

## Qualitative Analysis Plan

### Data Collected

School	Teacher Interviews	Student Focus Groups
Katherine Johnson Middle School	0	5
Alexa Canady Middle School	2	5
César Milstein Middle School	5	5
Helen Rodríguez Trías High School	2	4
Walter Lincoln Hawkins High School	3	5

### Codebook

Parent Code	Subcode	Description
<b>Visible engagement</b>		The ways in which students show up and teachers encourage math engagement. These occur mostly in the classroom, but could also show up in study halls, after school programs, or at home when students are learning math.
	Asks questions (or for help)	Refers to students asking (or not asking) questions or for help on math.
	Answers questions	Refers to students broadly answering questions (or not answering questions) in math class. This includes raising their hand, answering questions, going to the board, etc.
	Completes work	Refers to students working on (or not working on) their math classwork or homework. This includes taking notes, studying, time management, etc. This also includes having too much (or not enough) math work or homework.
	Listens (previously “listens in class”)	Refers to students listening (or not listening) in their math class.
	Pays attention	Refers to students paying attention (or not paying attention) in their math class. This includes looking at the board, being on task, etc.
	Focused (Previously	Refers to students being focused on math.

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Learn more about the Adapted Measure of Math Engagement at <https://www.childtrends.org/project/adapted-measure-of-math-engagement>.

Adapted Measure of Math Engagement

Parent Code	Subcode	Description
	"focused in class")	
	Distracted (Previously "distracted in class")	Refers to students being distracted in their math class (e.g., technology, off task, talking to other students, daydreaming).
	Thinks through math problems	Refers to students thinking through, and/or solving math problems, includes double-checking math problems.
	Learns from mistakes	Refers to students putting the effort in to understand, learn from, and/or correct their mistakes in math. This includes working productively through struggles/mistakes toward understanding.
	Helps others	Refers to students with mastery actively "helping" peers with their math work (either inside or outside of class).
	Works with peers or friends	Refers to students working with their peers (usually in a classroom context) or friends (either in or out of the classroom) on math.
	Prefers to work alone	Refers to students preferring to do math work alone (without their peers) or on their own time (e.g., more free learning without a set schedule).
	Has access to basic resources (e.g., pencils, paper) (previously "basic resources")	Refers to students having the basic resources needed to engage in math (e.g., paper, pencils, calculators, textbooks, study sheets and notes from teachers, food, transportation).
<b>Feelings</b>		The feelings students have towards math or their math classrooms that shape engagement. While these are held within students, they can be influenced by teachers and peers.
	Feels like math is enjoyable (previously "enjoys math")	Refers to students enjoying math, being good at math, or finding it easy.
	Feels motivated	Refers to students feeling proud, excited, or motivated (or not) to engage in math or complete their work.
	Feels a sense of belonging	Refers to students feeling a sense of belonging in their math classroom. This also refers to students feeling not belong (e.g., due to their skin color or identities) in their math classroom.

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Parent Code	Subcode	Description
	Feels safe	Refers to students feeling safe in their math classroom. This also refers to students not feeling safe in their math classroom (e.g., due to school safety concerns like harassment or violence).
	Feels comfortable	Refers to students feeling comfortable (e.g., being themselves) in their math classroom. This also refers to students feeling uncomfortable in their classroom.
	Feels bored	Refers to students feeling bored in math class.
	Feels discouraged or challenged	Refers to students finding math difficult, struggling with math (often related to understanding), and sometimes even feeling disheartened.
	Feels isolated	Refers to students feeling isolated in math class, such as not knowing peers, feeling alone, and not having friends.
	Feels dumb	Either internal or external feelings of being dumb, stupid, a failure, or doubting their math ability.
	Feels judged	Refers to students feeling judged in math class (e.g., asking too many questions, being good at math when others are not, not being good at math).
	Personal motivations for academic performance	Refers to the various motivations and personal qualities that support math engagement, including competitiveness, the desire for recognition, and grades.
	Mental and physical health (previously “Mental and physical capacity”)	Refers to students not engaging in math due to their mental health, stress, and/or physical health (e.g., hungry).
	Understands math	Refers to when students share that they understand or have mastered (or not) math lessons, problems, or tasks (e.g., using prior knowledge to do work, having lightbulb moments, not knowing how to do math, overthinking, falling behind).
<b>Classroom culture</b>		The ways in which classroom instruction, rules, norms, expectations, spirit, setting, and relationships shape engagement. This culture is created by teachers and supported by students.
	Teacher-student relationships (previously coded as negative teacher-student)	Refers to experiences and perceptions of interactions between teachers and students within the math classroom. On the positive side, this includes instances where teachers establish personal connections with students, foster a sense of community, provide support to students, express care, and expand possibilities.

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Parent Code	Subcode	Description
	relationships and positive teacher-student relationships)	On the negative side, this includes instances where students faced difficulties, conflicts, perception of favoritism, or other negative dynamics with their teachers.
	Instruction style	Refers to students being more engaged when math lessons are interactive (e.g., activities, moving around, games). Also refers to students being less engaged when math lessons are lecture-based.
	Teacher personality	Refers to the different types of personalities math teachers can have, including how engaging or fun a teacher is, whether they are strict or lenient, and how they handle their emotions.
	Differentiated learning strategies	Refers to math teachers using different teaching approaches to meet the unique needs and abilities of students, such as pairing them up based on their strengths, offering language support, and giving individual attention.
	Classroom management and structure	Refers to the environment and structure of the math classroom (e.g., is it an inviting, collaborative space, positive energy, negative energy), disruptive behavior, discipline (e.g., quiet room, in-school suspension, kicking students out of class), and the role of the math teacher in maintaining order and facilitating learning.
<b>Outside the classroom</b>		The ways in which external resources (e.g., family, programs, or technology) outside of the classroom shape engagement. These resources often support math engagement and are not distributed equitably. Students or teachers can choose to use them, if they are available. The availability of these resources is not necessarily controlled by students or teachers.
	Guardian supports	Refers to the ways that guardians (e.g., parents, primary caregivers) support (or not support) their child's math engagement (e.g., help with homework, encourage their child, express the value of education, meet with the teacher, set expectations, places pressure to do well).
	Sibling supports	Refers to the way that siblings support (or not support) their siblings' math engagement (e.g., help with homework, go to college, take advance classes).
	Supports from peers or friends	Refers to the ways that peers or friends support (or not support) math engagement (e.g., helping with homework, encouraging each other, expressing the value of education, and pressuring from peers).
	Extended family or community supports	Refers to the way that extended family (e.g., cousins, uncles, aunts, grandparents) or community members support (or not support) students' engagement (e.g., help with

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Parent Code	Subcode	Description
		homework, encouragement, meet with the teachers).
	Supportive non-familial adults (previously “need for multiple instructors)	Refers to the way that non-familial adults (e.g., paraprofessional educators, classroom aids) support (or not support) students’ math engagement. This includes recognition and appreciation of the value that multiple instructors bring to the learning environment.
	School-based programs	Refers to the school-based programs (either during the school day or after school) that support (or not support) student learning (e.g., Galaxy, study rooms, sports, math clubs).
	Technology resources	Refers to the technology (e.g., Google, ChatGPT, YouTube, Khan Academy, math-based apps) that support student learning and engagement.
<b>Connections to the outside world</b>		The ways in which students’ connections to the outside world (e.g., ideas for success or future careers) shape their math engagement. While students may develop these independently of teachers, they can also be shaped by teachers.
	Feels math is relevant	Refers to students feeling that math is relevant (or not) to them or connected to their everyday life.
	Engagement for future aspirations	Refers to instances where individuals express their active involvement and interest in math is due to its relevance to their future aspirations.
<b>Systemic factors</b>		The ways in which external factors outside of the classroom shape engagement. These external factors are not controlled by students or teachers. These are often systemic barriers (e.g., practices, events, or decisions that result in unequal access or exclusion for students) to engagement. These external factors often decrease engagement.
	School and class schedule	Refers to the way that school structure (e.g., semester system, start of school, number of classes) and class schedules (e.g., time of day, day of the week) impact student engagement in math (e.g., being tired, too much of the same, too much work).
	Lack of representation (previously “Disparities in representation in and access to math”)	Refers to the unequal distribution of challenges/hurdles to math achievement and limited availability of math educational opportunities, such as class options, class tracking, for certain racial or ethnic groups.
	Family obligations	Refers the obligations that students have with families (e.g., work, taking care of siblings) that impact their ability to engage in math.

**Codes that got dropped/merged from first round to now**

Code	Definition	Where did this code end up?
Receives rewards	Refers to students receiving (or not) rewards (e.g., leaving class early, prize, individual time, food) for completing work or succeeding in an activity.	Some excerpts ended up being recoded under Classroom management and structure, Instruction style.  Most of the excerpts indexed for these specific codes were deleted altogether. Some were re-coded to “lack of representation”
Math people can be anyone	Refers to the idea that anyone can be a math person regardless of race, gender, sexual identity, and aptitude.	
Math people enjoy math	Refers to the idea that math people are those who are good at math and enjoy learning, solving, and/or talking about math, including when students mention that they are not math people because they are not good at math or do not enjoy it.	
Math people have math careers	Refers to the specific math careers (e.g., math teachers, scientists, professors) associated with math people.	
Physical features of math people	Refers to the physical features of math people (e.g., wearing glasses, being tall).	
Math people are white	Math people are white, including when Black and/or Latina/o students mentioned that math people "don't look like me".	
Social, personality features of math people	Refers to any description of math peoples’ social and/or personality features (e.g., kind, standoffish, analytical, down to earth).	
Impacts of COVID-19	Refers to the ways in which COVID-19 impacted student learning (e.g., falling behind, unable to do online school, managing priorities).	

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		behaviors as a result of the pandemic (feels discouraged or challenge, feels bored). Other codes included works with peers or friends, and physical and mental health.
School safety	Refers to the ways in which students and teachers feel safe (or unsafe) in their school environment. Includes both mental and physical safety. Includes issues with teachers, students, and administrators.	Many of the excerpts indexed under this code were double coded across a range of different codes, but particularly under teacher-student relationships.

## Coding Process

### What is the Role of the Coders?

- *Coder* – codes all documents assigned.

### What Am I Coding?

- For each assignment you will be coding the transcript (if available) and notes (if available).
  - When coding the notes, only code for information that you think wasn't caught in the transcript. For example, if the notetaker captured that lots of people agreed or responses were cut off.
- Memos from facilitators are linked to each transcript. It may be helpful to read these before you code.

### How Should I Code?

- Code in Dedoose.
- Things to remember:
  - It is always good to over-code rather than under-code. If you think the excerpt might fall into two categories, code them as both.
    - For example, an excerpt could represent both “parent support” and “sibling support.”
  - It is always good to create more codes than under-code. If you think the excerpt might be portraying an idea that could fit under a code and you want to capture that idea, add a code.
    - For example, an excerpt could represent “relationships with teachers” but you see that the teacher is providing the student with support to build that relationship. Therefore, you might add “provides support” under the “relationships with teachers” code.
    - When adding a new code, be sure that the new code could not be captured by an existing code.

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- For example, if you were to slightly expand the definition of an existing code, could you capture the new code?
  - Remember that we are ultimately using these codes to create survey items related to math engagement. Therefore, the same code could represent both positive and negative aspects of a concept.
    - For example, all excerpts related to “doing work” and “not doing work” can be captured under the same code.
  - We will clean up all the codes as we go!

### **How Should I Recode?**

- Review the codebook (see above) to ensure you have a strong understanding of all the codes used for this project.
- Before you begin coding, **ensure upcoding is turned off**. Click the sliding scale looking button on the codes menu and ensure that “Automatic Upcoding” is set to off.
- Read through the transcript and what has already been coded. You can add or delete codes from existing excerpts. You can also decide to chunk the data into different excerpts (especially if you see a way to make an excerpt smaller) and apply codes to them.
- You should not add new codes to the codebook at this time. If you have questions about how to code an excerpt with the existing codes (e.g., what code might be the best for an excerpt, an excerpt doesn’t quite fit with an existing code), make note of it and share with us or create a memo.
- Don’t code the parent codes (e.g., cognitive engagement, environment, social engagement), they don’t matter. Please delete parent codes from excerpts when you see them. If an excerpt will not have codes when you delete the parent code, see if you can add a different code that captures the same themes.
- Things to pay special attention to as you recode:
  - There are some newer codes that are likely under-coded and need to be added to excerpts:
    - Feels motivated
    - School safety
    - Family obligations
- We have refined the definitions of or split up some codes that now require some extra attention:
  - Basic resources
  - Pay special attention to the differences in description for “Instruction style,” “Classroom management and structure,” and “Differentiated learning strategies.” Double coding multiple of these is okay.
  - We split “Works with peers and friends” into two codes: “Works with peers and friends” and “Supports from peers or friends”. So please check all mentions of this code in your transcripts to see if “Works with peers and friends” or “Supports from peers or friends” is the best fit. Double coding for both is okay.
  - “Focused in class” and “Distracted in class” might have some excerpts for each other currently because some coders forgot that both exist, so this is another one to double check that any uses of these codes are accurate according to the definition.

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- It is always good to over-code rather than under-code. If you think the excerpt might fall into two categories, code them as both.
  - For example, an excerpt could represent both “parent support” and “sibling support.”
- Remember that we are ultimately using these codes to create survey items related to math engagement. Therefore, the same code often represents both positive and negative aspects of a concept. The definitions will guide you.
  - For example, all excerpts related to “doing work” and “not doing work” can be captured under the same code “Completes work.”

### Example Coding Plan

Data	Coder
<b>Week 1 – June 19 to June 23</b>	
Walter Lincoln Hawkins High School – Focus Group 1	Sammy
Walter Lincoln Hawkins High School – Focus Group 2	Diane
Walter Lincoln Hawkins High School – Interview 1	Mark
César Milstein Middle School – Focus Group 2	Alyssa
Alexa Canady Middle School – Focus Group 1	Mark
Alexa Canady Middle School – Focus Group 2	Alyssa
Alexa Canady Middle School – Interview 1	Sammy
Alexa Canady Middle School – Interview 2	Mark
<b>Week 2 – June 26 to June 30</b>	
<p>Realigning the codebook:</p> <ol style="list-style-type: none"> <li>1. Review all the codes in your assigned section. For each code:           <ol style="list-style-type: none"> <li>a. Review the excerpts.</li> <li>b. Review the code name (rename the code if you think you can make it clearer).</li> <li>c. Add a code description to fully explain the code.</li> </ol> </li> <li>2. Review codes in other sections to see if they are capturing similar concepts as the codes in your section:           <ol style="list-style-type: none"> <li>a. If they are capturing similar concepts and it is clearly obvious (e.g., both codes are talking about distractions in the classroom), merge the codes.</li> <li>b. If you are not sure if they are capturing similar concepts, email the person in charge of the other section.</li> <li>c. If you two are still not sure, email the entire group.</li> </ol> </li> <li>3. Special notes:           <ol style="list-style-type: none"> <li>a. Strive as much as possible to have codes live at the second level of codes (i.e., the aqua/blue color). This will make it easier for us when we engage the AM-ME Research Group.</li> <li>b. If you are not sure about a code or its description, reach out to the entire group!</li> </ol> </li> </ol>	

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Data	Coder
<b>Week 3 – July 2 to July 7</b>	
César Milstein Middle School – Focus Group 1	Diane
Walter Lincoln Hawkins High School – Interview 2	Diane
César Milstein Middle School – Interview 1	Diane
César Milstein Middle School – Interview 2	Alyssa
Helen Rodríguez Trías High School – Focus Group 1	Alyssa
Helen Rodríguez Trías High School – Interview 1	Alyssa
Helen Rodríguez Trías High School – Interview 2	Alyssa
Katherine Johnson Middle School – Focus Group 1	Sammy
Katherine Johnson Middle School – Focus Group 2	Diane
<b>Recode – July 17 to July 21</b>	
Walter Lincoln Hawkins High School – Focus Group 1	Avalloy
Walter Lincoln Hawkins High School – Focus Group 2	Avalloy
Walter Lincoln Hawkins High School – Interview 1	Avalloy
Walter Lincoln Hawkins High School – Interview 2	Avalloy
Alexa Canady Middle School – Focus Group 1	Avalloy
Alexa Canady Middle School – Focus Group 2	Avalloy
Alexa Canady Middle School – Interview 1	Avalloy
Alexa Canady Middle School – Interview 2	Avalloy
César Milstein Middle School – Focus Group 1	Avalloy
César Milstein Middle School – Focus Group 2	Michael
César Milstein Middle School – Interview 1	Michael
César Milstein Middle School – Interview 2	Michael
Helen Rodríguez Trías High School – Focus Group 1	Michael
Helen Rodríguez Trías High School – Interview 1	Michael
Helen Rodríguez Trías High School – Interview 2	Michael
Katherine Johnson Middle School – Focus Group 1	Michael
Katherine Johnson Middle School – Focus Group 2	Michael