CONTEXTUALIZED DEVELOPMENTAL MATH

Early Childhood Education Division
Central Piedmont Community college
Charlotte, North Carolina
DEVELOPMENTAL STUDENTS

- Feeling intimidated
- Suffering from a major lack of self confidence.
- Do not see relevancy of “regular” English, math, or reading
- Do not trust the process
- Putting math off till the end of program of study
- Need additional help – Tutor
How CPCC EC Started

• The need – Math struggle
• The shared passion/mission (2007, Smart Start Partnership) – Workforce development with education
• Raising bar of profession – State ENG/RED pre-requisite requirements (2008)
• Research proven “Contextualization” – Learner focused (adult learners)
• Inter-disciplinary collaboration
• Continued success/Completion focused
CONCEPTUALIZATION VS. CONTEXTUALIZATION

- generalizing from specifics
- forming general ideas
- thinking abstractly
- forming a concept or idea of the specific to the general

- understanding the surrounding elements (the "context") of an idea
- placing in, or treating as part of a context
- studying in contexts
- result of contextualizing the general--a phenomenon--to the specifics--its factual context
Example

DMA 010 Early Childhood Activity

1. You are interested in buying a house to transition into a childcare center. There are multiple rooms in the home that you need to determine the area so that you stay in compliance with all regulations for childcare centers.
   
   You also need to determine which rooms will be best for each age level with your current enrollment. The law states that each child must have _______ ft² of indoor space.
   
   The first room is a rectangular shape. Find the area.
   
   ![Rectangular Room Diagram]
   
   The area for this room is ________ ft².
   
   How many children could be in this room? ________

2. Another room was a large bedroom. It is 15 feet by 25 feet. Find the area of this room.
   
   ![Large Bedroom Diagram]
   
   The area for this room is ________ ft².
   
   How many children could be in this room? ________

3. There is also a garage that has been converted into living space. It is 15 feet by 32 feet.
   
   ![Garage Diagram]
   
   What is the area of this room? ________ ft²
   
   How many children could be in this room? ________

4. You plan to add on an additional room for group times. Your best space would be a trapezoid.
   
   ![Trapezoidal Room Diagram]
   
   What is the area of the trapezoidal room? ________ ft²
   
   How many children could be in this room? ________
   
   What is the total area of the childcare center? ________

5. The last thing to consider for your center is a fenced in play area.
   
   a. Find the amount of fencing needed ________
   
   b. If the fencing cost $15/ft² installed. What are you going to pay to have this area fenced in? ________
   
   c. Find the area inside the fence ________
What Contextualization Means?

Contextualizing material simply means connecting college curriculum to students’ real lives. When we contextualize material, we allow students’ to utilize their own rich knowledge and skills as a foundation to learn new knowledge and skills.

Contextualized learning relates instructional content to the specific contexts of learners’ lives and interests, and increases the motivation to learn.
DMA 020  
Balance Checkbook Project  
Working with Decimals  

Using the following bank account actions and amounts find the balance of the checking account after each activity. Your assignment is to post the actions and amounts into the correct columns in the check book register attached. Then compute and record the correct balance amounts in the check book register. The beginning balance of $469.28 and first action Deposit Paycheck of $245.30 has been recorded for you. Finish recording the remaining actions and amounts then find the balance.

<table>
<thead>
<tr>
<th>ACTIONS</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check #1450 to Scholastic Books</td>
<td>$425.00</td>
</tr>
<tr>
<td>Check #1451 to Substitute Teacher</td>
<td>$189.49</td>
</tr>
<tr>
<td>Debit Card Transaction to UNCC for workshop</td>
<td>$136.21</td>
</tr>
<tr>
<td>Check #1452 to ABC Catalog for Art Supplies</td>
<td>$157.43</td>
</tr>
<tr>
<td>Deposit from the State</td>
<td>$346.81</td>
</tr>
<tr>
<td>Debit Card Transaction to Wal-Mart for Cleaning Supplies</td>
<td>$85.27</td>
</tr>
<tr>
<td>Check #1453 to Get Oven fixed in the Kitchen</td>
<td>$197.25</td>
</tr>
<tr>
<td>Deposit Money from Fundraiser</td>
<td>$157.89</td>
</tr>
<tr>
<td>Check #1454 to CPCC for Tuition Costs</td>
<td>$436.75</td>
</tr>
<tr>
<td>Deposit Check from Smart Start</td>
<td>$380.74</td>
</tr>
<tr>
<td>Debit Card Transaction supplies for Parent Night</td>
<td>$135.42</td>
</tr>
<tr>
<td>Deposit Check from Target for fundraiser</td>
<td>$273.69</td>
</tr>
<tr>
<td>Debit Card Transaction to Exxon for Gas for Van</td>
<td>$54.99</td>
</tr>
<tr>
<td>Check # 1455 to Kinko’s for printing</td>
<td>$67.95</td>
</tr>
<tr>
<td>Check # 1456 to Exterminator</td>
<td>$52.38</td>
</tr>
<tr>
<td>Deposit State Funds</td>
<td>$549.18</td>
</tr>
<tr>
<td>Debit Card Transaction for Vehicle Insurance on the Van</td>
<td>$126.89</td>
</tr>
<tr>
<td>Check # 1457 to Staples for New Teachers Desks</td>
<td>$297.58</td>
</tr>
<tr>
<td>Debit Card Transaction for Classroom Rewards</td>
<td>$12.99</td>
</tr>
<tr>
<td>Check #1458 to Postage</td>
<td>$40.00</td>
</tr>
</tbody>
</table>
**Advantages of Contextualization**

- When students feel confident about their own knowledge and skills, they are much more relaxed and receptive to learning new knowledge and skills.

- The curriculum becomes meaningful to students and they see how this is not “just another class to pass.” Instead, they begin to realize that they are learning relevant, useful skills that they will utilize in their everyday lives.

- Contextualization is application oriented and learner centered.

- Contextualization can allow you to show explicit purposes. Ex: “if you learn this, you can then do this.”

- Subject matter is not isolated, but is actually applied to real life issues.

- When an instructor contextualizes the curriculum, he/she can make broad and easy connections among disciplines.
Section 2.8 Introductions to Decimals

Complete the table below.
Write Decimals as Fractions

<table>
<thead>
<tr>
<th>Decimal</th>
<th>In words</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7</td>
<td>seven tenths</td>
<td>$$\frac{7}{10}$$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.51</td>
<td>fifty-one hundredths</td>
<td>$$\frac{51}{100}$$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.009</td>
<td>nine thousandths</td>
<td>$$\frac{9}{1000}$$</td>
<td></td>
<td></td>
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<tr>
<td>0.505</td>
<td></td>
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Discuss how to write a check.
The Kit Center has run out of the kitchen. Write a check to the contractor for $5,521.69.

Your class raised money for new playground equipment. If your class raised $213.45, write a check for that amount to your director.

Practice: Rounding
Each child’s lunch cost approximately $3.15. Round that to the nearest dollar. If you have 15 students in your class, how much does your class pay for lunch total?

At Carmelina, the ride Thunder Road lasts 2.1667 minutes. Round this number to the nearest hundredths place.

The average height of a 4-year-old girl is 3.35 feet. Round to the nearest whole number.

You make $14,782.13, round to the nearest thousandths place.

Section 2.9 Adding and Subtracting Decimals

Word Problems
Give students a checkbook balance sheet and have them balance it.

We started out with $345.83. You went to the grocery store and spent $65.55. Then you went shopping and spent $98.96. Yeah, it’s payday. You got a check for $678.11. Then you pay rent which is $385 and your car payment of $187.65. How much do you still have in your checking account?

<table>
<thead>
<tr>
<th>Check Number</th>
<th>Description of Action</th>
<th>Debit (+)</th>
<th>Credit (-)</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beginning Balance</td>
<td>$345.83</td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td></td>
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</tbody>
</table>

I looked in two different catalogs to buy Base 10 blocks for the class. Catalog A had them for $29.30. Catalog B had them for $28.95. How much more did Catalog A want than Catalog B?

You are ordering books from Scholastic’s Flyers Catalog. The books you plan to buy cost $9.95, $5.25, and $12.95. How much do you owe Scholastic?

You are going on a field trip. You originally thought all the children were going on the trip and you paid the Lazy 5 Ranch $596. However, 3 students got sick and could not go. You only needed to pay $568.55. How much money should you get back?

The chart below shows the average Gas Price in North Carolina as of 3/23/07.

You can see the average price dropped from 2.66 in December to 2.55 in January, then dropped to 2.25 in February. How did the gas price change over time?

<table>
<thead>
<tr>
<th>North Carolina</th>
<th>US average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Today</td>
<td>2.95</td>
</tr>
<tr>
<td>Yesterday</td>
<td>2.93</td>
</tr>
<tr>
<td>One Week Ago</td>
<td>2.44</td>
</tr>
<tr>
<td>One Month Ago</td>
<td>2.46</td>
</tr>
</tbody>
</table>

How much has the average gas price gone up in NC in one year? How much less is the average gas price today than the average gas price for the US? How much has the gas price jumped in one month?
“We prefer to be in a classroom of our peers”. For the EC population, this typically comprises older students, many of whom have not been in school for many years.

“We feel more comfortable being in class with students we see in our regular EC classes. Since the subject material is already intimidating, it helps to see familiar faces”.

“We learn more effectively in contextualized courses, as we are able to search for meaning in why we are taking the class and how it will impact our lives outside of the classroom”.

STUDENT SAYS...
Section 2.10 Multiplying Decimals and Circumference of a Circle

Example
There were approximately 17 thousand children in the More At Four Program last year. Write that number in standard notation.
17 thousand = 17,000

In 1998 approximately 13.5 million children lived in poverty. Write that number in standard form.

Solve.
An assistant teacher worked 40 hours last week. Calculate her pay before taxes for last week if her hourly wage is $12.50.

An electrician comes to the Star Center to fix the wiring in the entrance way. If he charges $28.45 per hour and worked 4 hours, calculate how much the center had to pay him for these services.

Circumference:
Find the circumference of a kickball whose radius is 10 inches.

What is the circumference of a classroom globe that has a diameter of 16 inches?
JMA Module 2

Section 2.1 Introduction to Fractions and Mixed Numbers

1) Draw and shade a part of a diagram to represent the fraction.
   \[
   \frac{2}{7}
   \]

2) Of the 181 children at the Learning Center, 42 are 2 years old. What is the fraction of children that are 2 years old?

3) Of the 88 children at the ABC center, 32 are Hispanic. What is the fraction of the children that are Hispanic?
   
   How many children are non-Hispanic?
   
   What is the fraction of children that are non-Hispanic?

4) In the 8 year old classroom there are 18 children. 7 of them are girls and 11 of them are boys. What fraction of the class is boys?

Simplify the following fractions:

- \[\frac{12}{12}\]
- \[\frac{3}{3}\]
- \[\frac{5}{6}\]

Write the fraction in two other equivalent ways by inserting the negative sign in different places.

\[-\frac{15}{6} = \]

Sections 2.2 Factors and Simplest Form

Write the prime factorization of each number.

12
63
128

Write each fraction in simplest form.

A teacher at the Kid’s Center works a 10 hour shift. She gets two one hour breaks each day. What fraction of the teacher’s work shift is represented by these 2 hours?

Sixteen out of the total 34 students in the pre-K classrooms at the Sunshine Center have qualified for free tuition. What fraction of the pre-K children receives free tuition?

Out of the $79,000 that is budgeted for teacher’s pay, the lead teachers receive $54,000. What is the fraction of the budget that is paid to the lead teachers?

Of the 12 teachers at the Little center, 8 of them have their associate’s degrees in Early Childhood Education. What is the fraction that has their degree?
CHALLENGES

- It is not always easy to contextualize curriculum unless you are familiar with both disciplines.

- Contextualization is time-consuming. It may actually require an instructor to re-do every lesson plan and class assignment he or she previously utilized. It is not for the faint-hearted. 😊
Section 2.3 Multiplying and Dividing Fractions

Solve the following problems.

\[
\left(\frac{3}{5}\right) \left(\frac{2}{3}\right) = \frac{6}{15} = \frac{2}{5}
\]

The budget for Head start programs was 200 million dollars. If there are budget cuts, the government will take back \(\frac{1}{3}\) of the budget. Find the approximate amount of money that will be cut from the current budget.

A new childcare center is opening in Gastonia. The director decides to advertise that for the first month, the tuition will be decreased by \(\frac{1}{2}\) of the regular tuition. If the regular tuition is $545, what is the sale price?

In 2012, a center had a budget of $425,000 for the year. They budgeted that art supplies would account for \(\frac{3}{8}\) of the budget. How much money is budgeted for art supplies?

A recipe for play dough calls for \(\frac{1}{2}\) cup of salt. If I want to make 5 batches of play dough, how much salt will I need?

A recipe for play dough calls for \(\frac{1}{2}\) cup of salt. How much salt should be used if only \(\frac{3}{4}\) of the recipe is being made?

A child should only get \(\frac{1}{4}\) of his calories at lunch. If he can have 2000 calories a day, how many calories can he eat at lunch?

Sec. 2.4 Adding and Subtracting Like Fractions, Least Common Denominator

For a Thanksgiving Day celebration, you are making vegetable soup with your class. The recipe calls for \(\frac{1}{4}\) teaspoon of salt and then later another \(\frac{1}{2}\) teaspoon of salt. How much salt did you add to the soup altogether?

In your preschool, \(\frac{11}{16}\) of the classes have 1 special needs child. \(\frac{3}{16}\) of the classes have at least 2 special needs children. What is the fraction of classes that have at least 1 special needs child in their class?

By the end of TK, you want at least \(\frac{5}{6}\) of your students to be able to identify all the letters of the alphabet. If \(\frac{2}{6}\) of your students have already met this goal, how many more need to learn them to reach the goal?

When teachers take Advil, \(\frac{27}{21}\) use it for pain. Of those teachers, \(\frac{12}{21}\) take it because of a headache. What fraction shows the teachers that take Advil for something other than a headache?

If we are going on a field trip to the Columbia Zoo, we have traveled \(\frac{20}{25}\) of the trip. What fraction is left to travel?

I read \(\frac{1}{5}\) of a book on Monday, \(\frac{2}{5}\) of the book on Wednesday, and \(\frac{3}{5}\) of the book on Friday. How much of the book have I read? Am I finished reading the book to the class? How much is left?
Example

MAT 140 – Early Childhood/Mortgage Loan Project

There are several things to consider when buying a house or a business. The following scenarios will help guide you through the important things that will be required to qualify for a loan.

Scenario 1: Cindy Smith earns $55,000 annually. She wants to open her own childcare center. She currently has an older car that will be paid off in half a year with a payment of $247.27 per month and a new van for the center that still has a $1,000 car payment at $354 per month. She has no other debt obligations. Assuming she has $55,000 to cover the down payment and the extra money for closing costs, can she afford an $115,000 home outside Charlotte to start her own childcare center? If the loan she chooses has an interest rate of 5.7% for 30 years?

- a) At closing she can estimate her costs to be 1% of the loan amount. These costs include a fee for surveying and a loan origination fee paid to the bank. How much would her closing costs be? (She has extra money to cover these costs.)

- b) Look at the down payment and the price of the house. PMI is approximately $400/yr. You are required to carry this insurance if you do not pay 20% down. Does Ms. Cindy need PMI insurance?

- c) The combined City/County tax rate in Mecklenburg County is $1.2566/$100 of assessed value (not newest data). For the county, if the house is not within Charlotte city limits, the rate is $0.8368/$100 of assessed value.

- a. What is her tax rate per month?

- b. You will need to purchase homeowners insurance at about 0.2% of the selling price per six months. What is her insurance amount per month?

In addition, she must qualify for a loan. When a financial institution reviews a mortgage application, it usually follows some basic guidelines in determining how large a mortgage to grant:

- e) Principal and interest(Payment), taxes, and insurance(PITI) should not exceed 28% of monthly gross income before tax income:

  - a. Based on her loan choice of 6.5% interest for 15 years, her monthly payment is $731.11.
  - b. What is her monthly PITI? 
  - c. What is 28% of her monthly gross income?

- f) PITI plus other long term debt should not exceed 36% of the monthly gross income. (Long term debt includes any debt that will take more than 10 months to pay off. Such as a car loan, installment loans, alimony, child support, and balances on credit or charge cards):

  - a. What is her monthly PITI plus her long term debt?
  - b. What is 36% of her monthly gross income?

- g) The house price (including down payment) should not exceed 2.5 times your annual gross income.

  - a. What is 2.5 times her annual gross income?
  - b. Is the house price less than part a?

Did Ms. Cindy qualify to buy this home and begin her childcare center?

Scenario B: Cathy Greene earns $65,000 annually. She also wants to open a childcare center. She has a car payment of $217 per month, credit card debt for needs for the opening of the childcare facility of $275 per month for 3 years, and since she just completed school she has a student loan of $250 per month for 5 years. Assuming she has $10,000 to cover the down payment, can Cathy afford a $125,000 in Charlotte with an interest rate of 5.6% for 15 years?

- a) At closing she can estimate her costs to be 1% of the loan amount. These costs include a fee for surveying and a loan origination fee paid to the bank. How much would her closing costs be? (She has extra money to cover these costs.)

- b) Look at the down payment and the price of the house. PMI is approximately $400/yr. You are required to carry this insurance if you do not pay 20% down.

- a. Does Ms. Cathy need PMI insurance?

- c) The combined City/County tax rate in Mecklenburg County is $1.2566/$100 of assessed value (not newest data). For the county, if the house is not within Charlotte city limits, the rate is $0.8368/$100 of assessed value.

- a. What is her tax rate per month?

- b. You will need to purchase homeowners insurance at about 0.24% of the selling price per six months. What is her insurance amount per month?

In addition she must qualify for a loan. When a financial institution reviews a mortgage application, it usually follows some basic guidelines in determining how large a mortgage to grant:

- e) Principal and interest(Payment), taxes, and insurance(PITI) should not exceed 28% of monthly gross income before tax income:

  - c. Based on her loan choice of 6.5% interest for 15 years, her monthly payment is $500.77
  - d. What is her monthly PITI? 
  - e. What is 28% of her monthly gross income?

- f) PITI plus other long term debt should not exceed 36% of the monthly gross income. (Long term debt includes any debt that will take more than 10 months to pay off. Such as a car loan, installment loans, alimony, child support, and balances on credit or charge cards):

  - f. What is her monthly PITI plus her long term debt?
  - g. What is 36% of her monthly gross income?

- g) The house price (including down payment) should not exceed 2.5 times your annual gross income

  - h. What is 2.5 times her annual gross income?
  - i. Is the house price less than part a?

Did Ms. Cathy qualify to buy this home and begin her childcare center?

List at least one thing that you found interesting or learned from completing this project.
Example

MAT 140 - Early Childhood Project

Ratios and Proportions

In this project, you will setup a toddler classroom. The classroom dimensions are 24 feet by 24 feet. In this classroom you will need to have the following items with the correct dimensions.

1 table (5 ft x 3.5 ft x 2 ft)
5 tables (2 ft x 2 ft x 2 ft)
6 Shelves (1.5 ft x 3 ft)
1 set of cubbies (1.5 ft x 6 ft x 8 ft)
Book shelf for a reading area (1 ft x 3 ft x 3 ft)
Changing table (3 ft x 1.5 ft)
Sink and counter (1.5 ft x 6 ft)
Supply closet (1.5 ft x 3 ft)
Bathroom (5 ft x 6 ft)

Need space for 12 kid mats for napping (2 ft x 4 ft)

For this project, you will be making a model of how you would setup this classroom. You will use ratios and proportions to downsize your classroom. You can be creative in how you want to present your project. You may use poster board, computer layouts, construction paper, etc. However, make sure the scale that you choose is consistent for all your measurements in this project. For example 1 in = 5 feet. Also make sure that it is neat and all items are labeled correctly.

Rubric:

Follows directions and includes all items from the list above 25%
Uses correct scale for all items 50%
Neatness and Organization 25%

Total 100%
Questions?

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