasibility potential to positively shape the math learning experience by fostering a sense of relevance and belonging

Math practitioners' perception of the importance and feasibility of addressing the top 10 barriers to supporting R&B

IMPORTANCE



Access to supplemental supports to infuse R&B

- Time constrains to infuse R&B
 - Opportunities to connect learning to real-world
- Fast instructional pacing
 - Material culturally responsive – SEL supportive
- Students' confidence in their learning capabilities
- Student buy-in in math importance
 - Students behind in math or ELA
- Lack of Professional learning
- Buy-in re effectiveness of R&B (SEL/CRSE) to improve outcomes

FEASIBILITY



Practitioners believe that to better facilitate SEL, developers need to continue gamifying learning and building in customization capacities. There is a call for more and better representation of students' identities, content adjusted to their needs, preferences and interests as well as activities and content that activate students critical thinking.

To better facilitate SEL	Product Developers Should Keep Doing ...	Product Developers Should Start Doing ...
Gamification of learning	To motivate, engage, teach to persevere (rewards effort), connect students, social skills, high quality engaging images	Less competitive, more collaborative, connected to learning, non-violent, less repetitive, avoid babyish characters for older kids
Customization	By instruction level, curriculum and standards specific, students' choices.	By instruction level, student progress <u>and age-appropriate</u> (low level content appropriate for MS and HS students), curriculum and standards specific, students' choices, special learners needs, relevance to students' interest and background
Relevance and representation	Students' representation (customizable avatars), connections to their interests, preferences (interactive, engaging) real world, life skills	More/better connections to real life, practical application of knowledge and skills, tutors that look like students, <u>language</u> appropriate considering reading levels. Accessible (free access) and user friendly for teachers.
Learning support	Quizzes, scaffolding, videos, foundational skills	More options for students struggling, scaffolding.
Feedback	Encouragement and reflective feedback (quizzes)	More positive feedback and encouragement, avoid discouraging feedback, rewards not earned with effort
Creative and critical thinking		Avoid activities that don't require or discourage active or creative reasoning/thinking/learning, one way to solve a problem, one type of activity
SEL specific activities		SEL checks, relaxation, social skills practices, professional development, SEL training for teachers



To better facilitate CRSE, practitioners wanted less “one size fits all” language and to avoid ethnocentric content and framing. Practitioners see the need for more customizable products, better representation of diversity, as well as content and options more aligned with students needs, preferences and interests.

To better facilitate CRSE	Product Developers Should Keep Doing ...	Product Developers Should Start Doing ...
Relevance and representation	• Cultural and linguistic representation of students' cultures and identities (customizable avatars) • Students' cultures and ethnicities represented and valued • Relevant content (students' preferences, knowledge applications, real life situations)	• More cultural diversity, inclusion and better representation (call for a more diverse and inclusive use of names and characters, more realistic avatars representative better ethnic diversity) • Content relatable to students' experiences, interests and math applications • Real life/world problems and situations • Age-appropriate content
Customization	By instructional level, students progress and needs, local curricula and standards	More language options, by learner level, needs and cultural background, local curricula and standards
Others	Gaming, Motivation, Support teachers' work, students' independence, attractive graphics,	More interactive, engaging and user friendly, more professional development for teachers', improved access



Key Takeaways: Many practitioners lack access to materials and the time it takes to facilitate relevance and belonging in math. While more practitioners identify SEL as an avenue for relevance and belonging than CRSE, many see potential of DLPs for supporting relevance and belonging by facilitating SEL and CRSE in math.

1	2	3	4
Practitioners cite that the top barriers to supporting relevance and belonging practitioners are 1) lack of access to high-quality materials that are culturally responsive and that support SEL, and 2) Time constrains due to curriculum fast pace and rigidity and standards requirements.	There is a strong buy-in among practitioners around the importance of infusing relevance and belonging to enhance MEP and learning outcomes/ Many see SEL and CRSE as frameworks for building relevance and belonging even if many resources for such do not currently exist. While practitioners are resourceful at implementing strategies that infuse SEL in the math classroom, they could use more training and institutional support around integrating CRSE in math.	Practitioners utilize DLPs to enhance relevance and belonging and to provide practice opportunities and differentiated support. However, practitioners were more wary of DLPs' ability to facilitate SEL and CSRE with key concerns including the risk of diminishing the human connection and the challenges of adequately representing student diversity.	Despite concerns, practitioners remain optimistic regarding developers' ability to enhance DLPs and open to leveraging DLPs to support SEL and promote CRSE in the math classroom by promoting interpersonal connections and closing the gap between the perceived importance of CSRE and its limited implementation in students' learning. Integration however will require training in the use of DLPs to integrate CSRE, support SEL, and promote relevance and belonging in math.



Relational Map of Concepts and Frameworks

Top barriers for supporting relevance and belonging	• Lack of access to high-quality materials • Time constrains
Frameworks for Supporting Relevance and Belonging	• SEL: Widely accepted; Extensively implemented • CRSE: Somewhat accepted; Limited implementation
DLPs	• Extensive use for enhancing relevance and belonging • Limited use to facilitate SEL and CSRE
DLPs future	Practitioners are open to leveraging DLPs to support SEL and CRSE



APPENDIX

STUDY APPROACH | Integrated Thinking & Diversified Approach

The Insights Confab developed a study plan with common goals and learning questions. Each partner, according to their strengths and the community they are closer to, developed a particular methodological approach to address specific goals and learning questions. High-level insights were summarized in a memo directed to DLPs developers. Reports detailing each Partner findings and takeaways were elaborated for Gates program officers and shared with product developers in the education space.

ResultsLab Methodological Approach

- Triangulation of data collection techniques and types of data (qualitative and quantitative)
- Tap math practitioners (teachers and coaches) to learn about their experiences, practices, opinions and perceptions.
- Tools designed to address all the study plan goals and learning questions.

Open-Ended Pulse Check Questions in Slack (July 2023)

- Pulse I
 - What does it look like, feel like, or sound like in a math classroom where relevance and belonging of students is prioritized?
 - What do you do or use to promote relevance for students?
 - What tools or approaches help you instill a sense of belonging?
- Pulse II
 - What are the biggest barriers to facilitating relevance and belonging in the math classroom?

Online Journal (July-August 2023)

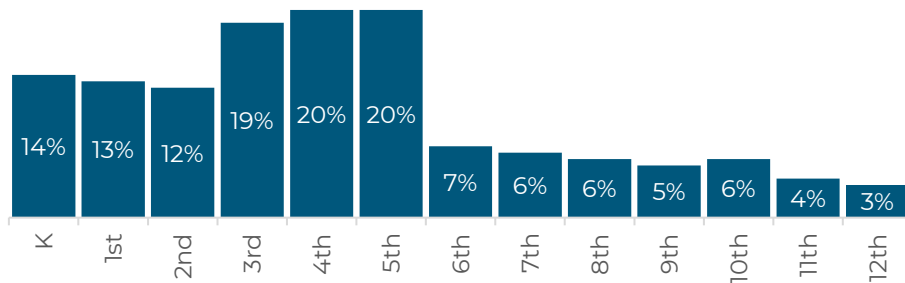
- Design informed by the pulses results.
- Comprehensive questionnaire including open ended and close questions addressing each one of the study goals and learning questions.
- Access to the online journal [here](#).

STUDY APPROACH | Phases

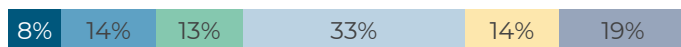
Phase	Approach + Goal	Participants	Incentive	Deliverable(s)	Timeline
Study Scoping	Participatory design of a study plan with common goals and learning questions	Confab Partners + Gates POs	N/A	Study Plan	June-July 2023
Definition of methodological approach	Each partner determine the learning questions that will explore aiming at maximum coverage and its own methodological approach and designs its data collection tools	Confab Partners	N/A	Data collection tools	Mid July 2023
Data Collection (ResultsLab)	2 Open-Ended Pulse Checks in Slack Online journal	Math educators in the K-12 Practitioner Panel Slack workspace 101 math teachers and coaches who engage with math students of all grades and in all in all states, with an oversampling of 4th-10th grade teachers, Gates priority states (CA, TX, NY, and FL) and participants working at schools with 51+% of students who are Black/African American, Hispanic/Latinx, or eligible for free or reduced lunch in alignment with these populations making up a larger portion of the network	\$5 Coffee on Us per Slack Post response \$50 incentive for ~30 minutes of engagement	Emergent findings to inform online journal design Slides deck with findings and takeaways	Mid to Late July 2023 Late July to early September
Write-up	Definition and elaboration of a communication vehicle to share high-level findings with DLP developers	Confab Partners	N/A	Memo integrating Confab partners	August-September

STUDY APPROACH | Participant Demographics

Grade Levels of Students Most Frequently Worked With (N = 101)

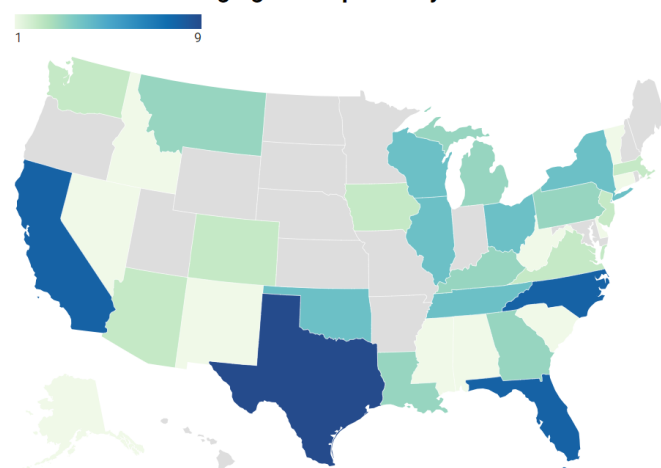


Years in Current Role (n=101)

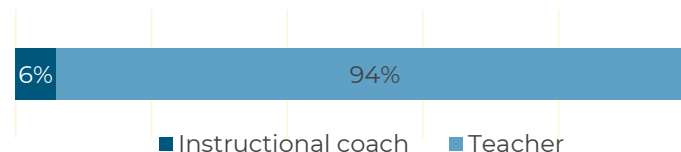


■ 0-3 years ■ 12-15 years ■ 16-19 years
 ■ 20+ years ■ 4-7 years ■ 8-11 years

Relevance & Belonging Participation by State

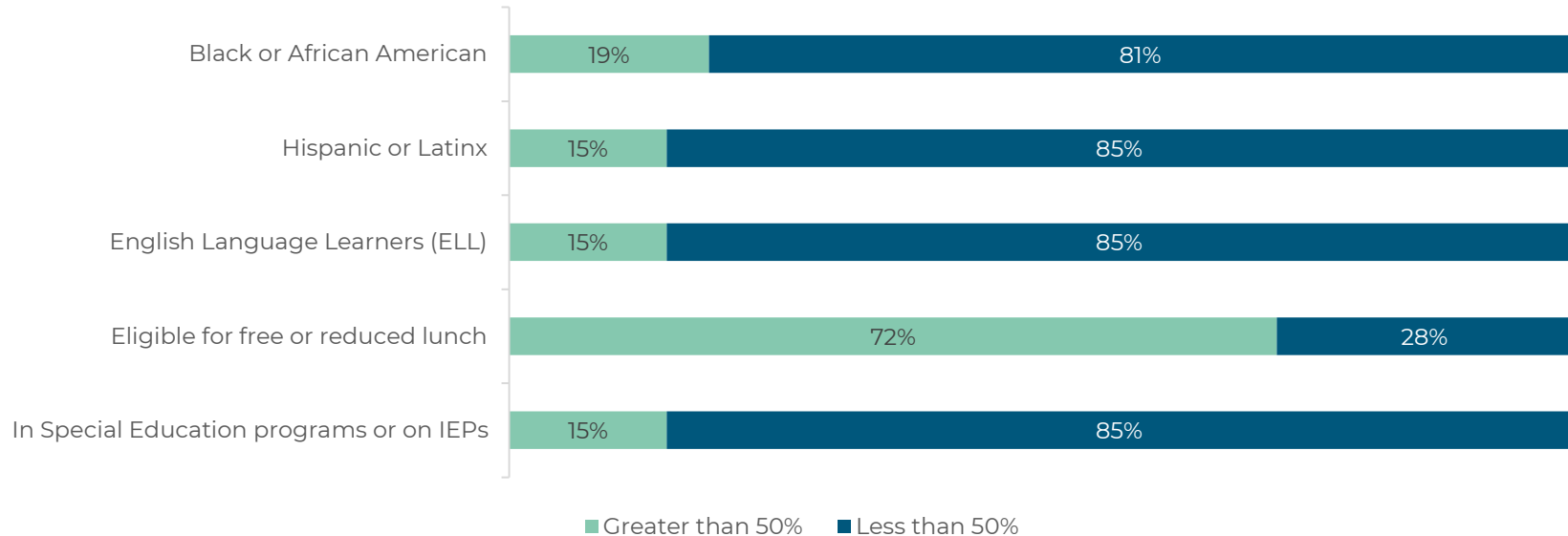


Participants by Role (n=101)



STUDY APPROACH | Participant Demographics

Percentages of participants working with student populations at or above 50% in the following demographic groups (n=101)





THANK YOU!