The *Food Drive Task*: Problem Solving for Social Justice in the Elementary Grades

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Abstract: *This article introduces a social justice problem-solving task designed for grades K–2 that explores place value and food insecurities. The intentions and instructional design of the task are shared, including how the task recognizes students' identities, leverages problem solving and use of multiple strategies, and purposefully integrates mathematical goals with interdisciplinary ELA connections through a social justice lens. Sample student work from the task and lessons learned from the instructors are shared to inspire others wishing to design and implement similar tasks in their elementary mathematics settings.*

Keywords: *Mathematics education, problem solving, social justice mathematics, interdisciplinary connections, elementary mathematics, classroom discussion*

Introduction

When designing high-quality mathematics tasks that develop students' conceptual understanding and encourage sense-making, teachers must consider how to align mathematical goals that promote problem solving while leveraging students' mathematical thinking (National Council of Teachers of Mathematics, 2014, 2020). Other best practices call for teachers to consider the expertise of students and the experiences students bring to the classroom, including their unique personalities, backgrounds, and academic needs—which influence students feeling seen and valued when learning mathematics (Bonner, 2021; Rhodes et al., 2023). One way for teachers to do this important work is to provide students the opportunity to use mathematics to problem solve, so they can make sense of injustices they see in the world around them (Gutstein & Peterson, 2013). Further, this lens of social justice supports students in using mathematics as a tool to understand and enact change in their communities (Koestler et al., 2022). However, problem solving through a social justice lens, while keeping in mind mathematical goals and effective teaching practices, can be complex in elementary settings, especially for teachers wondering if and how young children can confront societal inequities and take action using early mathematical concepts.

This article describes our experiences as teacher educators in designing and implementing the *Food Drive Task* in first-grade classrooms. The task explores issues of social justice—food insecurities and community resources—while building understanding of place value and adding two-digit numbers. Further, this task attends to the identities of students, leverages multiple strategies, and is centered around a children's book used for an English language arts (ELA) lesson. We also describe ways to differentiate the task for grades K–2.

Context of the *Food Drive Task*

Considering how elementary classroom teachers teach across content areas, the *Food Drive Task* stems from a children's picture book. We chose Ruiz's (2018) *A Gift From Abuela*, as the main characters in the book shared a similar culture with students in the first-grade classrooms and provided an opportunity for all students to make connections between their lives and the lives of the characters (see Figure 1). The book also aligned with ELA and mathematics goals related to the grade-level and connected with Learning for Justice Standards (2016), which reflect domains focused on identity, diversity, justice, and action.

Figure 1: *Summary of Ruiz's (2018)* A Gift From Abuela.

A Gift From Abuela
By Cecilia Ruiz

Abuela and her granddaughter Niña have a special relationship and enjoy doing many things together. Abuela decides to put aside 20 pesos each week to save money to buy Niña something special. The country where the story takes place, Mexico, goes through a change of currency and a recession, which impacts the lives of those in the community. Items like food become more expensive and, as a result, times become harder for some people in the community. Abuela can no longer put aside pesos and forgets where she tucked them away. In the end, Abuela and Niña find the most joy in spending time together—making *papel picado* banners out of old pesos and sitting in the park together eating *pan dulce*.

Authors' note: Prior to the implementation of the Food Drive Task*, students read the text during their ELA portion of the day and shared stories about their loved ones and the places and things students enjoyed doing with those people.*

While reading the text aloud to students, we focused on parallels between the events in the text and items costing more due to inflation in our own communities, such as food, travel, or entry fees for certain activities. Students shared ideas of how people make decisions and how these decisions can impact community members in different ways; thus, communities find ways to support each other through uncertain times.

Learning Goals of the *Food Drive Task*

The mathematical learning goal of the *Food Drive Task* aligns with Common Core State Standards, addressing place value and properties of operations to add numbers. Specifically, 1.NBT.4 requires students to use concrete materials, drawings, and place value strategies, including written equations, to flexibly add numbers within 100 (CCSSO, 2010). In this task, students begin with the number 4 and add multiples of 10. Students also use two-digit numbers (e.g., 14, 24, 34) and add multiples of 10 through 100. Space is provided for students to choose multiple problem-solving strategies, which aligns with the Standards of Mathematical Practice (SMP) 1—make sense of problems and persevere in solving them (National Governors Association Center [NGAC], 2010). During the task, the teacher facilitates discussion on the mathematical ideas found within students' varying strategies, such as the number of tens and ones, (1.NBT.2; CCSSO, 2010). The *Food Drive Task* promotes student discussion and justification of problem-solving strategies, which also aligns with SMP 3—construct viable arguments and critique the reasoning of others (NGAC, 2010).

The task's social justice learning goal targets the Learning for Social Justice (2016) Action, Standard 20 noting how students will plan and carry out collective action against bias and injustice in

the world and will evaluate what strategies are most effective. Building from the discussion about food insecurity during the ELA lesson, students examine a representation of the number of children in the local community that experience food insecurity through a notice/wonder routine. Students then learn about local food banks and how these community resources support people, thus sparking discussions on what students can do to support a cause.

Description of the Task

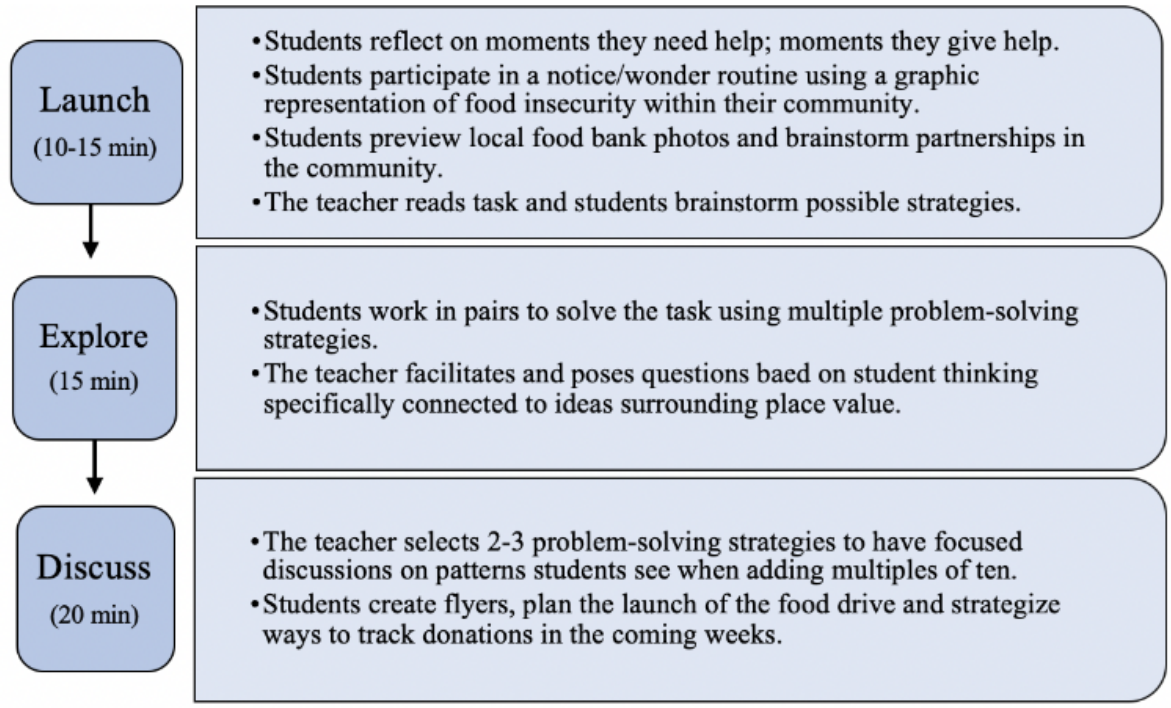
The *Food Drive Task* is embedded within and supported by three parts of a problem-based instructional model called launch, explore, and discuss (see Figure 2) and constructed to be a high cognitive demand task (Lappan & Phillips, 2009). The task asks students to explore the following problem:

> If we start with 4 items and want to collect 10 items every week, how many weeks would it take to collect at least 100 items?

Students are paired to engage in the task that ends with students creating a flyer as an action product to begin a classroom food drive, which can later be pitched to local businesses to develop a school-community service learning project.

In the following sections, we detail the problem-based instructional design of the mathematics lesson and its implementation, showcase student work from the task, and share suggestions for task modifications and differentiation.

Figure 2: *The* Food Drive Task *Summarized Within the Problem-Based Instructional Model.*

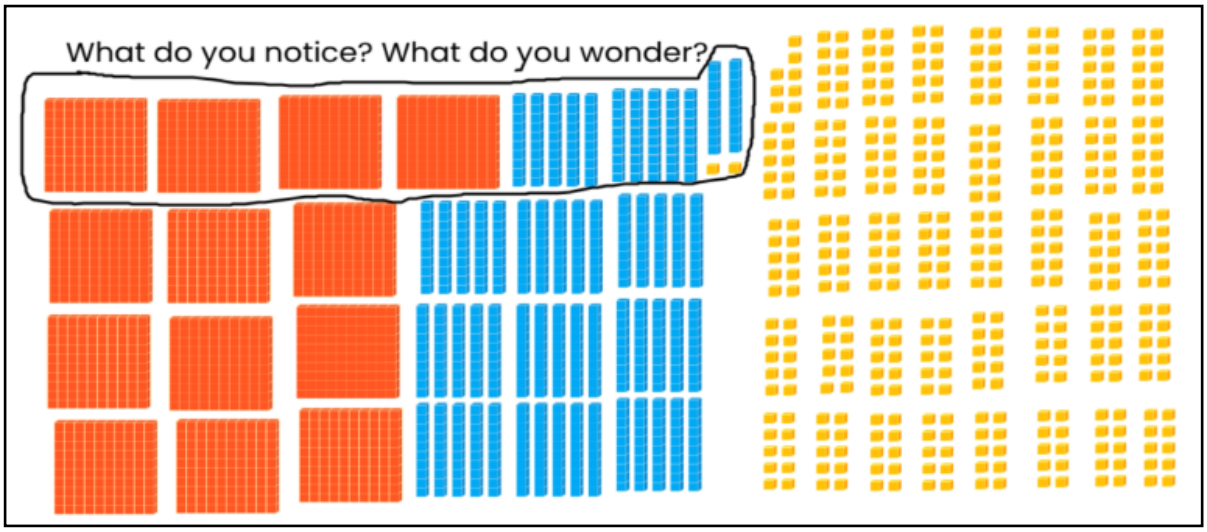


Authors' note: The lesson was designed for implementation in 50 minutes.

Launching the *Food Drive Task*

To begin, students summarize Ruiz's (2018) *A Gift From Abuela* and think about a time when they needed help from someone or provided help to someone, making connections to the characters and events from the text. After students share their experiences, the teacher engages students in a notice/wonder routine with reference to a representation of the number of children facing food insecurity in the local community. The teacher asks students: "What do you notice? What do you wonder?" It is important to note during the notice/wonder routine, the teacher does not share what the base ten blocks represent until after ideas are collected (see Figure 3).

Figure 3: *Representation of Children Facing Food Insecurity in a Rural Community.*



Authors' note: The total number of children experiencing food insecurity (2,270) reflects the most recent data available in the students' community. Out of that population, 522 children are ineligible for benefits (Feeding America, 2023). In preparing to implement this task, the teacher can visit the website and filter by state, county, and year to access the numbers for their area.

As students share, the teacher records students' words, phrases, and questions. After collecting responses, the teacher highlights mathematical ideas, specifically quantities focused on place value, (e.g., 10 ones are the same quantity as one group of 10 or counting by 10s to 100 as review). Then, the teacher shares that each unit cube represents a child in their community who experiences food insecurity. In connecting back to students' ideas of ways to help those in need, the teacher shares ways to support local food banks. The teacher uses a photo array that displays photos of the local food bank, collections, and/or volunteers. Using photos from the actual community, the teacher describes a local food bank's mission to curb hunger and improve the health of people in the community as well as ways people can become involved.

The teacher asks students how their classroom could support a local food bank with the assumption an action like a food drive would surface. When designing the lesson, it was important to us that the financial demand of collecting food items would not be placed on the families of children in this classroom, especially because many of the students' families experienced food insecurity themselves. Thus, students brainstorm places in their local community that may support the classroom's efforts in collecting donations.

To complete the launch, the teacher notes that four items are provided to begin the food drive and proposes a goal of collecting 10 items each week, similar to how Abuela in the text collected pesos every

week. The teacher describes the need to know how many weeks to collect food items to communicate when the food drive will start and end. Finally, as a whole class, students brainstorm tools or strategies they know that can be used to track the number of donations, such as number lines, written equations, and base ten blocks. The teacher can make available the suggested tools for student use.

In our implementation of the task, students shared various times they needed help when engaged in the notice/wonder routine (see Table 1 for sample student responses). In exploring the food bank photos, students recognized donations and where they have seen food drives before in the community. A few students showed excitement in recognizing the food bank sign and mentioned they had been there before or knew where it was located. We noticed students were eager about supporting the local food bank and had their own ideas of items to collect and places that would support the cause. For instance, students suggested the community center, local churches, local restaurants, and childcare centers.

Table 1: *Student Observations and Questions During the Launch.*

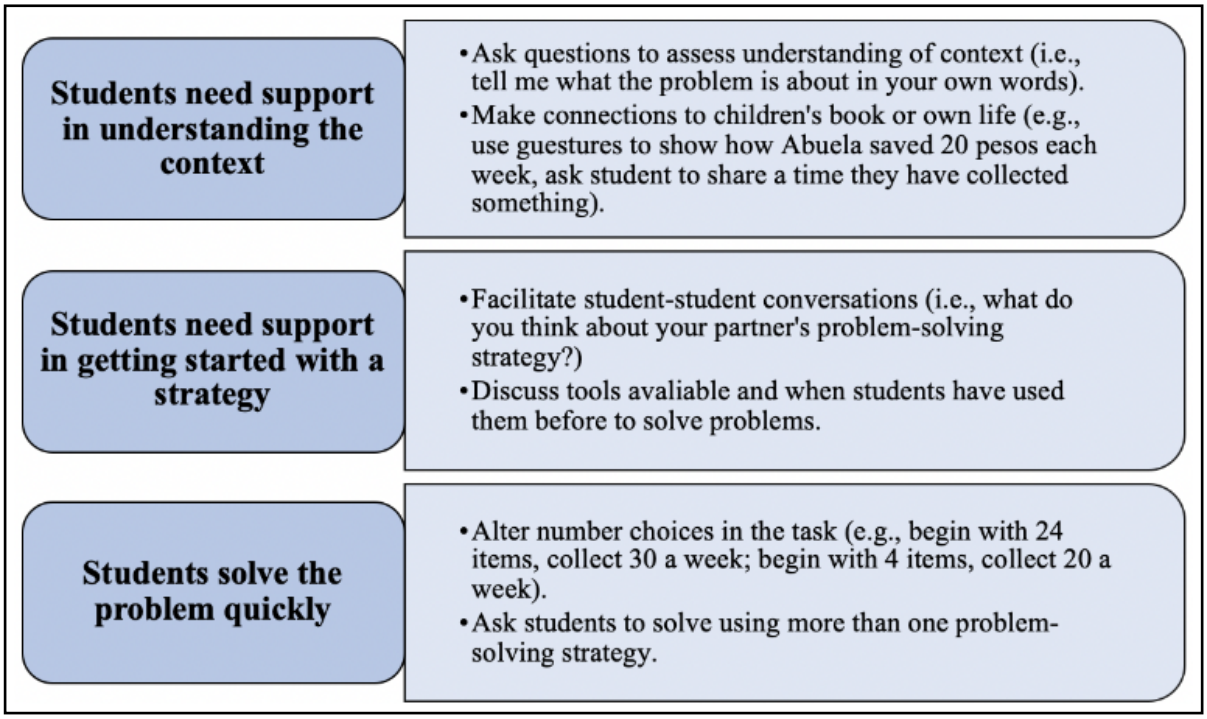
When have you needed/given help?	What do you notice?	What do you wonder?
• I was thirsty and needed a drink. • I couldn't open something. • When I lost my toy car. • I helped my grandma fold towels.	• There are orange, blue, and yellow colors. • Some blocks have a circle around them. • There are a lot of blocks. • The blue lines have 10 blocks stuck together. • The yellow blocks represent 1.	• How many cubes are in the big orange square? • Why are there so many blocks? • How many blocks are there? • Why are some blocks circled?

Exploring The *Food Drive Task*

In the explore part of the task, students engage with the problem while the teacher circulates to observe and question students' thinking. To begin, students sit with partners and decide what strategy to use to solve the problem. Students receive a handout with the task and have access to various materials at their tables (e.g., hundreds charts, base ten blocks, number lines). While examining student work, the teacher circulates to ask students follow-up questions connected to their mathematical thinking (Jacobs & Empson, 2016). For instance, the teacher could ask, "Would you share with me how you solved the problem?" Or, the teacher could probe, "What do you notice? What do you wonder?" or ask students, "I see how you started with 4-unit blocks and kept adding a ten rod. When will you know when to stop?" Engaging in the problem-based instructional model, the teacher takes notes of strategies that could be shared during the "discuss" part of the lesson (North Carolina Collaborative for Mathematics Learning [NC2ML], 2017). To align with the standard, targeted student work may show various ways to add multiples of 10 using (a) concrete objects, (b) counting strategies, and (c) equations.

During task implementation, we noticed some students needed support in understanding the context and getting started, whereas others decided on a strategy quickly. While circulating, we supported students in a variety of ways—building onto and advancing student thinking (see Figure 4).

Figure 4: *Strategies Used to Support Students Responding to the* Food Drive Task.

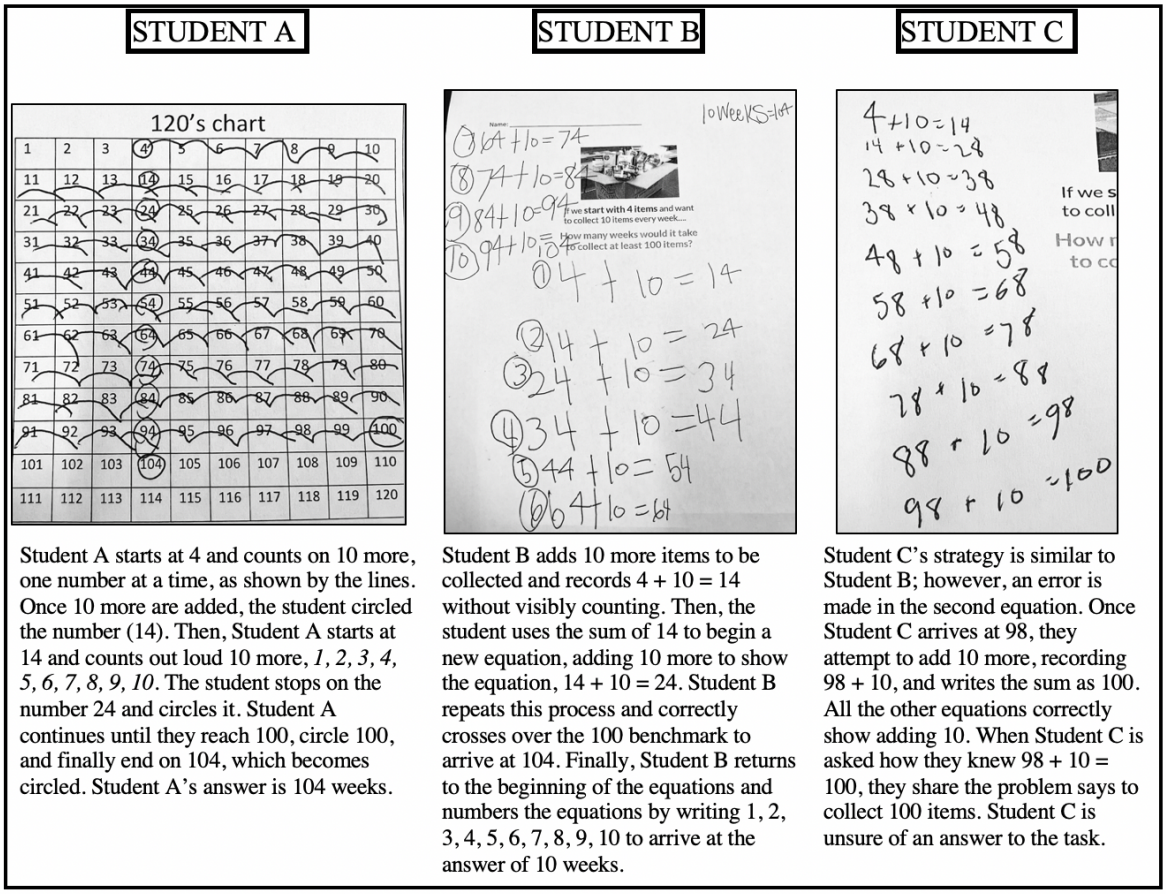


Authors' note: When implementing tasks, students respond in different ways. The list above reflects ways students across two first-grade classrooms responded and what strategies we used to build onto and advance their thinking.

During the explore part of the task, we noticed common problem-solving strategies used by the students, which included written equations and use of the hundreds chart. Figure 5 showcases the student work we selected to share in the whole-class discussion. Although there are a variety of reasons to select student work, we selected work based on the mathematical details in the strategy to provide space to discuss ways place value is used to add multiples of 10.

We chose Student A to share their strategy because not only was the hundreds chart used by other students but also the strategy was recorded in ways that support students in seeing patterns within the tens/ones places. We chose Student B to share their strategy because they showed a similar pattern in adding 10 using equations and were able to explain how 10 weeks would be needed to collect at least 100 items. Further, all student work would encourage discussion around the idea of adding multiples of 10 (a group of 20 or a group of 30).

Figure 5: *Student Work Selected for Whole-Class Discussion of The* Food Drive Task.



Student A starts at 4 and counts on 10 more, one number at a time, as shown by the lines. Once 10 more are added, the student circled the number (14). Then, Student A starts at 14 and counts out loud 10 more, *1, 2, 3, 4, 5, 6, 7, 8, 9, 10*. The student stops on the number 24 and circles it. Student A continues until they reach 100, circle 100, and finally end on 104, which becomes circled. Student A's answer is 104 weeks.

Student B adds 10 more items to be collected and records 4 + 10 = 14 without visibly counting. Then, the student uses the sum of 14 to begin a new equation, adding 10 more to show the equation, 14 + 10 = 24. Student B repeats this process and correctly crosses over the 100 benchmark to arrive at 104. Finally, Student B returns to the beginning of the equations and numbers the equations by writing 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 to arrive at the answer of 10 weeks.

Student C's strategy is similar to Student B; however, an error is made in the second equation. Once Student C arrives at 98, they attempt to add 10 more, recording 98 + 10, and writes the sum as 100. All the other equations correctly show adding 10. When Student C is asked how they knew 98 + 10 = 100, they share the problem says to collect 100 items. Student C is unsure of an answer to the task.

Authors' note: During lesson implementation, we initially chose Student A, B, and C to share their work. However, due to time constraints, we invited Student A and B to share their thinking. Student C highlighted an important error that could be further explored if time permitted.

Discussing the *Food Drive Task*

During the discussion, students share mathematical details of their peers' problem-solving strategies and design flyers for the classroom food drive. To begin, students take ownership by explaining their own work to peers. During whole-group discussion, the teacher asks follow-up questions related to place value and questions that support students in making connections between strategies. Once students solve that it will take 10 weeks to reach at least 100 items, they preview sample Food Drive flyers. The notice/wonder image (see Figure 3) is displayed and students summarize the purpose of the classroom food drive. Afterwards, students create flyers to distribute to places in the community who might participate in the food drive and bring collected items to the school. To conclude the lesson, the teacher asks, "How can mathematics help us make progress toward solving issues facing our community?"

During our implementation of the discussion, two students shared their strategies (see Figure 5). Student A shared their strategy and provided reasoning as to why they utilized the hundreds chart. The other students were asked to examine the details of their own work and whether or not it was similar or different (i.e., counting on 10 by ones or skip counting by 10s starting at 4). The question

was posed, "What pattern do you notice in the numbers they circled?" Student B shared their strategy with the class and the question was posed, "What happens to the ones and tens place when we add 10 more?" Student A and Student B's work were displayed side by side to further explore what patterns were observed when adding multiples of 10 to a number. In the last part of the discussion, the students excitedly decorated their flyers and exchanged stories about places in their community that might help the class with the food drive. Students shared the reason for the project including, "We are collecting because people need to eat," "to help," and "for people who need food." It is important to note this lesson was piloted in classrooms at the end of the school year; thus, the food drive was not completed. However, in collaboration with the same classroom teachers, our next steps are to re-teach the lesson and follow through with the food drive.

Modifications and Extensions of The *Food Drive Task*

When implementing the *Food Drive Task*, two modifications or extensions came to mind. First, the data displaying the number of children in a local area experiencing food insecurity can be altered. For instance, we took the number of children facing food insecurity and represented that number as hundreds, tens, and ones as opposed to using thousands blocks or written numerals themselves to best support the grade level standards. We also used the data available for their specific county and children under 18 as opposed to using data representing state or nationwide numbers, alternate age groups, or differences across ethnic backgrounds (Feeding America, 2023). Second, the number choices in the task itself can be altered to allow the task to focus on other quantities, concepts of place values, or operations. For instance, we could start the food drive with any given amount and have a goal of collecting any number of items each week until the ultimate classroom goal is reached. In Kindergarten, the task could read, "If we start with 2 items and want to collect 2 items every week, how many weeks would it take to collect at least 20 items?" In second grade, the task could read, "If we start with 36 items and want to collect 135 items every week, how many weeks would it take to collect at least 1,000 items? Aside from these modifications and/or extensions, this lesson provides embedded opportunities for students with learning differences (e.g., students with IEPs/504s or ELLs). For instance, the task provides visuals and manipulatives, uses context to help students understand mathematics, encourages work with partners to share strategies, and gives space for altering number choices.

Final Thoughts

Problem solving through a social justice lens can be implemented in elementary settings through lessons like the *Food Drive Task*. In our design and implementation of the task, it was helpful to start with a children's book that highlighted social justice issues in ways young children could understand and draw parallels in their own lives. The text provided a context for students and an entry point to examine data from their community while considering ways mathematics could be used to take action. The problem-based structure of the *Food Drive Task* showcased ways to generate student work to facilitate rich discussion around mathematical ideas. Through the discussion, students deepened their understanding of ways to use place value to add multiples of 10 all while being agents of change in their local community. We encourage teachers to center issues facing students and their communities within problem solving tasks (see Koestler et al., 2022) and use student work to leverage productive discussions around varied problem-solving strategies to enhance meaningful explorations in elementary mathematics classrooms.

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