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# Student Motivation and Engagement in the Middle School Math Classroom: How Can Teachers Respond?

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**Student Motivation and Engagement in the Middle School Math Classroom: How Can  
Teachers Respond?**

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### **Abstract**

This study investigated the factors that contribute to and take away from middle school students' active and meaningful participation in math class. The study also sought to gather students' opinions and ideas for how their teachers could better engage and motivate them in the middle school math classroom setting. Using surveys, student interviews, and a teacher focus group, the researcher gathered and coded data via the constant comparative method and identified the major themes of intrinsic motivators, extrinsic motivators, distractions, and impacts of COVID-19 as key factors. The study also generated the concepts of teacher assistance, lesson style and activities, and incentives as students' suggestions for teacher responses.

## **Student Motivation and Engagement in the Middle School Math Classroom: How Can Teachers Respond?**

On one side of the room, Cooper (all names have been replaced with pseudonyms) sat, working diligently at his desk and happily placing his assignment in the turn in tray when he finished. Just a few seats away, however, Josh rolled his eyes and flung a pair of scissors into the air, uninterested in determining the slope of graphs after a lesson that I had eagerly planned and taught. In front of him, two students hadn't touched their papers since they had received them five minutes prior, one with a blank stare on his face despite multiple redirects and attempts to help, and the other distracted by her friends. Somehow still, Maria and Annie worked together, helping each other find their own "aha" moments that thrilled my teacher heart. As the class left the room, I thought about the stark contrast between my students. How were all of them so vastly different in their motivation and engagement in math? What made some of them invested in their work and others not at all? I wanted them to enjoy our class, to come alive in the problem-solving process and fall in love with (or at least better appreciate!) the wonder of math. With some, I felt encouraged. With others, I was stumped. Even the smallest bit of work seemed almost impossible to pry out of them. There had to be some way to motivate them, some way to get them engaged, something that I could do to help them as their teacher. I just needed them to help me find it.

### **Purpose**

When I noticed the issue of student motivation and engagement in my year-long clinical teaching placement, I knew it was an opportunity for meaningful action research. This was prompted further after my cooperating teacher mentioned that the number of students who struggled in this area seemed even greater than usual this year. I wanted to dig into the roots of

our specific students' motivations (or lack thereof) for math learning--particularly in the context of a school year heavily influenced by COVID-19--and how they wanted to see their teachers respond to this with instruction and encouragement. In hopes of finding these insights through my study, I posed the following research questions:

**Question 1:** What factors influence students' motivation and engagement in a middle school math class?

**Question 2:** What are students' perceptions of what could be done by teachers to increase student motivation and engagement in a middle school math class?

This study took place while I was a graduate student completing a year-long clinical teaching placement at Carnes Middle School in a West Texas city of approximately 123,000 people. Carnes, one of four public middle schools in the district, serviced just over 900 students in grades 6-8. Of the student population, 43.1% were White, 41% were Hispanic, 10.5% were African American, 4.2% were multiracial, 0.8% were Asian, and 0.4% were American Indian. Sixty-nine percent of students were identified as economically disadvantaged, and 57.2% were considered at-risk. Almost 2% of the students were part of the bilingual/ESL program, 11.9% were gifted and talented, and 15.3% participated in special education. My specific placement was in three eighth grade math and four eighth grade algebra classes filled with a variety of these students.

### **Literature Review**

Teachers and researchers alike agree that student motivation and engagement play critical roles in a child's schooling. These elements have distinct differences, although they are closely related and intertwined within the learning process. Martin (2021) identified motivation as "students' energy and drive to learn and to work hard at school" (p. 1) and engagement as "the

behavior that reflects this energy and drive” (p. 1). Essentially, a student’s engagement is the outward expression of his/her motivation. A wide range of studies have been conducted over student motivation and engagement, with many seeking to identify the intrinsic and extrinsic factors that affect these variables. Wilkie and Sullivan (2018) asked 3,500 Australian middle school students to share “their one wish for learning mathematics” (p. 236) in an attempt to better understand their motivations and aspirations for math education. Among the externally motivated wishes that the students mentioned were engaging, creative, and meaningful tasks, greater levels of challenge, and more collaboration. The students’ internal motivations and wishes related to a desire to understand math more, to compete with other students, to perform well, to get good grades, and to enjoy math more and experience less stress from it. In another study, Nardi and Steward (2003) interviewed middle school students and named several sources of their “quiet disaffection” (p. 346) for—and lack of motivation and engagement in—math. These sources included irrelevance of the subject, limited opportunities to collaborate, little encouragement to explore alternate ways of solving problems, lower confidence/heightened anxiety, and a lack of personalization and differentiation.

The struggle to get students to actively participate and maximize their learning during class is an issue many middle school teachers experience. A decrease in educational motivation and engagement is a common characteristic among adolescents, especially within the subject of math. A history of research has shown that students’ motivation for learning math decreased as they entered middle school and progressed into the upper grades (Collie et al., 2019), particularly in females (Jacobs et al., 2002).

Prior research and theory have indicated a need to focus in on the classroom teacher’s role in student motivation and engagement. Reeve (2012) used the theoretical background of

self-determination theory (SDT) to assert the importance of teacher-student relationships in increasing student motivation and engagement. According to SDT, all students “possess inherent growth tendencies... that provide a motivational foundation for their high-quality classroom engagement and positive school functioning” (p. 152). The role of the teacher, then, is to nurture a classroom context and provide support that utilizes these “inner motivational resources” (p. 152) to help students actively and meaningfully engage in class.

Ample research exists connecting positive teacher qualities to increases in student motivation and engagement. Özkal (2018) concluded that motivational support provided by teachers increased student emotional and behavioral engagement and decreased emotional disaffection in middle school math classes. Umarji et al. (2021) found that teachers who exhibited a care for their students at the beginning of the school year increased their students’ motivation to learn math by the end of the year. Muller (2001) further determined that the quality of teacher caring was even more critical for students who were identified as at-risk. Less research has been done, however, on what exactly the positively motivating and engaging qualities of math teachers are. Kiefer et al. (2015) indicated that teachers who had a positive impact on students’ motivation, engagement, and school belonging were those who upheld respect in their classrooms, emphasized the relevance of their subject, attentively monitored student and class learning, held high positive expectations, and were involved inside and outside the classroom. Aside from this, little research exists linking specific teacher qualities and actions to student engagement and motivation.

Finally, students’ motivation and engagement, as influenced by their teachers, have effects that extend beyond the affective level, stretching to impact their academic achievement. Semeraro et al. (2020) explained that a positive teacher-student relationship mediates one of the

factors affecting student motivation and engagement in the math classroom: math anxiety. In many cases, when a student's math anxiety is reduced, his/her academic achievement improves. Thus, in the case of a student who isn't motivated and/or doesn't participate due to math anxiety, the encouragement of a teacher can indirectly improve his/her academic performance (Semeraro et al., 2020). Cantú Ruiz (2012) also concluded that high expectations increase the motivation of middle grade students, thereby improving their participation and performance in class. In sum, when student motivation and engagement increase by way of teacher support, academic achievement typically follows.

Drawing from the foundations of prior research, we know that greater teacher support improves student motivation and engagement in the math classroom, but what does this look like practically, and what do students themselves have to say about it? This study allowed me to explore motivation factors in a specific classroom, gather ideas from the students about ways to fix lack of student engagement as a classroom teacher, and adjust instruction accordingly. In addition to serving a purpose for one classroom in particular, this study adds to the existing body of research on middle school students' motivations and engagement in math classes (along with the role of the teacher in it) with the additional element of COVID-19 and its effects as a new finding. While prior research has addressed students' motivation and engagement in the middle school classroom, little information exists on students' opinions of how they would like to see their teachers respond and engage them in math. This study adds the valuable input of students on this topic to better equip teachers in their instruction.

### **Methods**

This action research study took place in an on-level eighth grade math classroom. I began by administering a survey that assessed the students' varying levels of motivation and



engagement in math. I then conducted interviews with a sampling of these students and a focus group composed of math teachers from each of the grades at Carnes Middle School. Forms of data analysis included the constant comparative method (Hubbard & Power, 2003) and leveled coding (Tracy, 2013).

### **Participant Selection**

Seeing as it was the inspiration for my research and contained students of a variety of motivation and engagement levels, I chose our sixth period eighth grade math class as the focus for the study. The class contained 13 males and nine females between 13 and 15 years of age. Five students were identified for special education, and two qualified as English language learners but were mostly fluent. Eleven of the students were Hispanic, six were White, two were Black/African American, one was Hispanic/White, one was Hispanic/Black/African American, and one was Hispanic/American Indian/Alaskan Native. The classroom teacher was a White female.

I introduced the study to the students and their families by sending home a parent information letter and consent form as well as a student assent form. All 11 students who received permission and assented to participate completed the surveys, with six moving on to the interviews.

Recognizing that some of the students could struggle to identify and/or verbalize their motivation and engagement, I also consulted the perspectives of some of the math teachers at Carnes. During a weekly vertical team planning period, I explained the study to the teachers who were present and invited them to participate in a focus group during the following week's meeting. Those who were interested attended the meeting where they signed a consent form and contributed to the interview. A total of seven teachers participated in the focus group: three

White female sixth grade teachers, one Hispanic/White female sixth grade teacher, one White female seventh grade teacher, one White male seventh grade teacher, and one White female eighth grade teacher. Two other teachers could not make it to the meeting but asked to contribute alternatively. One of these, a White female eighth grade teacher (who also served as the cooperating teacher of the classroom in which the research was conducted), completed an individual interview with me. The other, a White male eighth grade teacher, answered the interview questions via email.

### **Data Collection**

Data was collected over a period of approximately three weeks, then triangulated (Hubbard & Power, 2003) to reinforce key findings. First, all participating students completed the Motivation and Engagement Scale – High School (Martin, 2021) survey (see Appendix A), also called the MES-HS. Seeing as this version of the MES was designed for use with students ages 12 to 18, it was the most appropriate option to measure the students' perceptions. The MES-HS contains four sections of 11 Likert scale sections each (44 questions total) that assess the four different parts of the Motivation and Engagement Wheel (Martin, 2021): positive motivation, positive engagement, negative motivation, and negative engagement. I used the results of the survey to develop motivation and engagement “scores” for each of the students. In accordance with purposive sampling (Patton, 1990), I then intentionally selected two students with lower scores, two students with medium scores, and two students with high scores to participate in semi-structured (Hendricks, 2017) individual interviews approximately 15-30 minutes in length (see Appendix B). Through these, I hoped to glean more information about the sources of their motivation, what helped or hindered their engagement in the math classroom, and what ideas

they had for how teachers could best support their students in this realm. These interviews were audio recorded and transcribed for further analysis.

To gain a fuller picture of students' motivation and engagement from the perspective of their educators (and gather information on a wider range of students than the limited number of those who were interviewed from the sixth period sample), I also conducted a semi-structured focus group with seven of the other math teachers at Carnes. The interview lasted roughly 30 minutes in length and discussed the teachers' perspectives of middle schoolers' motivation and engagement in math, what might be the cause for some of their students, and implications for their instruction (see Appendix C). This discussion was also audio recorded and transcribed. Two other teachers requested to participate that were unable to make it to the focus group and thus answered the same questions through alternative means: a 30-minute individual interview and email. These were also transcribed and coded.

### **Data Analysis**

Using Martin's (2021) MES-HS scoring methods as an initial framework, I adjusted the suggested data analysis process to fit my study and condensed each student's sub-scores into one overall motivation and engagement score. First, I determined a score for each student's positive motivation/engagement factors, which I termed their P score, and negative motivation/engagement factors, which I termed their N score, by adding the totals for each associated set of Likert scale questions, converting them to raw scores out of 100, and calculating an average. (Because the N score represented the level of the student's *negative* motivation and engagement and the P score represented the level of the student's *positive* motivation and engagement, a *lower* N score was considered better, while a *higher* P score was considered better.) I then subtracted the average N score from the average P score to determine

an overall motivation and engagement score. Students' scores could have ranged from -89 (suggesting low motivation/engagement) to 89 (suggesting high motivation/engagement). This range of scores is unusual due to the nature of the Likert scale options, which ranged from 1 (for "disagree strongly") to 7 (for "agree strongly").

After conducting individual interviews with two students from each category and leading the teacher focus group, I analyzed the transcribed qualitative data using the constant comparative method (Hubbard & Power, 2003) to create, assign, modify, and review codes to fit the data as I processed it. The coding process began with designating level 1 codes, which described the initial themes, to approximately 20% of the data. I then used these codes to code the remaining 80% of the data, creating additional ones when needed. Following this, I completed a secondary cycle of coding to identify level 2 codes, which "explain, theorize, and synthesize the data" (Tracy, 2013, p. 194). These came to serve as my key themes and findings. During the data analysis process, I updated an index listing each of my level 2 codes and where they were located in the data. I also created memos for the level 2 codes in which I further explained, reflected upon, and provided examples of each (Tracy, 2013). A full list of codes, definitions, and examples is provided in the codebook (see Appendix D).

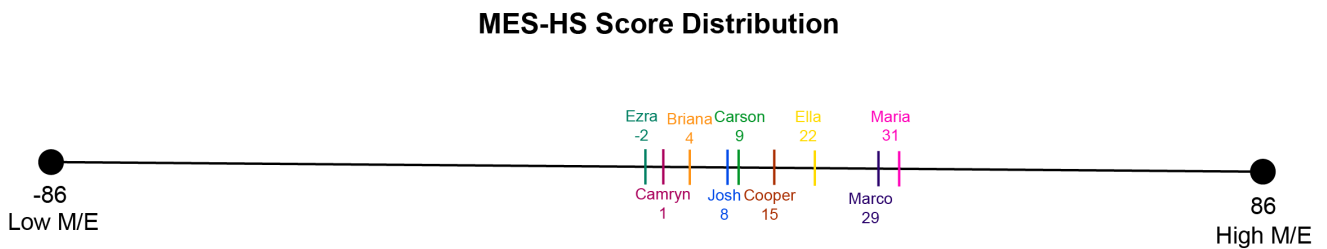
### **Findings**

Quantitative analysis from the MES-HS results revealed that most of the students who participated in the study fell in the middle of the possible motivation/engagement score range, as visualized in Figure 1. Nine of the 11 students' numeric scores are listed in Figure 2. The other two students filled out the MES-HS randomly and incorrectly, rendering their scores invalid and thus unusable for accurate data analysis. These results were slightly different than what I anticipated, something that I attribute to potential limitations in the data collection process.

Because the students had to agree to participate without compensation, it makes sense that those with lower levels of motivation and engagement were not interested in the study. I can only assume that at least some of the students who did not agree to participate would've scored lower on the MES-HS. In addition to this, I wonder if the students who did participate completed the survey with a potential bias, selecting the answers that they thought would look best. There is always, of course, the potential for a student to have over- or under-evaluated his/her motivation and engagement, as well. Taking these factors into consideration, I decided that I could collect enough data from the low to high motivation and engagement range by inviting two of the students with lower scores (Ezra and Briana), two with medium scores (Cooper and Ella), and two with higher scores (Marco and Maria) from my sample to complete one-on-one interviews.

**Figure 1**

*Distribution of Student Scores on the MES-HS*



**Figure 2**

*Student Scores on the MES-HS*

**MES-HS Scores**

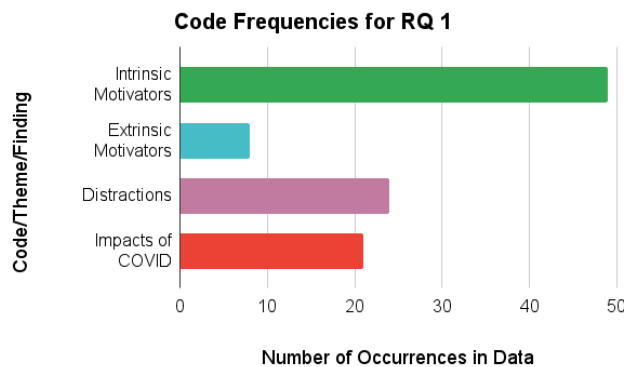
Student	Score
Ezra	-2
Camryn	1
Briana	4
Josh	8
Carson	9

Student	Score
Cooper	15
Ella	22
Marco	29
Maria	31

As I sifted through the interview and focus group transcriptions, I found that the students and teachers brought up a multitude of factors that they believed affect middle school students’ motivation and engagement in math. These factors were narrowed down to intrinsic motivators, extrinsic motivators, distractions, and impacts of COVID-19 to answer my first research question, as represented in Figure 3 below. I then discovered the students’ major suggestions for how teachers could improve student motivation and engagement to answer my second research question. Among the key findings (listed in Figure 4) were teacher assistance, lesson style and activities, and incentives.

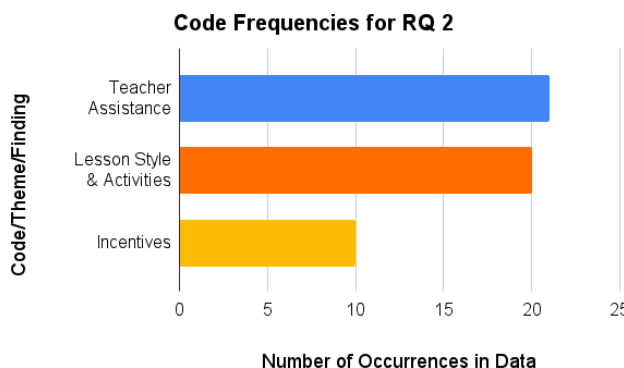
**Figure 3**

Bar Graph Displaying the Frequencies of the Study’s Codes/Findings for Research Question 1



**Figure 4**

Bar Graph Displaying the Frequencies of the Study’s Codes/Findings for Research Question 2



The students and teachers who participated in the study shared a wealth of factors that they believe affect student motivation and engagement. The major themes are explored below.

### **Intrinsic Motivators**

Both teachers and students mentioned a larger number of intrinsic motivators than extrinsic ones, among which were students' enjoyment level of math as a subject, experiences of success and struggle, perceptions of themselves as learners, and opinions on the relevance of math. Understandably, students who enjoy math are much more motivated to learn it and put forth effort in class. Out of the students who participated in the study, most of those who received the highest scores on the MES-HS mentioned that they liked math and/or found it "fun." In contrast, students who received lower motivation/engagement scores made rather strong comments about their dislike of math. Adolescents give the greatest portion of their attention to the things they value and enjoy the most. School subjects, especially math, are no exception.

Students who enjoyed math and experienced higher levels of motivation were also typically those who had experienced more success in class. One teacher emphasized, "I don't think there's anything that motivates like success... Especially if you can get a student to... try something really, really hard that's difficult and then they can understand or achieve it, that's motivating." Additional observations from the study supports this, as the students who had the highest motivation/engagement scores were also those who generally did very well in class. In our interviews, these students shared that they were happier when they understood the math they learned in class and were, in turn, more willing to do their work. This points to the idea of self-efficacy: when students experience success, their confidence grows, empowering them to continue working hard and reaching for the satisfaction of mastering something—especially something as challenging (at times) as math.

Considering this, it makes sense that experiencing struggle in math has the opposite effect on students. In the interviews, many students voiced that they did not enjoy math when it was difficult. Confusion and lack of understanding lead to frustration and burnout, causing students to give up easily when they feel defeated. Just as success breeds success, it's very easy for failure to breed failure. Students are less encouraged and willing to try something that they've struggled with in the past, believing that they will likely experience that same failure and thus rendering their efforts worthless. Teachers who participated in the focus group also noted this connection between students' ability level and motivation.

Students' success—or lack thereof—in class directly influences their perception of their own abilities in math. Students who are more confident in their mathematical knowledge and skills (plus their ability to improve them) are more motivated to learn new content and practice it during class. On the other hand, students who possess a negative self-perception of their ability to do math are much less willing to engage. This was a common theme among most of our students who scored lower on the MES-HS, with comments about not being good enough or never being able to achieve in or enjoy math occurring frequently during our interviews. The negativity of these students' beliefs about themselves permeated their motivation, looping them back into the cycle of negative thoughts, reduced effort, decreased success, and more negative thoughts again.

The final intrinsic motivator mentioned by several students (though oddly enough, none of the teachers) was their opinion on the relevance of math to their lives and futures. Students who saw a use for math in their daily activities and future careers expressed a greater desire to learn math than those who did not see a need for it. Adolescents need to know the “why” behind



what they're doing and how it will benefit them. If they don't know why it's worth learning, they won't see a point for learning it at all – a huge source of demotivation for students in math.

### **Extrinsic Motivators**

Though less prevalent than the intrinsic motivators previously mentioned, students in the study also noted the important role that extrinsic factors--such as the approval of others and the desire/pressure to meet major milestones and progress to the next grade level--have on their motivation in math. Aside from being motivated by their own desires and expectations, students are also greatly influenced by the opinions of the people around them, especially those who are particularly important in their lives. One student expressed her desire to not disappoint her parents: "Disappointing them is like the worst thing. It's worse than them being mad at me." When students sense high expectations from people they care about, they work to meet them. Coach Davis, an eighth-grade math teacher at Carnes, explained that "The students who do their work have pride in themselves and want to receive praise and seek to make others proud of them as well (i.e. parents, teachers, coaches, friends, etc.)."

Another factor mentioned multiple times by the students was the necessity of passing math for their future, whether that be meeting a requirement to graduate eighth grade and continue to high school or pursuing a college education and/or career involving math. Students who saw a use for math beyond their school years seemed much more invested in their work long-term. Nevertheless, those who did not see a use for math in their daily lives or future careers still recognized that they needed to complete math in order to progress to the next grade level—an area of particular concern for eighth graders eager to enter high school with their friends.

### **Distractions**

When it comes to students' *engagement* in math, distractions were a key finding that emerged during the study. Both students and teachers consistently identified outside factors as one of the biggest obstacles to their learning in class. These distractions mainly came in the form of phones, peers, bad days/bad moods, and outside trauma. Briana, a student who scored lower on the MES-HS yet did very well in class when she was focused, explained it like this: "I don't really, like... I can do the work if I actually pay attention. But whenever, like... stuff is going on, it kind of catches my attention." When I asked her to elaborate on this, she mentioned her tendency to listen to other people's conversations, get pulled into drama, and become agitated when people she didn't like (or had previous altercations with) bothered her. Briana admitted that she struggled to focus when other things and people demanded her attention, and she wasn't alone in that. In fact, many of the other interviewees communicated that the distractedness of their classmates became a distraction for them, as well. The "messing around" of distracted peers in their class period served as a disruption to their learning, weakening the effectiveness of the class environment.

Phones also came up often in my interviews with students and teachers as a major distraction. For many students, there is a relentless temptation to consume media on their phones. While technology can be a wonderful tool in the classroom, it must be used in the right ways and at the right time. Until students learn how to do that, phones will likely do more harm than good. A veteran sixth grade teacher urged that "when [students] have their cell phone, they're distracted and they're not engaged with what I'm doing, and they're not motivated to do what I want them to do, they're motivated with what idea they have to use their cell phone with... I think we're trying to engage students, and many times, when you have that competition between the cell phone, a lot of times, you're never gonna win."

Other distractions affecting students' engagement that emerged from the study included external circumstances such as bad days/bad moods and trauma. When asked when she was least engaged in the classroom, one student answered, "Whenever... if I'm ever, like, in a bad mood or I'm upset about something." Another student shared that she's had moments of not wanting to do math on "bad days when I'm just like, 'Aw, I guessed on every answer.'" Students of every age have off days, and these moments certainly impact their effort in the classroom. In addition to this, trauma in students' lives—such as the death of a friend or family member, divorce, illness, child welfare investigations, financial instability, and so on—can consume students' minds so much that little bandwidth is left for them to concentrate and put forth effort in class.

### **Impacts of COVID-19**

When asked about if and how the pandemic affected their approach to math class, half of the students interviewed noted a negative shift, while the other half claimed to have seen either no impact or a positive change in their math skills (though they were not able to explain why this was). On the other hand, teachers' opinions were much stronger, with many of them expressing a firm belief that COVID negatively impacted their students' achievement, motivation, and engagement in math. Together, the students and teachers identified the loss of learning, the loss of structure through in-person attendance, the tendency for students to "forget how to be students," and students' increased hunger for interaction with their peers as key results of the pandemic that shaped their classrooms.

First, COVID caused setbacks in student learning due to a significant decrease in instructional time, whether that be through school lockdowns, online schooling difficulties, or increased student absences. Ezra admitted that trying to do school online was difficult and made him fall behind in his learning, though he was able to catch up when he came back to attending

class in person. Several teachers also mentioned that the wide gap of time students spent out of schools caused a loss of structure, making it much more difficult for students to get back into the swing of the school schedule when in-person instruction started again.

Teachers also urged that the lapse in in-person schooling caused many students to “[forget] how to be a student.” One teacher shared: “They have forgotten how you’re supposed to act at school and, you know, you’re supposed to work when you’re in class, not just... you’re not in class so you can sit and visit with your friends, you’re in class to get your work done. And I--I feel like--some of them are... struggling with that.” Another teacher shared that she believed that after being out of the classroom for so long and having the freedom to do other things (since some of them were not always supervised or held accountable to do their schoolwork by their parents), students’ motivation to work hard in school greatly decreased after COVID started. If something as small as sharpening pencils became a task that required a lot of energy to motivate students to do, it was no wonder that encouraging students to learn challenging math concepts became a considerable feat for middle school teachers. One student admitted a similar struggle of finding the level of focus for learning that she had before the pandemic after returning to school: “I don’t really pay attention anymore. I mean, like, I try, but like... it’s kind of hard ‘cause, with everything that’s happened from last year to this year, I’m not really the same anymore... Yeah, I lost a lot of concentration and stuff.”

Finally, in the height of the pandemic, COVID separated students from social interaction with their peers, compounding the isolation they were already experiencing from the impacts of technology, cell phones, and the modern paradox of being more connected yet more alone than ever. One teacher passionately explained, “I call it number one, cell phones, and number two, COVID. And what did they do? They increase loneliness. They increase isolation... They *don’t*

encourage community, and they don't encourage togetherness and human contact, which I feel like you ultimately need." Students returned from the lockdowns of COVID more "hungry for human interaction," to quote another teacher, than ever before. When asked if students' increased tendencies to get distracted and disrupt class could be related to a need to "make up for" the lack of social interaction during the pandemic, several teachers agreed emphatically. After going so long without opportunities to interact with their friends in school, one teacher theorized that middle school students—or at least those at Carnes-- "realize[d] that they do miss that structure and interaction [of school], but they don't necessarily miss the structured teaching part of it," making the transition back into traditional school expectations difficult for many students.

Acknowledging that countless factors such as these contribute to (or take away from) students' motivation and engagement in math, I wanted to gather suggestions from students on how teachers could respond effectively and encourage their interest in class. The following were the most prominent ideas from my interviews.

### **Teacher Assistance**

As I spoke with students about the role that their teachers play in their motivation and engagement in the math classroom, the appreciation of and desire for help and explanations from their teachers emerged as major findings. Ella, a student who transferred to Carnes from another middle school, expressed how her motivation and engagement in math class had improved because of the encouragement and help of her teachers: "I've gotten a lot more understanding, too, 'cause like, teachers here are willing to sit down one-on-one and help me... Since teachers have been helping me a lot more here, [math has] been a lot more enjoyable." When asked how middle school math teachers could increase student motivation and engagement, she responded specifically with the idea of teacher explanations: "the teacher should be willing to help you with

your learning... So, I believe they should work with every student, like, sort of individually, because some students, they don't understand the same." Other students expressed similar desires for thorough explanations from their teachers. Briana believed she's most successful in math when concepts are explained to her in detail by the teacher, and Marco said that "it's better to learn in math when you have a good teacher in math that... that is, like, makes you do work, not like those teachers that just like, tell students hi and you sit down and just be there through it. Basically... like, explaining [the math] clear[ly]." While comparing my cooperating teacher to his former math teachers, Cooper shared that "My other teacher, she only gave us a little bit of instructions and then she taught us how to do it. [Mrs. Cannon] gives us a lot more detail, which I like." It became clear to me that all of the students craved the assistance of their teachers through one-on-one help and strong explanations of the content. Between the six student interviews I conducted, I identified at least 20 mentions of teacher assistance as a suggestion to improve student motivation, engagement, enjoyment, and success, making this one of the most prominent findings from the study.

### **Lesson Style & Activities**

Students also mentioned the value of exciting lesson styles and activities for improving motivation and engagement in the middle school math classroom. These included initiating collaborative activities that would allow them to work with their friends, making math into a game, and using engaging classroom technology. Multiple students emphasized that they enjoyed class more, experienced increased motivation and engagement, and understood the material better when they were able to work with their friends on class assignments. The students attributed this success to the encouragement, help/feedback, and level of fun that their friends contributed to their time in class. One student claimed, "I work better whenever I'm with people

I'm actually, like, close with, than I do... by myself. I've noticed that." She enjoyed having her friends in class and felt as though their help enabled her to get her work done and receive good grades.

When asked how teachers could make math more engaging and exciting for middle school students, Briana responded, "If you turn it into a game, they'll actually focus." Marco and Ella also suggested incorporating math games into lessons, and several others discussed how they enjoyed activities that sparked playful competition with their peers. This was especially true for games and activities involving technology. Ezra requested "more projects on the Chromebooks," a statement that was further echoed by teachers during the focus group. Mrs. Carrolton explained that technology such as Chromebooks engaged her students, allowed her to make efficient use of her class time, and decreased behavioral concerns. Ms. Pollock added that she experienced fewer issues of phones distracting students when her class used Chromebooks, reinforcing the value of classroom technology.

### **Incentives**

The final suggestion offered by students was for teachers to offer incentives through material rewards or goals. According to one of the students, the best way to engage students is to "give prizes or make a goal." Students like to see that their hard work will pay off. They want to know that their effort will be worth it, and one concrete and age-appropriate way to do that is through setting goals and providing small incentives from time to time. It's important to note that the danger here, however, is that students will become more extrinsically motivated than intrinsically motivated. Ms. Cannon brought up a valid point: "I mean, any time they have food or a carrot dangling, yeah, that's engaging, um... I think the danger in doing that a lot is, is that... they then work with an expectation that they're gonna get something in the end of it. And

to me that's a dangerous, slippery slope to be on as a teacher. You don't – you don't want them to think that because... while it is true engagement, in a way, it's not true motivation." Of course, we ultimately want to encourage our students to be intrinsically (rather than extrinsically) motivated to learn new things and succeed in school. However, using prizes can be a helpful way to get students to "buy in" before they've matured enough to understand the value of learning for themselves, making it a particularly useful strategy — if used tactfully! — for working with middle schoolers who are still developing abstract thinking skills.

### **Implications for Teachers**

By the end of my data collection and analysis, I realized just how wide of a range of factors exist that influence middle school students' motivation and engagement in math. Given that the specific factors identified in this study came from a relatively small sample of students and teachers, it is likely that many more factors exist for the larger population of students in schools across the globe. Ultimately, this points to a need for teachers to truly know the students in their classrooms — their strengths, preferences, motivations, and backgrounds — and use that knowledge to make the most out of their instructional approaches to them. While many of these instructional approaches will vary depending on each student's needs and personality, this study illuminates several key ideas for teachers to consider implementing to motivate and engage all students in math.

First, teachers should look for students' strengths and find ways for them to experience success in class, building their self-efficacy and confidence. Students' self-perceptions proved to be one of the most common and powerful influencers of student motivation and engagement, with most students maintaining high levels of each when they did well in class. Teachers should orchestrate as many opportunities as possible to show students that they CAN be successful in



math and are capable of achieving more than they realize. This means introducing challenging tasks while providing ample support that enables students to work within their zone of proximal development (Vygotsky, 1978). When they experience success with the help of their teacher, students will feel empowered and eager to learn in the math classroom.

With this being said, it is also critical for teachers to cultivate a growth mindset in their students and encourage perseverance when they inevitably face more difficult math content. Students often lose hope and feel defeated when they sense that they are struggling to grasp a concept, leading to a quick downfall in their motivation and engagement in class. Teachers have the power to change their students' perspectives in these moments of struggle, reminding them that working through the difficulty and making mistakes are good things because they allow fruitful learning to happen. Educators should teach students to celebrate challenges and mistakes, knowing that they are opportunities to grow and that they are equipped with the right tools and support to overcome them.

Another implication of note is the importance of establishing relevance. Students want to know that their learning will be worthwhile before they invest in a class. Unfortunately, too many students view math as a subject that is not useful for their lives and approach the class as a requirement that they need to push through to get to the next grade level. To change students' perspectives, teachers need to make their content relevant and show their students why what they're learning is important. This might mean exploring the ways certain concepts are used in different careers, describing the uses for math in daily life, and/or explaining the valuable learning processes and problem-solving skills that math develops in students. We need to prove to our students why math is worth pursuing! By sharing our enthusiasm for and the relevance of the subject, we can give students a reason to value and engage more in it as they learn.

Teachers must also take intentional measures to limit and effectively address distractions, as things such as cell phones, the temptation to talk with friends, and the rowdiness of peers were brought up frequently as issues negatively impacting motivation and engagement by students in the study. Having strong classroom management skills, setting clear expectations, and establishing procedures for dealing with distractions in class will help teachers prevent obstacles to learning and disruptions in class.

As an implication from the study more specific to the current climate of schools, teachers cannot ignore the fact that losing a significant amount of in-person instruction due to the coronavirus pandemic changed the students that walked back into their classes. They need to consider that students lost the structure of normal schooling and will likely need time to readjust. This might require some re-teaching of school procedures and frequent reminders of the expectations... along with heaping amounts of patience! Teachers must also take into account students' increased social emotional needs, recognizing that many of them have missed interactions with their peers and opportunities to develop valuable inter- and intrapersonal skills. We need to look for intentional ways to weave the teaching of these skills into our lessons and our relationships with students.

There are, of course, also implications for the students' suggestions on how teachers can increase student motivation and engagement. For one thing, it is clear that the value of providing teacher assistance cannot be overstated. Being attentive to students' needs and working hard to meet them is something that students value more than many teachers may realize. Providing support through one-on-one tutoring, work sessions, or targeted explanations and re-teaching are among some of the ways that teachers can engage students in active learning and show them that they care about their success, motivating them to put forth greater effort. Students also

mentioned a desire to work more with their peers, an element that teachers can seek to incorporate into their lessons more frequently and strategically. These collaborative activities must be supported, however, by instruction over conducting productive group work, as not all students may know how to work well with their friends and stay focused on academic projects. Teachers may decide to establish a set of team jobs to ensure that everyone contributes or have students develop a group contract outlining their rules and expectations for what effective group work should look like. Implementing these steps will create a framework for the collaboration that students crave and the learning that teachers desire.

Finally, teachers must consider where they want their students' motivation and engagement to come from, specifically in regard to the balance of using rewards and incentives. As mentioned previously, it can be appropriate to use rewards in some instances, especially to scaffold students who struggle to see beyond the present moment and need a boost of motivation, but our ultimate goal should be for our students to have an intrinsic desire to learn. We want them to be motivated and engaged of their own volition, because *that* is what allows true and meaningful learning to happen. The amazing thing is that teachers are in a unique position to initiate these opportunities for students and change the ways they think about math. As educators, we are the ones that can shift the narrative for our students and make authentic, exciting, and empowering motivation and engagement in middle school math classrooms a reality, but it starts with knowing them first. By understanding what motivates and engages our students and what they desire in their teachers, we can respond with intentional and effective instruction.

While other studies have explored students' motivation and engagement in the middle school classroom, this study garnered the valuable opinions of students themselves on how

teachers can better motivate and engage their students in math, especially in the context of post-pandemic schooling. The results of my study have prompted me to think about further areas of research to explore. What suggestions do teachers have for addressing student motivation and engagement in middle school math classrooms, and how do those compare to the ideas mentioned by students? Will student motivation and engagement increase as we move further away from the pandemic/lockdown and students adjust back to normal schooling, and if so, why and/or how will that happen? How might the results for this study look different with participants of another age level? These are just a few of the questions that emerged from my findings.

As a result of the study, the student participants reflected and gained a better understanding of their levels of motivation and engagement in math as well as how teachers influence them. The educators who participated were able to think critically about their students' involvement in their classrooms, converse with other teachers about their experiences with student motivation and engagement since returning to school after COVID-19, and generate ideas about how to address any challenges related to these subjects. My hope is that this study will provide helpful insights and spark better informed critical thinking for other middle school math teachers who long to get their students engaged in class and make their teaching more meaningful and effective. Many concepts from this study can translate easily to other subjects, as well, making the results beneficial to the educational community as a whole.

Personally, this study allowed me to learn more about the many factors that affect middle school students' motivation and engagement in math and begin thinking of ways to intentionally respond to those so that my students are excited about math and invested in my future classroom. I will now walk into my career as an educator with the understanding that while my students' motivation and engagement levels are shaped by countless components of their lives, I have a

role to play in calling them higher. I want to structure my classroom, my instruction, and my relationships with students to leverage their motivation and engagement for their good. With this action research as a key part of my background, I hope to make my instruction responsive to my students' needs and a source of a more meaningful math classroom for all.

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## **Appendix A**

### **MES-HS Information**

Due to protection under copyright law, the Motivation and Engagement Scale – High School (MES-HS) cannot be re-printed in this manuscript. To access more information about the survey and view example questions, please visit the company's website, linked below.

<https://lifelongachievement.com/products/motivation-and-engagement-scale-high-school>

**Appendix B****Student Interview Protocol**

Tell me about your experiences in math.

How would you describe your relationship with math?

How would you describe your motivation and engagement in the math classroom?

What motivates you in the math classroom?

What de-motivates you in the math classroom?

Tell me about the role of the teacher in your motivation in math.

How can teachers motivate students? How would you like to be motivated by teachers?

When are you most engaged in math?

When are you least engaged in math?

How can teachers better engage students in math? What can teachers do that would engage more middle school students in math?

Tell me about your experience in math class in middle school since the start of the pandemic.

Describe your ideal math classroom. Where would you flourish and be most motivated and engaged?

## Appendix C

### Teacher Focus Group Protocol

What is your teaching background? Traditional teacher training or alternate certification? What are you certified in? How long have you been teaching for? How long have you been at Madison?

Tell me about student motivation and engagement in your classroom this school year (2021-2022).

What do you think motivates students? What de-motivates them?

How do you currently motivate students to do math?

What have you found to be most helpful in engaging students in the math classroom?  
What have you found to be least helpful in engaging students in the math classroom?

How do you currently engage students in math?

Have you changed your teaching to better motivate or engage students in your class? If so, how? What happened as a result of that change?

Tell me about your experiences with student motivation and engagement in your math classroom since February 2020. What about last year when you operated under a hybrid instructional model (some online, some in person)? Have you experienced any challenges with the changes caused by the pandemic? Any victories? If so, what?

## Appendix D

## Codebook

Code	Level	Description	Example
<b>Intrinsic Motivators</b>	<b>2</b>	Motivation factors stemming from students' personal perspective, experience, and perceptions	N/A
Enjoyment Level	1	Students' natural enjoyment of math as a subject	"I do it to get it done and over with. I hate it, to be honest."
Relevance	1	Students' perceptions of math's relevance and usefulness for their daily lives/future	"And I know we will need to know how to use some things for future jobs and stuff. But like, I want to be a therapist, so like, I don't think that's gonna, you know, abide to me or whatever."
Self-Perceptions	1	Students' perceptions of their own abilities in math	"I'm not good. I suck [at math]."
Success	1	Students experiencing success and mastery in math	"Success. I think success motivates students. [Pause] I think that's the key to motivation. Um... I don't think there's anything that motivates like success. But, um, especially if you can get a student to... try something really, really hard that's difficult and then they can understand or achieve it, that's motivating."
Struggle	1	Students experiencing struggle and difficulty in math	"I don't understand anything and like, sometimes whenever I see that up on the board, I don't

			understand it at all, so I sort of just, don't really try on it because... if I try or don't try, I just don't understand, so I can't get it right either way."
<b>Extrinsic Motivators</b>	<b>2</b>	Motivation factors that emerge from people, pressures, and situations outside of the students	N/A
Motivated to Pass/Go to High School	1	Students' motivation to do math to pass eighth grade, go to high school, and eventually pursue college/careers	"I want to go to high school and go to college... that's why I want to get good grades."
Approval of Others	1	Students' motivation to please and meet others' expectations	"I also don't want to disappoint my dad and stepmom. Like, disappointing them is like the worst thing. It's worse than them being mad at me. If I do something bad and they're like, "I'm not mad, I'm just disappointed," I feel like that's just a different level of like [inaudible]."
<b>Distractions</b>	<b>2</b>	Factors that take away from students' focus and learning in the classroom	"I don't really, like... I can do the work if I actually pay attention. But whenever, like... stuff is going on, it kind of catches my attention."
Phones as Distractions	1	Cell phones (and the apps on them) as sources of distraction	"But I think we're trying to engage students, and many times, when you have that competition between the cell phone, a lot of times, you're never gonna

			win.”
Distractions from Peers	1	Talking, actions, and behaviors of other students as sources of distraction	“Sometimes, it’s kind of hard with a bunch of people in there, like, messing around, so... it’s sometimes hard to learn in there. Well, most of the time, when they’re gone, it’s really easy.”
Bad Mood/Bad Day	1	Students struggling in school due to being in a bad mood or having a bad day	“Or whenever, like, like I said before, if I’m ever like, in a bad mood or I’m upset about something. There’s certain points in my anger to where like, if I’m really upset with something, I’ll start breaking things. Or like, I’ll start banging my fists on the table, or I’ll start cussing people out, like...”
Trauma	1	Trauma (including but not limited to past experiences, family situations, financial concerns, and other crises) affecting students’ motivation and engagement in class	“...trauma, family stress, lack of needs being met, lack of family structure, breakdown of the family unit, breakdown of physical level— activity level—all those things.”
<b>Impacts of COVID</b>	<b>2</b>	COVID-19 as a source of key factors affecting students’ motivation, engagement, and learning	“COVID made it even harder because of online learning. And... it’s a lot harder to learn online, because the teachers can’t really teach as well as they can in person.”
Learning Loss	1	Loss of learning due to loss of instructional time, changes in learning methods, and stress	“And whenever I came back from being online, I didn’t learn anything, so I was also--I didn’t

			understand anything when I got here... So that put me behind a lot."
Loss of Structure Through School from COVID	1	Students' loss of structure due to school lockdowns and distance learning	"So they've gone a year and a half without any type of structure whatsoever because school was their only structure."
Forgetting "How to Student" Due to COVID	1	Students' loss of classroom skills/expectations after time out of school	"And I feel like... some of them... especially the ones that weren't in school last year... they have forgotten how to be a student. And they have forgotten how you're supposed to act at school and, you know, you're supposed to WORK when you're in class, not just, you know, you're not in class so you can sit and visit with your friends, you're in class to get your work done. And I, I feel like, some of them are just... they're struggling with that."
Students' Hunger for Interaction	1	Students' increased desire for interaction with their peers after the lockdown, leading to increased talking/distractions during class	"I call it number one, cell phones, and number two, COVID. And what did they do? They increase loneliness. They increase isolation. Ummm... they <i>don't</i> encourage community, and they don't encourage togetherness and human contact, which I feel like you ultimately need."
<b>Teacher Assistance</b>	<b>2</b>	Students' desire to receive assistance	N/A

		from their teachers	
Help from Teacher	1	Teachers providing one-on-one help on specific problems and concepts	"I've gotten a lot more understanding, too, 'cause like, teachers here are willing to sit down one-on-one and help me..."
Teacher Explanations	1	Teachers giving thorough explanations of content that students misunderstand	"Um, just by explaining it a little better. Like, once you get it done and over with, if people have questions or like, whatever... explain it like, in a more detailed way and like... um... help them anytime they need help. Yeah."
<b>Lesson Style &amp; Activities</b>	<b>2</b>	Intentional planning and structuring of the style of and activities in a math lesson to increase engagement	N/A
Make It a Game	1	Incorporating games, competitions, and fun challenges into class	"If you turn it into a game, they'll actually focus."
Working with Friends	1	Students' desire to work with and get help from peers for boosted engagement and understanding	"I work better whenever I'm with people I'm actually, like, close with, than I do... by myself. I've noticed that."
Classroom Technology	1	Increased engagement with use of classroom technology such as Chromebooks	"One of the things that would help is to have... technology. It just helps! It just helps."
<b>Incentives</b>	<b>2</b>	Providing incentives to motivate students	N/A
Material Incentives/Goals	1	Setting goals, giving prizes, and providing incentives to motivate students	"Give prizes or make a goal. Like, if everybody passes the six weeks, like, throw maybe a little party or something like that, or give like, a movie day on the first day of the six



			weeks, if you pass one of the six weeks, the first day, you play a movie and then... you set a goal for everybody.”
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