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## Mega Math Workshop: Perceptions of Dual-Class Cooperative Learning Stations

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**Mega Math Workshop: Perceptions of Dual-Class Cooperative Learning Stations**

Lindsay Dilbeck

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### **Abstract**

This study investigated student and teacher perceptions of Mega Math Workshop, a model combining learning stations, small-group intervention, cooperative learning, and content repetition, as well as its effect on academic achievement. The researcher used surveys, student work samples, interviews, and observational notes to compile data. The qualitative data was analyzed using the constant comparative method, and the quantitative data was analyzed according to measures of central tendency. This data showed a large range in student perspectives on Mega Math Workshop, both negative and positive. Generally, students had a positive opinion of Mega Math Workshop, and their achievement was not adversely affected. The classroom teacher, however, had a more neutral opinion, seeing the opportunities for growth and change.

### **Mega Math Workshop: Perceptions of Dual-Class Cooperative Learning Stations**

On Thursday, a wall of our classroom disappears, and two classrooms combine to become one. We greet our students at the door to tell them it is time for Mega Math Workshop. Instantly, there are smiles and whispers of excitement. Students walk into the room more silently than ever, determined to prove themselves worthy of this time. Others are not as reverent, standing with flat faces and shuffling slowly into the room. A few wave to friends on the other half of the classroom, and others keep their heads down. Every student knows this is something different than a typical day in math class.

The teachers and students of Lamar Elementary School (all names are pseudonyms) moved into their new building at the start of the 2019-2020 school year. Because of its modern creation, Lamar has many features built into it to optimize collaborative learning, including a central space in each grade level pod, outdoor work areas, and retractable walls between classrooms. In fourth grade, teachers are organized so that two teachers of the same subject share a retractable wall. As the Covid pandemic began halfway through the first year in this new building, many of these collaborative learning features went unused. The 2022-2023 school year was the first that began with no Covid restrictions, allowing teachers to use these areas and features once again. Mrs. Potter and Mrs. Grant had been teaching math alongside one another for a few years, and their dream was to be able to open the wall between their rooms to create a large, combined-class workshop environment. They named this Mega Math Workshop and began a few weeks into the school year.

Mega Math Workshop happens at least every other Thursday. The students from Mrs. Potter and Mrs. Grant's classes are sorted into four homogenous ability groups which determine what order in which they will complete the day's tasks. As students have already had three days

with the week's content by Mega Math Workshop, these activities are designed to be extra independent practice. Students complete four tasks. One is always the Thursday version of the daily numeracy page, something that Mrs. Ford created to provide fluency and spiral review practice to fourth-grade math students. This involves multiplication or division fact practice, a skill review of an earlier concept, and a word problem. The other activities vary from online review lessons to games played with a partner. One rotation is spent with the classroom teacher. Groups of students who are struggling receive a more intensive content review and practice, whereas students who have mastered the concept are able to work in their group without teacher guidance. At the end of Mega Math Workshop, students staple the day's work together and turn it into their teacher. Occasionally, a grade is taken from one of those assignments, which students are made aware of at the beginning of the workshop.

### **Purpose**

The purpose of this study was to investigate student and teacher perceptions of the Mega Math Workshop model as well as the effect of this model on student math achievement. The 2022-2023 school year was the first year that Mega Math Workshop had been implemented, so it was unfamiliar territory for both students and teachers. I investigated this model with the following questions:

**Research Question 1:** What are student and teacher perceptions of Mega Math Workshop?

**Research Question 2:** How does student achievement vary within and without Mega Math Workshop?

This action research study was completed during my year-long clinical teaching placement for my M.Ed. program. I was placed at Lamar Elementary School, located in a small city in Texas with a population of about 120,000 people. Lamar Elementary School is part of

East Hills Independent School District. The student body was comprised of 57.8% White, 31% Hispanic, 6.8% African American, 3.7% Two or More Races, 0.3% Asian, 0.2% Pacific Islander, and 0.2% American Indian. Over 46% of students qualified as economically disadvantaged, 14.7% received special education services, and 2.9% were Emergent Bilingual/English Learners.

### **Literature Review**

Mega Math Workshop is a unique model that combines several well-known educational practices into one. It has elements of learning stations, small-group teaching, content repetition, and cooperative learning. Each of these strategies appears in different ways throughout a single Mega Math Workshop session.

Learning stations is a strategy that allows students to practice content in various forms across different activities. Ocak (2010) found that the use of learning stations improved student performance, and that classes using learning stations were perceived more favorably than those who did not use that model. Learning stations involve a high level of repetition which Alsaadi and Al Sultan (2021) said allowed students to have more opportunities to create understanding and develop mastery. As learning station activities are completed independently from the teacher, students learn how to propel their own learning, solve their own problems, and persevere through challenges (Alsaadi & Al Sultan, 2021).

Within Mega Math Workshop, the learning stations model provides teachers with the ability to meet with their students in small groups. Small-group teaching is a commonly used and implemented practice among elementary school environments. Fuchs et al. (2008) concluded that small-group teaching in combination with whole-class teaching improved math problem solving skills in at-risk and non-at-risk students alike. In a study conducted by Chambers et al. (2011), the researchers found that a small-group reading intervention program

was more effective than one-on-one tutoring. They attributed this result to the opportunity for student collaboration within a small-group setting.

Because Mega Math Workshop occurs on Thursdays, students have already had three days of exposure to new content. Even so, the classroom teachers use their small-group meetings to repeat the content again with students who are still struggling or are approaching proficiency. Content repetition was found to both improve students' accuracy and their ability to apply their learning to unfamiliar contexts (Carver & Kim, 2018).

For students who have achieved mastery prior to Mega Math Workshop, their small-group time is not led by the teacher but is instead used as a time to work cooperatively with the other students in their group. Cooperative learning involves a group of students working together to solve a problem (Siegel, 2005). After exposure to cooperative learning, students show a higher level of academic achievement (Jacob, 1999; Shachar, 2003). Hima et al. (2019) and Shachar (2003) also discovered that cooperative learning improves student opinion of the subject and the class as a whole. Additionally, Silva et al. (2022) theorized that critical thinking skills are enhanced after cooperative learning. This strategy also affects the overall classroom community. Jacob (1999) reported a higher level of cooperation among diverse groups of classmates. The use of cooperative learning also decreases the gaps in ability among peers (Silva et al., 2022). Students gain confidence from either having a peer available to help them or being the one providing help to a classmate (Hima et al., 2019). Davidson and Major (2014) found this practice also strengthened student relationship-building skills and created a stronger community within the classroom.

One well-researched model that incorporates many of the above strategies is the math workshop model. It begins with a brief introduction to the new content by the teacher, but

afterwards most of the responsibility for learning falls on the students. They work collaboratively to explore the math concept and develop their own understanding (Hoffer, 2012). This model has been studied regarding teacher perceptions (Sharp et al., 2019) and effect on mathematics achievement (O’Conner et al., 2021). While Mega Math Workshop is similar to this method, math workshop does not contain the combined class element or the use of learning stations. Mega Math Workshop is unique in that it covers a multitude of common teaching strategies within one system. All of these individual pieces have been researched, but no study has investigated all of these at once. Therefore, this study will provide an important contribution to each of these pools of research by showing the efficacy and perceptions of multiple strategies being used in one class period.

### **Methods**

The study took place in my year-long clinical teaching placement for the M.Ed. in Teaching and Learning. The participants of this study included three classes of fourth-grade math students and two classroom teachers. There were 57 students in these three classes, 31 boys and 26 girls. Six students were Black/African American, 17 students were Hispanic, 29 students were White, two students were Native Hawaiian/Pacific Islander, and three students were two or more races. Four students received pull out services for dyslexia, six were in RTI Tier 2, and ten students were recommended for RTI. Both classroom teachers were White females.

### **Participant Selection**

Of the students in my three classes, only those who returned a signed consent form from a parent or guardian were able to participate. Before the study began, I sent a family letter and consent form home with each student. Students who received guardian consent were then given assent forms to sign. Students and their families were informed of what this study would



investigate and how it would be conducted. All students participated in Mega Math Workshop and completed the survey, but only those with signed consent and assent forms were included in this study. Twenty-seven students and one adult participated in this study. Fourteen students were male, and 13 were female. Seventeen students were White, seven were Hispanic, three were Black/African American, and two students were two or more races. Eight students were identified as Gifted/Talented, two students were receiving special education services, and one had been recommended to special education testing. The classroom teacher was a White female. While two classroom teachers were involved in Mega Math Workshop, I chose to interview only Mrs. Potter, my cooperating teacher, because she could most accurately speak to the effects of Mega Math Workshop on our shared students. None of Mrs. Grant's students were participants in this study, so I decided Mrs. Potter alone would add the most to this study on our students.

### **Data Collection**

All participants completed a survey containing a mix of Likert scale and open-ended questions about Mega Math Workshop (see Appendix A). The survey addressed student opinion, motivation, and confidence. Additionally, nine students were interviewed for 10-15 minutes each. Three students from each class were chosen based on their achievement levels in math to create a more diverse group. Candidates also varied in the amount of interaction they sought out with students from the other math class and those in their cooperative learning group. The classroom teacher was also interviewed for 20-30 minutes. Interviews were semi-structured with a list of open-ended questions, but participant response altered this structure slightly (Hendricks, 2017). Interviews were audio recorded using two devices and transcribed after they were conducted.

After each Mega Math Workshop during the six-week research period, I recorded my observational notes from the day. These were taken while students were transitioning between classes and during planning period at the end of the day. Student work samples were collected four times throughout the six-week research period. Two work samples were completed during Mega Math Workshop, and two were completed within the contained classroom setting on another day. These work samples were the numeracy pages that students complete daily and were collected the day before and the day of Mega Math Workshop.

### **Data Analysis**

The qualitative interviews from student and teacher participants, open-ended survey questions, and observational notes were analyzed and coded with the constant comparative method. This method involves sorting data into hierarchical categories and to discover recurring ideas and themes within all of the data (Hubbard & Power, 2003). I began by reading the first twenty percent of this data, highlighting key words and phrases and writing notes in the margins. These notes and highlights became my level 1 codes, which served to describe and begin to categorize the data. I used those level 1 codes to guide the coding of the remaining eighty percent of data. Once I had all of my level 1 codes, I began to group them according to related themes, which became my level 2 codes. I finished with five level 2 codes that served to synthesize the whole of my qualitative data (Tracy, 2013). I then indexed all of the information that belonged to each of my level 2 codes into five separate documents. While I was creating these codes, I wrote memos to clarify and remind myself of important things in my research. I placed these level 1 codes under their level 2 codes in a codebook (see Appendix B), adding a definition and example of each level 1 code.

The quantitative data I collected was analyzed by frequency and measures of central tendency. The Likert scale responses from the surveys were placed into bar graphs (see Appendix C) to compare what the most common answer was to each of these questions, which allowed me to find the general opinion of my entire study population. Student work samples completed within and without Mega Math Workshop were graded and compared based on the percentage score. These scores were compared in a table, and measures of central tendency were used to compare overall difference in scores among the entire group.

### **Findings**

Every student is unique. They have had years of individual experiences to shape them into the people they are, one with different likes and dislikes, wants and needs. Because of that, students react differently to elements of the classroom. Mega Math Workshop was starkly different from a standard day for my students, and their responses to that were as varied and highly individualized as they are. During analysis, the qualitative data I collected on Mega Math Workshop was categorized into six sections: social aspects, environmental distraction, graded assignments, students' favorite parts, changes students wanted to see, and teacher perspective. The findings below are organized according to those themes, with each having its own section. The final section covers findings from my quantitative data, shown in a table format, and demonstrates the effect of Mega Math Workshop on academic performance.

#### **Social Aspects of Mega Math Workshop**

There were two other times throughout the year that students had classes with students from the other trio, both in their science and social studies class. Otherwise, the only time was during Mega Math Workshop. Fifteen out of the 25 students surveyed chose "agree" or "somewhat agree" to the statement "I work with people I don't usually get to during Mega Math

Workshop.” Therefore, it was not surprising that students had much to say on the topic of social interaction. How students perceived the benefits and drawbacks of this higher level of social aspect varied across the nine students interviewed.

The majority of students viewed the social interaction allowed by Mega Math Workshop positively. When asked about their general opinions on Mega Math Workshop, several students mentioned being able to work with other classes as a reason they enjoyed it. Mackenzie said that students “get to see [their] friends that [they] don’t often see.” With classes shuffling each year, students get accustomed to seeing one another all day one year and then must adjust to having very little access to one another. Mega Math Workshop allowed students to see old friends, but there was also the opportunity to make new ones. Ava, who was new to Lamar Elementary this year, liked Mega Math Workshop because “it always changes so you get to meet different people.” This ever-changing environment also helped Gabriel in overcoming his nervousness around unfamiliar people. He said, “If we keep on doing this, I think it will help my social anxiety and keep on decreasing and decreasing it because I’m getting used to talking to people that I usually don’t see every single day.”

Beyond the relationship-building side of this social opportunity was also access to more knowledge. Even though Mrs. Potter and Mrs. Grant taught the same content, they approached it in different ways and taught different strategies according to their individual teaching styles. When students from these separate classes worked together, “everybody [has] the chance to know everybody else’s knowledge.”

Additionally, Mega Math Workshop gave students more opportunities to work with their own classmates. During a workshop, a group of students were working in a large group with Mrs. Potter on decimal comparison. Joe initially struggled with the strategy that Mrs. Potter was

teaching the group on breaking down comparison lists into smaller parts. Thomas turned around and explained it to him briefly, solving the problem without relying on Mrs. Potter. During a typical classroom lesson, this type of interaction may be discouraged because it could distract students nearby. Within Mega Math Workshop, however, it was expected and even welcomed, allowing students to lean on each other for help when needed.

Not all students had a good opinion of socializing with the other class during Mega Math Workshop. Gabriel, a student who struggled with social anxiety, did say that Mega Math Workshop helped him get used to talking to new people. However, he also added that he was not always able to find that courage, sometimes staying quiet during group work instead of reaching out to others due to not knowing his group members well. Joe also mentioned group work as a source of difficulty during Mega Math Workshop, saying that “sometimes they don’t listen” when he was trying to help solve a mistake, or that he felt rushed to keep up with groupmates or else “[he’s] gonna miss something.”

The addition of less familiar students also caused students to feel apprehension in asking for help. Lexie, who has an anxiety disorder, talked about how being around students from other classes and a new teacher led to her feeling too nervous to ask for help when she needed it. Finally, working with a teacher with unique expectations caused difficulty for one student in particular, Marina. At the beginning of the school year, an incident with another student caused Marina to become self-conscious about her hair, leading her to wear a hood every day since. In her typical day-to-day classes, Marina’s teachers knew the reason behind the hood and allowed her to keep it on. Mrs. Grant did not know the context and asked Marina to remove her hood. Marina did for the time she was in Mrs. Grant’s room, but quickly put it back on after coming back to Mrs. Potter’s classroom. The next day, Marina arrived to school wearing a facemask,

something she had not done since the beginning of the school year. I believe this was due to being without her hood during the school day prior, and that she wanted to have another layer of security the following day.

### **The Environment of Mega Math Workshop**

In addition to creating new social opportunities, the addition of another class of students also produced a more distracting environment. None of the students I interviewed found Mega Math Workshop to be a distraction-free environment but were instead divided between finding the environment too distracting or a tolerable distraction.

Within Mega Math Workshops throughout the year, students experienced working while a teacher had a small group nearby, while students were moving throughout the room, and while peers were talking to one another. For several of my students, this was a large challenge. While not exclusive to Mega Math Workshop, the presence of a teacher small group within the working environment caused many students to lose their own trains of thought. Joe discussed how overhearing Mrs. Potter teaching caused him to lose his place in his work. The most significant problem was overhearing numbers being said. “Mrs. Potter is saying, ‘Three divided by seven’ and I’m doing eight times nine, and it can confuse me.” Joe added that he saw other students in the room struggling as well, needing to start over when using strategies like counting on their fingers due to outside distraction.

Norman also mentioned that teacher small groups could be distracting, but his struggle came while working with another teacher. He would listen in on what Mrs. Grant was saying while working with Mrs. Potter and miss out on important information, focusing “on the other stuff than what you’re supposed to be focused on.” The added background noise also challenged

him while working independently. According to his own estimate, he could have completed two more activities within a Mega Math Workshop period if the environment was quiet.

The environment also stopped some students from taking in information. Lexie, one of my students who struggled most in math, said that “When I’m doing work and someone is explaining to me, I can sometimes hear people talking, and it just ruins what my question was.” She was not able to receive the help she needed within the louder environment.

Other students were not as negatively impacted by the added volume. Thirteen out of 25 students said that they disagreed with the statement “Mega Math Workshop makes it hard to get work done.” In interviews, students acknowledged the difference between Mega Math Workshop’s versus a typical day’s distractions, but they also said they were able to refocus themselves and complete their work. Ava felt no difference in her quality of work or learning, admitting that Mega Math Workshop was “just a little bit more distracting. It’s not too distracting.” Norman, who said he could complete more work in a quiet environment, spoke about his strategy for refocusing during Mega Math Workshop. He would set his math to the side, draw for a few moments, “and reconnect, like reconnecting to the internet, then [he’s] back on.” Other students expressed a more innate ability to focus in a louder environment. Donald told me, “Whatever I’m focused on, I’m focused on, unless it’s reading.” Mega Math Workshop was tolerable, but this same model would not have worked for him in a subject requiring more reading.

### **The Impact of Graded Assignments Completed During Mega Math Workshop**

Due to the higher level of distraction during Mega Math Workshop, I wanted to know how my students felt about being graded on assignments completed within it. For many, grades

in general proved to be an area of worry. For others, grades within and without Mega Math Workshop were just grades.

When students talked about grades coming out of Mega Math Workshop during interviews, they seemed confident about the content. Ava said that “taking grades in Mega Math Workshop is also fun because it’s kind of like a review.” We typically practiced a skill we had developed Monday through Wednesday during Mega Math Workshop, meaning students were already familiar with the content. Gabriel, one of my highest-performing students, was not at all worried about grades. “I’m smart. And I’m usually fast at doing stuff,” he said. He was sure in his content mastery, so the idea of doing poorly seemed to be something he did not consider.

Other students showed a more general worry about grades. Mackenzie, another high performer, talked about feeling nervous that she would get a bad grade on something from Mega Math Workshop. When I asked for more information, however, she said “because I don’t want my grades to be bad,” signaling a general worry rather than something stemming from Mega Math Workshop. Norman also talked about fearing low grades. He mentioned that his math grades “were high, and [then] they went down. [...] Went into the 60s.” He wanted to improve his math grades, but was nervous that they would instead continue to go down. Like Mackenzie, he did not cite anything specific to Mega Math Workshop that affected his worry.

Still, some students were made more nervous due to the fact that they were working on the graded assignment during Mega Math Workshop. Donald said that “sometimes, the stuff that we’re still fresh on hasn’t fully gotten in. So sometimes I don’t know what I’m doing.” This referenced the times that we taught new content during Mega Math Workshop and assessed on it within the same period. Occasionally, we decided not to add those scores to the gradebook due to how low they were across the board, or students were given the opportunity to correct their



work the following day to raise their grades. In either circumstance, the worry about low performance still existed for Donald.

Lexie's nerves about grading Mega Math Workshop assignments came from the fact that help was not always available to her. Student independence was a must for Mega Math Workshop to go smoothly, which sometimes meant Mrs. Potter and Mrs. Grant would ask students to avoid asking questions of me, the only helper for forty students. "When I can't ask questions, I don't know what to do, then I might probably get a failing grade on it," Lexie explained. She struggled throughout the year in math, and typically relied heavily on teacher assistance daily. Mega Math Workshop removed that resource from her, and as a result, she worried more about her performance.

### **What Else Do Students Like and Dislike About Mega Math Workshop?**

Mega Math Workshop provided students with a wide range of benefits and drawbacks. When asked to name their favorite aspects of Mega Math Workshop, student responses covered the whole of that range. Certain aspects, however, were mentioned more than the rest. One of the most common themes that I heard from my students was that Mega Math Workshop was different from a typical day of math class. For most, this was a good thing, but it did not come without its challenges.

Engagement is a key factor in learning, and the break from routine that Mega Math Workshop provided naturally created it. "You're not just stuck in the same room all day," said Ava, "it's like a change." Our students were expected to work hard for three 100-minute sessions throughout the day. Even with their teachers working hard to keep things interesting, students still got bored or restless. The movement and change between activities meant students did not have to keep attention for long stretches. Mackenzie noted that in Mega Math Workshop

students “[got] to rotate, but for a regular day in reading [they had] to just sit at [their] desk.”

Allison also talked about the benefit of multiple activities going on within the class period: “It’s not so you’re in one thing, and you can only do this. [...] you have different things you can go back and forth between, so you’re not bored doing one thing.”

Most of a student’s time in Mega Math Workshop was spent working independently. We most commonly used choice boards to structure student time, and this freedom and independence was another frequently referenced idea by students and Mrs. Potter. When I asked the students that I interviewed what format of Mega Math Workshop they enjoyed the most, the resounding answer was choice boards. “You get to pick what you do. It’s not just, ‘You have to go here and get this,’” said Allison. Lexie also remarked that she liked choice boards because students “don’t have to ask what to do next.” Several of my students also enjoyed the opportunity to order the different activities for themselves. Some started with the assignments that appeared easier so that they could have a warm up, while others did the hardest activities first before they got tired. That freedom to choose allowed them to be more successful within Mega Math Workshop. The ability to work at their own pace was also a favorite of students. Daniel liked controlling the tempo of his work because it “just makes you feel more comfortable while you’re doing the math. You’re not stressed out.” Joe felt similarly, saying that he does not have to “be in a rush because [Mrs. Potter] might move on to the next question.” This was an issue we ran into within a typical class day. Our students worked at very different paces, with slower workers often feeling the pressure to move quickly to avoid keeping the class waiting. Within Mega Math Workshop, students could move at the pace that worked best for them.

Mega Math Workshop was created to be a time to strengthen student skills through review and further practice. Beyond the teacher small groups, students had abundant time to

practice the concepts they had learned that week or to revisit an older skill. Donald found this review helpful to his long-term knowledge, saying that review “helps it sink in, so I know it for a long time.” Revisiting previous grade-levels’ TEKS was also seen as a benefit to students. “If I’ve already known it, like I did it last year with my third-grade math teacher, then it probably just helps me get better at it,” said Gabriel. Both of these students performed highly in math, but even so they thrived with the opportunity to review, locking in their learning for long-term success.

### **What Would Students Change About Mega Math Workshop?**

Even though 16 out of 25 students agreed to the statement “I look forward to Mega Math Workshop,” there was still room for improvement expressed by many. In creating a single system, there is no way to make it perfect for every student in the room. However, Mega Math Workshop was brand new to students and teachers this year, meaning there is time to continue adjusting the format to best serve students.

The first change that students wanted to see was more time for social interaction. Though most of them enjoyed the new access to others that Mega Math Workshop provided, they still wanted more opportunity to spend time with those people instead of simply looking at them. About the other class in Mega Math Workshop, Joe said, “I don’t really get to talk to them much, I just work.” Donald also expressed a lack of direct interaction with the other class, saying, “I don’t really get to collaborate.” During this study, much of Mega Math Workshop involved students working independently. The wall was open to make both rooms accessible, but the only interaction came from working in small groups with teachers and the occasional group activity.

Students and teachers alike discussed wanting more engagement and challenge out of the activities done during Mega Math Workshop. When asked how Mega Math Workshop could be

better, Ava said, “Doing the same thing we’re doing, but then maybe doing something like having a fun activity.” She referenced a day in science class when they played Family Feud to review a unit, suggesting that we implement something similar in Mega Math Workshop.

Norman also brought up the idea of bringing games into Mega Math Workshop.

Another way to get added engagement is to increase the challenge of an activity, requiring students to put more of their brain power into it. Because Mega Math Workshop was more review-oriented, higher-level students sometimes became bored with the activities presented to them. Donald, an extremely bright math student, said, “I don’t really feel like I learned anything more than what we’ve learned in class. Like we learned about it in class, but then we just go over it in Mega Math Workshop.” Twenty-two out of 25 students surveyed chose agree or somewhat agree to the statement “Mega Math Workshop makes me better at math,” so they did feel their time was well-spent for the most part. Still, increasing engagement and challenge would only further improve math skills.

The final change mentioned by students was to give more time to complete activities. In most of the Mega Math Workshops conducted throughout the year, students had a list of activities to complete within the period. I noticed a struggle in getting all of it done early on, and I knew that I wanted to investigate that element through this study. In the survey, students were split nearly evenly between each category on the statement “I have enough time to complete each task,” with seven students agreeing, and six students each choosing the response somewhat agree, somewhat disagree, and disagree. On the free-response section of the survey, several students chose to mention the need for more time. Zeke, who wrote very slowly due to fine motor issues, wrote, “It kinda stresses me out every time we have Mega Math. There’s lots of papers I need to finish, but I can’t.” Dean and Allison both mentioned wanting more time and

less stations or groups to work on. When interviewed, Allison also added that mixing the classes together, “It’s just too much and overwhelming. You don’t have enough time to do everything.”

### **What Does the Teacher Think?**

The majority of the participants of this study had a generally positive opinion of Mega Math Workshop, even if there were some elements they would see changed. Mrs. Potter, however, saw more issues with the system.

The one solely positive element of Mega Math Workshop was the small group time. Within our group of students, some were as much as two years behind in their math concepts and skills. Small groups allowed Mrs. Potter to focus on “nailing into those TEKS that are struggled with.” The small group format allowed us to build students skills, and it kept students engaged in their learning.

For much of Mega Math Workshop, however, students worked independently. This required students to be accountable for their own learning, and this did not yield much work from several students. “We have a large majority now that have a lot of apathy towards school,” said Mrs. Potter. “And so unless somebody is near them, making sure they're doing all the things, they're not really concerned about the grade, they're not really concerned about their folder being signed, it doesn't really matter.” While several students worked hard each Mega Math Workshop, the students who did not stood out more and were more numerous. “So, then you’ve got a full class period and what are you getting? Maybe 35 minutes of good instruction out of an hour and a half?” Mrs. Potter wondered. The students were not getting the benefits of Mega Math Workshop because they did not put in the effort. This inability to trust students to work independently also meant it was more difficult to create enriching activities. Mrs. Potter

spoke about wanting to introduce more games and more challenging activities, but without being able to trust students to follow expectations, it was never done.

Students reported an appreciation of the variety of Mega Math Workshop, but teachers saw another source of problems. Mrs. Potter observed that “there’s some [students] that it provides a little bit of stress” to do Mega Math Workshop because they did not know what to expect. Additionally, this variety meant that students did not have set routines and procedures to follow. During one class period, Mrs. Potter finished teaching and directed her students to put their papers on our back table and Mrs. Grant’s students to keep their papers. About twenty students were with Mrs. Potter, and only one followed those directions the first time. Even though Mega Math Workshop in general was familiar, we changed the format throughout the year so often that students could not slip into routines.

### **Impact on Academic Achievement**

Throughout the first year of Mega Math Workshop implementation, I noticed that several students were frequently turning in unfinished work or very few assignments when they were asked to. When we began taking grades on assignments during Mega Math Workshop, they were completed, but how correct were they? Table 1 shows the differences between student scores on assignments completed during Mega Math Workshop and those from assignments done during a regular day.

**Table 1**

*Scores Inside and Outside of Mega Math Workshop*

	Outside MMW	Inside MMW	Difference	Outside MMW	Inside MMW	Difference
Average	84	85	1	70.8	92.5	21.6

Mrs. Hamilton						
Average	89.6	87.5	-4.2	49.5	96	37
Mrs. Williams						
Average	91.4	95.4	3.4	74.5	95.1	20.5
Mrs. Potter						
Overall Averages	89.3	91.2	1.5	71	94.7	21.6

*Note.* This table shows scores from assignments completed inside and outside of Mega Math Workshop from my three classes. Fourth grade was departmentalized, so Mrs. Potter and I saw three separate groups of students throughout the day. They are organized according to their homeroom teacher: Mrs. Hamilton, Mrs. Williams, or Mrs. Potter. The orange section represents one compared pair of assignments, and the blue represents the second pair.

With the first set of assignments, there was no major difference between student performances. Both involved using the least common multiple to compare fractions, and the assignments were given only a few days apart. Only Mrs. Williams' class scored lower on the assignment outside of Mega Math Workshop, which may be related to the amount of time they received to complete the assignment. During Mega Math Workshop, students had the entire period to finish. They had more assignments to finish as well, but the priority was the graded one. Outside of Mega Math Workshop, they may have had as little as half of a class period to complete the work. On the second set of assignments, students did much better on the assignment completed during Mega Math Workshop. That assignment was adding fractions with

like denominators, while the outside of Mega Math Workshop assignment was adding and subtracting decimals. The decimals assignment was also given more quickly after starting to learn the concept, compared to the adding fractions assignment that came after two to three days of concept development. Therefore, it cannot be said if it was the work environment that affected student performance, or if those changes only resulted from variation in content difficulty and level of exposure to that content.

The change in performance inside and outside of Mega Math Workshop was drastically different across these two sets of assignments. There were so many factors controlling student performance on these tasks, but it does not seem that Mega Math Workshop was a decisive factor in student scores. Had the paired assignments been over the same content or in the same format, the effects of Mega Math Workshop may have been clearer. However, those possible effects were overshadowed by those created by the content of the assignments.

### **Implications for Teachers**

The feedback I received from my students on Mega Math Workshop was as unique as they are. With each learner in a classroom comes a different set of preferences, and this study highlighted how students can have opposite experiences within the same room. To almost every positive opinion, there was a student who had a negative one or a change they hoped for.

The goal of Mega Math Workshop was to create an engaging way for students to practice familiar concepts and sometimes learn new ones. In its first year of existence, that goal was not perfectly met. However, Mrs. Potter and Mrs. Grant did succeed in making something unlike any other. Almost every student was excited to see Mega Math Workshop on the weekly plan, and they were thrilled to come into math class on Thursdays because of it. The most significant reason for this enjoyment was the presence of the other class. Learning is a social endeavor, and



my students longed for collaboration. During a typical week of school, I was asked if they could complete assignments in pairs daily. While many students wanted more social interaction during Mega Math Workshop, they were still happy to have the smaller amount that they did. Students made new friends, spent time with old ones, and overcame shyness and anxiety to form those bonds. At the same time, there was hesitance to share the classroom environment and a sense of overwhelm at the sheer number of people surrounding my students.

The addition of another class also caused students difficulty focusing on their math work. With double the amount of movement and voices in the room, there were naturally more things to pull focus away from work. Each learner was different; some students struggled to complete assignments in Mega Math Workshop, but others found little difficulty in pushing through to get their work done. Students were similarly split on their feelings about their teachers grading assignments done during Mega Math Workshop. Those who often felt confident in math had no worry, but other students felt an inadequate time to practice or a lack of help which made them fear failure. This variety of opinions continued to appear.

The students that I interviewed talked about enjoying the change in routine that Mega Math Workshop created, but Mrs. Potter saw it create stress in others who were more dependent on a predictable day. Students expressed an appreciation for the control and independence they were given while working individually during Mega Math Workshop. However, teachers saw this allow a lack of effort and work completion for other students. I heard from students that they enjoyed the opportunity to review and practice, but many said that they would like to see more engaging and challenging activities.

With any educational system, there are going to be different reactions. Students are human, and as humans we have individual needs and preferences. Any one model cannot

appease all students within it, and Mega Math Workshop was no different. The general opinion that I received from students was positive, but that was not the only opinion.

In each educational decision, teachers set out to improve the quality of learning in the room. Students may have liked Mega Math Workshop, but did it improve their math skills? The scores I collected from my students were as mixed as their opinions. One set of work from inside and outside Mega Math Workshop showed almost no change in scores, with the largest change being a four-point drop in Mrs. Williams' class. The other two classes performed better inside of Mega Math Workshop, but only by one and 3.4 points. On the second pair of assignments, however, students scored much higher on the assignment completed during Mega Math Workshop, with an average of 21.6 more points. With such a difference in data, this signaled that student scores changed more due to the content and timing of the assignments rather than the environment of Mega Math Workshop. It is impossible to know how students would have performed overall without ever having had Mega Math Workshop, but based on the perspectives of students, there was real benefit to that system. The opportunity to review and practice improved their skills and gave confidence, and the engagement created likely helped even more.

Students, for the most part, enjoyed Mega Math Workshop, and it did not adversely affect their learning. Any decision regarding what to implement in a classroom is highly personal to its teacher and students, but I see the good Mega Math Workshop created in my students. They were willing to work even in the later part of the week, they received one to two small group sessions with teachers, and they controlled their pace and list of activities according to their own preferences. If I had the opportunity to further this research, there are additional questions I would like to explore. Would the benefits this research revealed continue if this model were

used in another subject? How would it function in a school without retractable walls? This study was contained to one subject and school building, but I believe it would be valuable to observe a modified Mega Math Workshop in new environments and subjects.

Teachers are permanently on the search for new methods to help their students. Mega Math Workshop is one such method, and it can continue to change and develop to suit the classroom in which it is implemented, providing benefits to a wide variety of school communities. Doubling the amount of students in a space or working with students beyond your own requires strong classroom management and clear expectations. At the beginning of the year, Mrs. Potter and Mrs. Grant spent time giving explicit instructions and examples regarding acceptable behavior during Mega Math Workshop. Clear boundaries are crucial to maintaining a positive work environment when adding in more students or a disruption to routine. Developing student independence is also key to the success of a Mega Math Workshop model. Students and the classroom teacher mentioned teacher-led small groups as a loved and helpful aspect of Mega Math Workshop, but that benefit could be undone if students are not able to work independently. Providing explicit instruction on what to do when students get stuck will lessen their dependence on the teacher. In planning each workshop, teachers should also choose activities that most students will be able to do on their own or implement a system for classmates to help one another without becoming off-task. Of course, these are not all-encompassing pieces of advice. Teachers ultimately know their students and classrooms best, but keeping these considerations at the core of planning can help this model run successfully.

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## Appendix A

**Mega Math Workshop Survey**

1. I look forward to Mega Math Workshop.

I disagree. I somewhat disagree. I somewhat agree. I agree.

2. Mega Math Workshop makes me better at math.

I disagree. I somewhat disagree. I somewhat agree. I agree.

3. Mega Math Workshop makes it hard to get work done.

I disagree. I somewhat disagree. I somewhat agree. I agree.

4. I work with people I don't usually get to during Mega Math Workshop.

I disagree. I somewhat disagree. I somewhat agree. I agree.

5. I have enough time to complete each station's task.

I disagree. I somewhat disagree. I somewhat agree. I agree.

6. I wish we had Mega Math Workshop less often.

I disagree. I somewhat disagree. I somewhat agree. I agree.

7. My favorite part of Mega Math Workshop is...

8. What would you like your teachers to know about how you feel about Mega Math Workshop?

9. Would you like to explain any of your answers on questions 1-6? If no, leave this question blank.

**Appendix B**

**Codebook**

Name of Level 2 code	Definition of the code	
Perceptions of social aspect of Mega Math Workshop	How students and teachers perceive the social aspect of Mega Math Workshop: student-student relationships and interactions with the other fourth-grade trio.	
Name of the Level 1 code	Definition of the code	Example of the code
When are students able to be social?	Times during Mega Math Workshop students are able to interact with peers	<p>LD 2:38</p> <p>So when is the time when you get to see those other people the most?</p> <p>Daniel 2:44</p> <p>Mostly when we do the teacher work when we go work with Mrs. Grant for class.</p>
Positive perceptions of social aspect of Mega Math Workshop	Positive opinions about the opportunity to socialize during Mega Math Workshop	Well, I like that we get to work with the other classroom. So we get to see our friends that we don't often see. So we get to work together with different people.



<p>Negative perceptions of social aspect of Mega Math Workshop</p>	<p>Negative opinions about the opportunity to socialize during Mega Math Workshop</p>	<p>Sometimes we haven't gone back and forwards with somebody that I'm not really used to talking with me, and somebody that I'm used to. I'm just a shy person. So it just kind of doesn't add up for me. So that's why I kind of like, try to keep quiet.</p>
<p>Name of Level 2 code</p>	<p>Definition of the code</p>	
<p>Perceptions of the work conditions of Mega Math Workshop</p>	<p>How students and teachers view the ability to get work done during Mega Math Workshop due to possible environmental distractions</p>	
<p>Name of the Level 1 code</p>	<p>Definition of the code</p>	<p>Example of the code</p>
<p>The environment is too distracting.</p>	<p>Students who struggle to focus during Mega Math Workshop</p>	<p>Yeah, that kind of distracts me a little too. Because Mrs. Potter is saying, "Three divided by seven," and I'm doing like eight times nine, and it can confuse me.</p>
<p>There are distractions, but students can manage them.</p>	<p>Students acknowledge there are distractions, but claim it</p>	<p>I think I do the work the same. It's just a little bit more</p>

	does not affect their work greatly	distracting. It's not too distracting, but it makes a little bit more sound because there's like wrinkling of papers and then everybody running around, and the doors are opening so much more.
Name of Level 2 code	Definition of the code	
Effect of Mega Math Workshop on student worry about grades	How much do students worry about their grades on assignments from Mega Math Workshop?	
Name of the Level 1 code	Definition of the code	Example of the code
Mega Math Workshop causes no extra worry about grades.	Mega Math Workshop does not create more pressure on students; they may feel pressure in general, but not more than usual	But I also think that taking grades in mega math workshop is also fun because it's kind of like a review. So you still know what you're doing. And it's not like 100% you don't know what you're doing at all.
Mega Math Workshop causes some extra worry about grades.	Students worry more about their grades in Mega Math Workshop than in other	How do you feel about being graded on assignments for Mega Math Workshop?

	circumstances to a small degree	Mackenzie 5:13 Sometimes nervous that I'm gonna get a bad grade.
Mega Math Workshop causes significant extra worry about grades.	Students worry significantly more about their grades in Mega Math Workshop than in other circumstances	How do you feel when we take grades on paper as you've done during Mega Math Workshop? Norman 6:02 I feel nervous that they're going to be low. Because now my math grades... they were high, and now they went down. I mean, really down. Went into the 60s.
Name of Level 2 code	Definition of the code	
Other factors of Mega Math Workshop	Various aspects of Mega Math Workshop mentioned by several students during the interview process.	
Name of the Level 1 code	Definition of the code	Example of the code
Small group time with teachers.	Student perceptions of small group time with teachers during Mega Math Workshop	LD 1:13 So which activities in Mega Math Workshop do you think help you the most? Mackenzie 1:21

		When we do groups with the teacher because the teacher helps me more.
Mega Math Workshop is a break from routine and provides variety.	Student perceptions about how Mega Math Workshop is different than other class times and how variety is built in	I like it because you still get to see a lot of people and you're not just stuck in the same room all day and it's like a change.
Students have choice, control, and independence.	Student perceptions about their freedom within Mega Math Workshop	Choice board because you get to pick what you do. It's not just like, you have to go here and get this.
Students get to review and practice familiar concepts.	Student perceptions about practicing already-taught content during Mega Math Workshop	Sometimes. I kind of like to review more, because it helps me get it into my brain. LD 1:22 It helps you get into your brain. What does that mean? Donald 1:26 It helps it sink in so I know it for a long time.

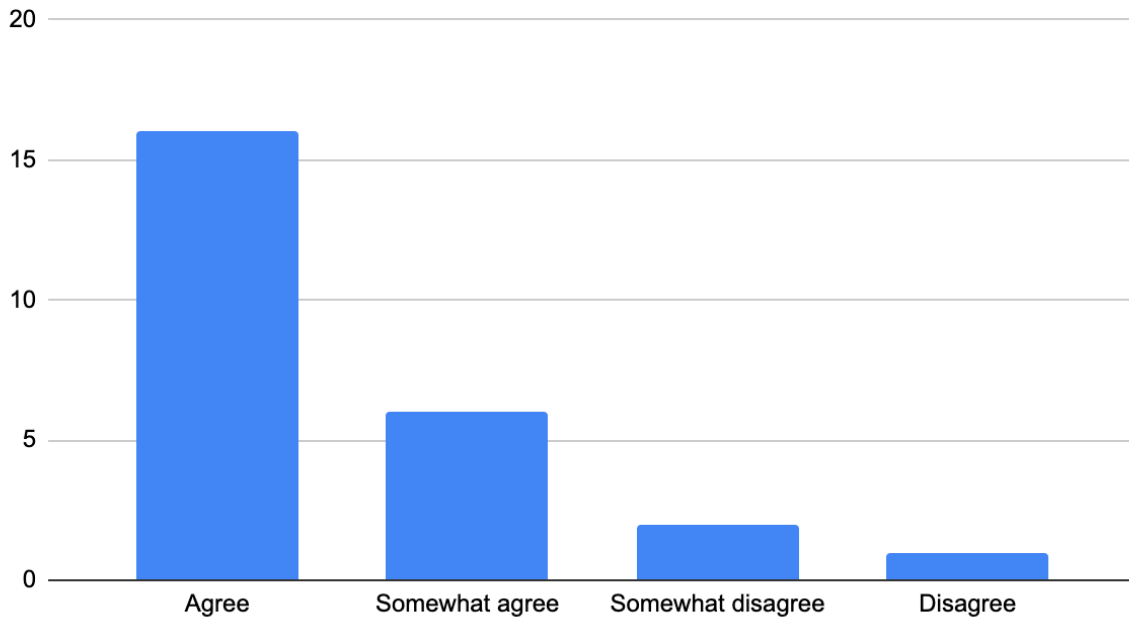
Name of Level 2 code	Definition of the code	
What changes students and teachers want.	What students and teachers said they would change if they were able to control how Mega Math Workshop is conducted	
Name of the Level 1 code	Definition of the code	Example of the code
Students want more social interaction with peers.	Students expressing a desire to spend more time interacting with their classmates or other students during Mega Math Workshop.	<p>LD 4:02</p> <p>Would you change anything that we do during Mega Math to make it better?</p> <p>Mackenzie 4:08</p> <p>If we could hang out with our friends more.</p>
Students want more engaging activities.	Students expressing a desire for more game-like activities during Mega Math Workshop.	<p>LD 4:55</p> <p>So how do you think we might be able to make MMW even better?</p> <p>Ava 5:01</p> <p>Probably doing the same thing we're doing, but then maybe doing something like having a fun activity, like a very fun activity.</p>

<p>Students and teachers want more challenging activities.</p>	<p>Both students and teachers expressing wanting more depth or difficulty during Mega Math Workshop.</p>	<p>I like it when we learn new things. Because I think when we go over the review, I get it like so much that I just know every single answer and it's really, really easy for me. But when we do something new, it seems more interesting and we get to find out the answer. And we don't already know the answer. So it's like a clue.</p>
<p>Students want more time to complete activities.</p>	<p>Students expressing a feeling of being unable to finish everything during Mega Math Workshop.</p>	<p>When you mix all the classes, it's just too much and overwhelming, you don't have enough time to do everything.</p>

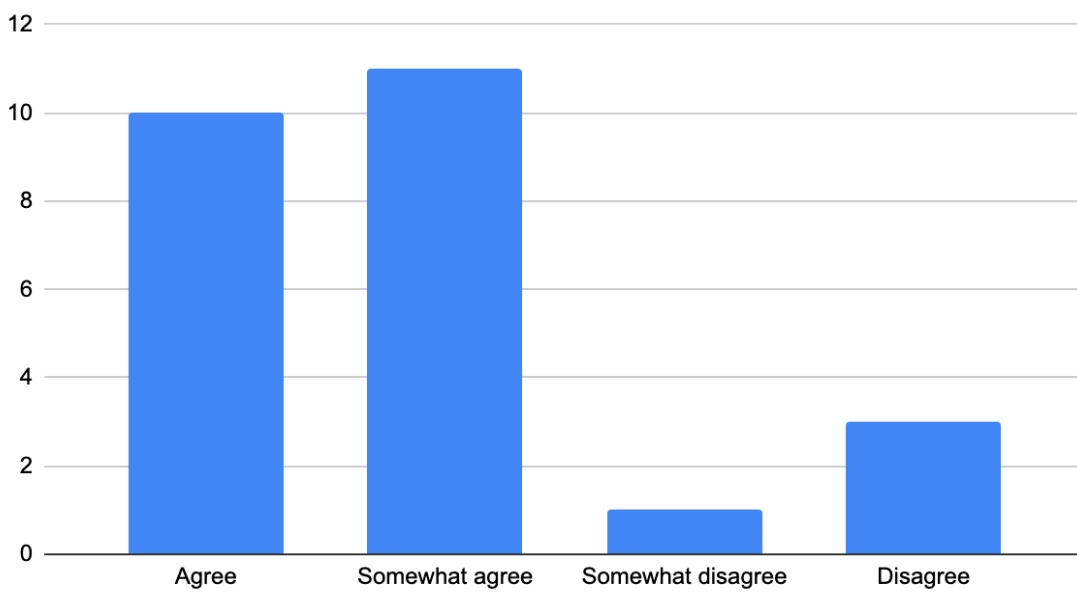
Appendix C

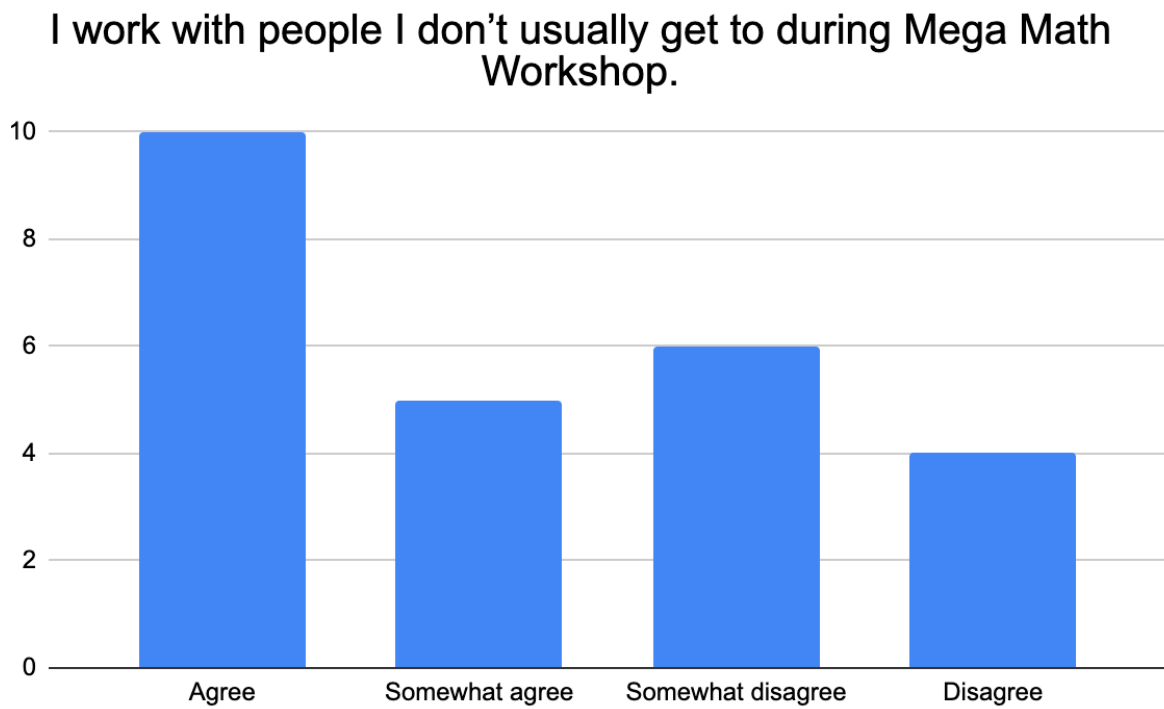
Survey Response Graphs

I look forward to Mega Math Workshop.



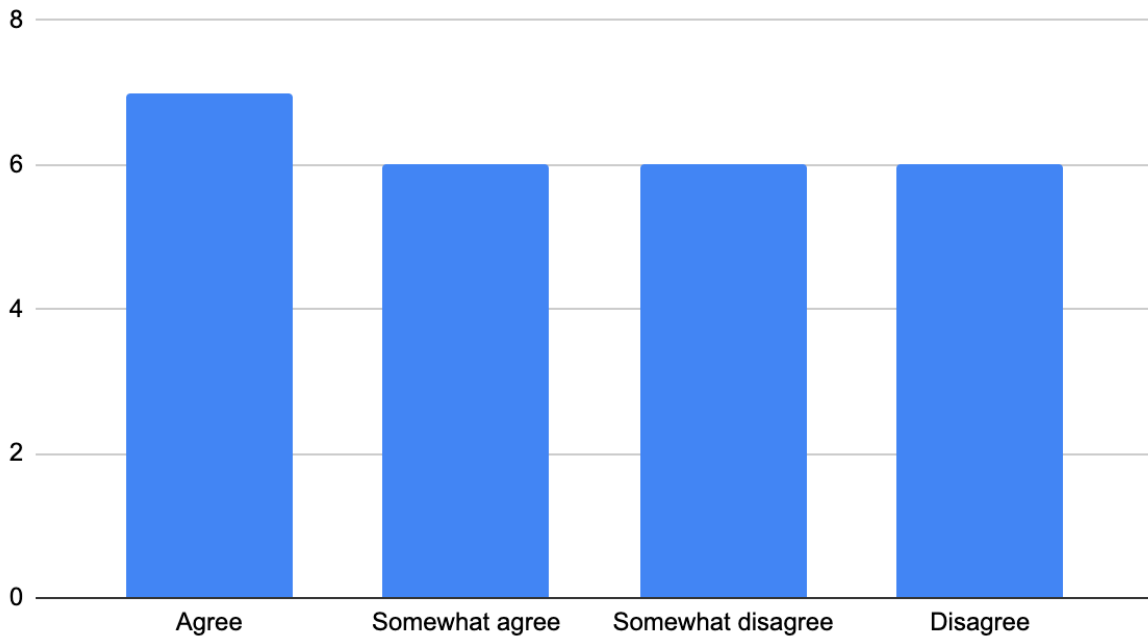
Mega Math Workshop makes me better at math.







I have enough time to complete each task.



I wish we had Mega Math Workshop less often.

