Traditional Won’t Do: Beginning Algebra tasks that promote understanding

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My frame of reference

• Algebra I part one class
• Multiple Learning Activities
Learning Activities

- Get your money right… (30 minutes)
- Complete, critique, create (30 minutes)
Get your money right…

• Complete a 5 month simulation (Berhane & Morton, 2015)
  – 1 day = 1 month
Center 1: Get your money right….

TASK CARD

**Instructions:**

1. **Work individually (collaborating with group members as needed)** to complete the 5-day (5-month) financial simulation

2. **Simulation Instructions (25 minutes)**

   Complete the following on the simulation tracking sheet

   - **Day one**
     - **Occupation selection** - Select on of the stapled sheets of paper (*you must keep the first one you select*). Record the financial information from your occupation sheet onto your track sheet.
     - **Please note** - Student loan debt monthly bills are roughly 10% of a paycheck. This is lower than average.
     - **Choosing Expenses** - Choose your expense choices from the grid in the expenses packet. Please record your choice on your track sheet.

   - **Day two**
     - **Make a Financial Plan** - Come up a financial game plan, and a goal for the end of the simulation. Please record this on your track sheet.
     - **Pay Bills** - Pay your expenses and use your track sheet to see if you are on track for your financial goals.
– Day three

**Upgrades**- Look up the cost of any upgrades you would like to add to your lifestyle.
You can also choose to upgrade to a family package

**Pay Bills**- Pay your expenses and use your track sheet to see if you are on track for your financial goals.

– Day four

**Random Events** – *(please return your event to the correct envelope when done)*
Select 2 events that pertain to your situation. One major (must keep the first item you select) and one minor (you can return this event).

**Pay Bills**
Pay your expenses and use your track sheet to see if you are on track for your financial goals.

– Day five

**Last Day for Changes**
Please make any last minute changes that you think might help you meet your goals before the simulation ends.

3. **Short reflection (5 minutes)**
What is one thing you learned from this simulation? Please share your response with at least one member in your group.
Complete, critique, create

• Show me the money
• Voting Dilemma
Center 2: Complete, critique, create

TASK CARD

Instructions:
1. As a group, read through and discuss the Cognitively Demanding Culturally Relevant Mathematics (CDCR) Task framework (5 minutes).

2. As a group, complete the Show Me the Money and Voting Dilemma tasks (8 minutes).

3. Work collaboratively to assess and discuss the two tasks using the CDCR framework rubric (10 minutes).

4. Work collaboratively to draft a CDCR task on the chart paper provided (remaining time)
Time for Debrief
Why Focus on Tasks?

- Classroom instruction is generally organized and orchestrated around mathematical tasks.
- The tasks with which students engage determines what they learn about mathematics and how they learn it.
- “Tasks convey messages about what mathematics is and what doing mathematics entails” (NCTM, 1991, p.24)
The Importance of Mathematical Tasks

“There is no decision that teachers make that has a greater impact on students’ opportunities to learn, and on their perceptions about what mathematics is, than the selection or creation of the tasks with which the teacher engages students in studying mathematics.”

Lappan and Briars, 1995
Dimensions of a Task

- **Task Features**
  - Development of mathematical understanding

- **Cognitive Demand Level**
  - The kind of thinking processes entailed in solving the task as announced by the teacher
  - Thinking processes in which students engage

- **Assumptions embedded in the task**
  - Prior knowledge

- **Context and Relevancy**
Context and Relevancy

• What is meant by the context of the problem?
• Why is context important?
• What is relevancy?
• Why is relevancy important?
Higher Level Cognitively Demanding Mathematics Tasks
(from Stein et al. 2000)

Procedures with Connections, Concepts, Meaning and Understanding
"Require some degree of cognitive effort" (p.16). Require use of procedures to develop deeper understanding of mathematical concepts versus narrow focus on algorithms. Promotes use of multiple representations to develop this meaning. Successful completion of the task requires engagement with conceptual underpinnings of task.

Doing Mathematics
"Require considerable cognitive effort" (p.16). Solution process is not obvious and require complex, nonalgorithmic thinking strategies which reflect understanding of mathematical concepts. Solution process may be unpredictable and tasks encourage a variety of strategies. Require students to draw from relevant knowledge and experiences and make appropriate use of them in working through the task" (p.16). Encourages students to examine task structure, solution and strategy limits.

Doing mathematics for the purpose of becoming empowered intellectually, culturally, politically and socially.

Features of Cognitively Demanding, Culturally Relevant Mathematics Tasks
Task is a mathematically rich, higher-level cognitively demanding, embedded in cultural activity.

Mathematics task explicitly requires students to inquire (at times problematically) about themselves, their communities, and the world about them.

Mathematics task draws from students' community and cultural knowledge. May draw from connections to other subjects and issues.

Task features an empowerment (versus deficit or color-blind orientation) toward students' culture. Task may explicitly seek to add to this knowledge through mathematical activity.

Task asks students to engage and overcome the discontinuity and divide between school and their own lives - home and school.

Task is real-world focused, requiring students to make sense of world through mathematics. The explicit goal of the task is to critique society - that is, make empowered decisions about themselves, communities and world.
Student voices…

“This experience felt like reality and I felt like I was really paying bills. It brought me to reality about real life (DB, 2013).

“My experience is that it is not easy being a waitress and having all these bills. I learned how to manage my money and my paychecks every week. I now know that I can do it and make it by myself” (DB, 2013).
A Final Note on Task Design

Teacher Considerations

• Content
  – How does the task represent the content?
  – What are the cognitive demands of the task?
  – What skills are required to complete the task?

• Students
  – What does the student already know?
  – How do the individual learn mathematics?
  – Is the context of the problem relevant to the student?
Asante Sana
Time for Evaluation