

The Development of Mathematical Identity and Agency Through Equity-Based Instruction

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EDTE 401



Project & Goals

Project: facilitating added mathematical instructional support to sixth graders

Goal 1: Support students in building a deeper conceptual understanding of mathematics.

Goal 2: Come to know a teacher's role in developing students' mathematical identity and agency.

Goal 3: Gain experience using equity-based teaching practices in mathematics.

Outcomes: All three goals were accomplished.

Background & Critical Issue

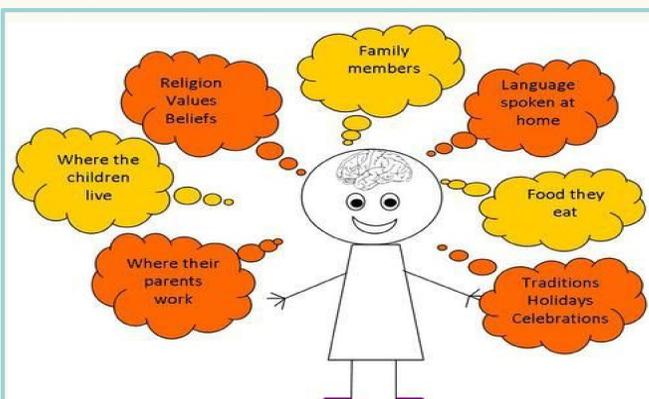
Background: Due to COVID-19, my education class could not have an in-person field placement, working with students, as it normally would. Instead, my professor coordinated a virtual instructional experience with a sixth grade class from Logan Elementary School.

Issue Addressed: Historical inequities in mathematical instruction

Logan Elementary School

The organization I worked with was **Logan Elementary School**. The school is located just a few blocks away from Gonzaga University. Logan is categorized as a Title I school, meaning at least 40% of students come from low-income families.

This project leveraged community assets by utilizing students' **funds of knowledge**, or the unique background knowledge each student brings to the classroom (see graphic below). The project addressed historical inequities in mathematical instruction by providing high-level mathematical instruction for students who come from low socioeconomic backgrounds and for those students who are labeled as "behind" their peers.



Visual Representation of a Student's Funds of Knowledge (not an exhaustive list); Source: Pinterest.com

What I Did

Day-to-day: A classmate and myself met virtually with 5-6 sixth-grade students twice a week

What I did: Facilitated discussion while working through mathematical problems provided by their classroom teacher

What students did: Participated in group discussion by explaining their reasoning when solving problems.

Content: Sixth-grade geometry principles and review of fifth-grade material. This included:

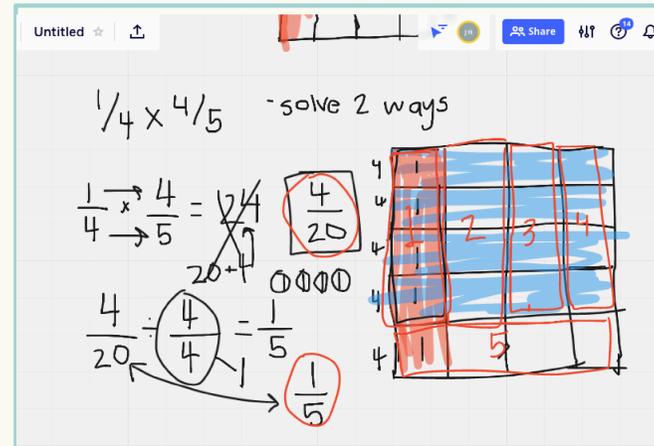
- Characteristics of triangles
- Volume and area
- Multiplying and dividing fractions

What was Accomplished: Students increased their confidence in mathematics and gained a deeper understanding of mathematical principles. Meanwhile, my classmates and I successfully based mathematics instruction on concepts instead of procedures.

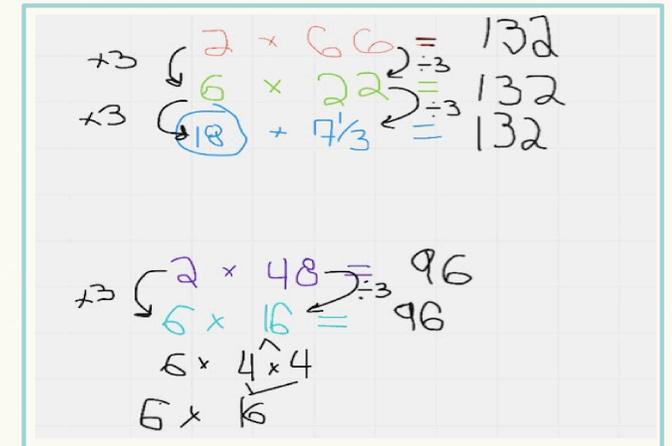
What I Learned

Students develop mathematical literacy and agency.....

- ❖ **By turning conceptual understanding in to procedural understanding**
 - students learn by knowing what they are doing instead of knowing what do
- ❖ **Through a productive struggle**
 - students learn by grappling with concepts on their own instead of being told what to do.
- ❖ **Using representations**
 - Representations deepen understanding
- ❖ **Through discourse**
 - Discourse allows students to evaluate their own and their peers' thinking



Recorded student reasoning- Multiplying Fractions Using Visual Representations and Procedures



Recorded student reasoning- Using Easier Multiplication Problems to Solve Harder Ones and Recognizing Patterns

What is Next

For the students: Continuing to build on their conceptual understanding of mathematics to eventually reach a higher level of mathematics knowledge than I, or my peers, had the opportunity to reach due to the high-level of instruction from a young age.

For me: I will carry this experience with me throughout my teaching career, remembering the importance of introducing mathematical ideas with concepts. I will utilize representations, discourse, and allow my future students to productively struggle in order to gain understanding on their own.

Vocational Development

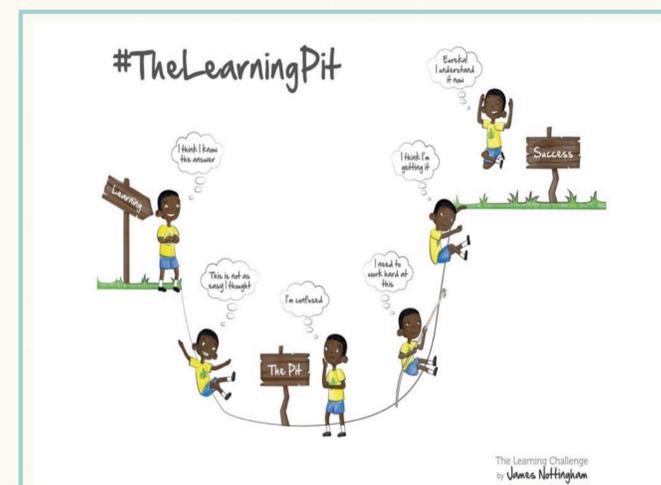
My emerging identity as a mathematics teacher has been greatly shaped by the interactions and experiences of working with Logan students. The students showed me the complexity of mathematics and the ability of elementary students to have such a deep understanding of mathematical concepts. The students were proof of the benefits of leading mathematical with concepts instead of procedures.

Academic Knowledge

The Logan students showed me the nature of mathematics and how a deep mathematical understanding is formed. They exemplified how fluid of a subject mathematics is. I used to think there was only one way to solve a mathematics problem, but now I know there is an infinite way to reach a solution. The Logan students also showed how discourse, a productive struggle, and the use of representations can truly lead to an in-depth understanding of mathematical concepts.

Community Assets

The Logan students reaffirmed my belief that a student's socioeconomic status (SES), race, gender and/or "progress" compared to the class does not determine their abilities. So many teachers believe if a student comes from this background or is this race or is "behind" on a certain concept, they should be stripped of the opportunity to have deep conceptual opportunities and stick to procedures because they "do not have the ability to do so." The Logan students completely put those beliefs to bed. They solved mathematics that confused my peers and I. Not only could the Logan students solve, but they understand why they solve the way they do.



Visual Representation of a Student's Productive Struggle; Source: katielmartin.com