

Math Backpack Project

Davenport School District

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Introduction

You've probably heard it said: "Kids need to be fluent with basic math facts." You've maybe seen the word *fluency* in Washington State mathematics standards, in textbooks, or on report cards. But the question is, "What does fluency actually mean?" For years we've struggled with this question. Luckily, dedicated mathematics educators and research have helped us with a common definition:

Procedural fluency includes accuracy, efficiency, flexibility, and appropriate strategy selection (National Research Council, 2001).

To assess basic fact fluency, all four tenets of fluency (flexibility, appropriate strategy use, efficiency, and accuracy) must be addressed (National Council of Teachers of Mathematics, 2011)

Goals

The goals of this project were to:

1. Increase teacher and administrator understanding of what basic fact fluency is and isn't.
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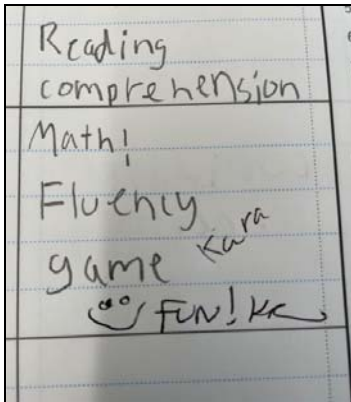
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2. Model and share games designed to support students in increasing their math fact fluency based on using efficient strategies flexibly to get an accurate answer.
 3. Initiate critical partner (family) support by inviting parents/guardians to learn about and support their third-grade student in developing long-lasting fact fluency.
 4. Have fun in math while supporting student growth in basic fact fluency!

Process

The grant work was in two third-grade classrooms and included 31 students, and one building administrator. This took place in the Davenport School District, a small and rural district located in eastern Washington. After some professional learning time with the teachers, an initial fact fluency assessment was given to determine what facts students knew and strategies they were using. This was important as research is clear that memorization is *not* an efficient strategy for acquiring fluency and evaluating a student's proficiency with math facts should never be timed (Boaler, 2015).

Next, we played strategy-driven math fact fluency games based on where the students were in mastering their basic math facts. During the 2020-21 school year, Davenport delegated Friday's as distance learning days. Based on that schedule, the teachers, elementary principal, and I decided that we would do the following:

1. On Thursday, the teachers and I would teach a fact fluency game based on strategies. The next day, Friday, their distance-learning work would be to play the game at home, bringing back the recording of the game results. Games were prepared, and game supplies were transported back and forth in their Math Backpack. The teachers and I would review the results.
2. After three weeks, parents were invited to an after school session to play a new math game, explore strategies involved, and to take home prepared fact fluency game supplies. They were asked to play the game two to four times with their child for 10-15 minutes.
3. This routine was continued until mid-May (except for the weeks that due to COVID-19 restrictions we were unable to meet due to school being moved to total distance-learning). The final parent session was held May 27, 2021.



Results

At the conclusion of the project, teachers reported a 34% gain in mastery of basic fact fluency and an 87% increase in students ability to use strategies efficiently and flexibly when solving and explaining their answers. Additionally, both teachers and the elementary principal now had a clear and common understanding of the four tenets of procedural fluency (math fact fluency).

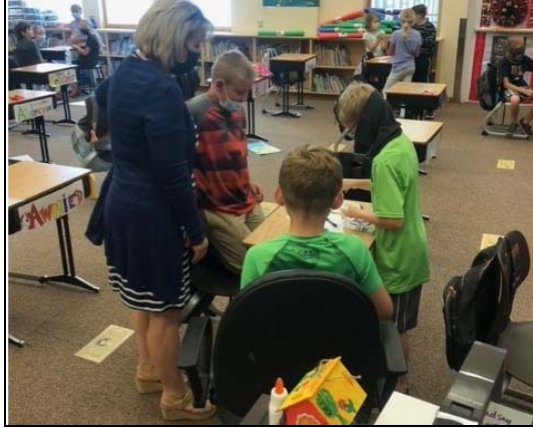
An unplanned outcome was that other teachers in the building heard about the project and, as a result, I began working with fourth-grade teachers and their students in late May/early June. Remarkably, it was *the students* who asked if we could continue math fact games "every day until school ends". Clearly, they were having fun! And, more importantly, they were learning and talking about strategies with basic math facts in a strategy-driven game. 100% of the fourth-grade students were actively engaged in math fact games 100% of the time we were playing. This is extraordinary at the end of the school year.

Next Steps

The teachers, elementary principal, parents, and I learned much through the Math Backpack Project. We hope that some planning over the summer could consider:

1. Teachers would like to continue growing in their understanding of math fact fluency including the research-informed progression of teaching math facts and the connections to content and practice standards.
2. Teachers and parents would like additional math fact fluency resources including but not limited to: board games, card games, and mathematized picture books.
3. Elementary administration is interested in looking at how this work could be incorporated into supporting unfinished learning for all students during and after the school day.
4. Parents would like to continue learning games, books, etc. and are wondering if this could be expanded to other grades PK-5th.

Student Work



Team/player 1 Ramira Team/player 2 MOM

Equal groups	Array
<p>Dice rolled: 3, 5 Equation: 3 groups of 5</p>	<p>$3 \times 5 = 15$</p>
<p>Dice rolled: 6, 4 Equation: 6 groups of 4</p>	<p>$6 \times 4 = 24$</p>

Miffy the MAD

	Index Card & Card	Number Sentence/Equation	Points for round
1	10, K	$10 \times 10 = 100$	1 100
2	1, 2	$2 \times 1 = 2$	0
3	5, Q	$5 \times 10 = 50$	1
4	10, 5	$5 \times 10 = 50$	0
5	2, 2	$2 \times 2 = 4$	0
6	8, 5	$5 \times 8 = 40$	1
7	10, A	$1 \times 10 = 10$	1
8	2, 2	$2 \times 2 = 4$	0
9	5, 6	$6 \times 5 = 30$	1
10			champion!!!

Something I liked about this game was playing by chance

Because even a child could win, like the little ones.

Something I would like to change in this game is adding gold/gold print counters.

because because why not?

How many times did you play this game? once Who did you play this game with? Annalise

I would play this game again (yes) no) Why? because its a game everyone in the house can play.



Conclusion

The grant allowed us to see if we could positively impact student-growth in math fact fluency. Specifically, the funds granted allowed the purchase of supplies for strategy-driven games, and resources to support families to actively engage in this important work as well. We are deeply grateful for the opportunity to do this work and are looking at the possibility of sustaining it in the future supported by funds from the Davenport School District.