Contexts in Mathematics Teaching- Why and How?

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Contexts in Mathematics Teaching

What is our purpose in using contexts for teaching mathematics?

NCF 2005

- Mathematical concepts can be represented in multiple ways..(pg 39)
- Children learn better when pictures and constructions provide proof for the operations they are doing on numbers.(pg 39)
- Modelling situations using quantities, shapes and forms is the best use of mathematics. Such representation aid visualization and reasoning, clarify essentials, help us discard irrelevant information

Contexts in Mathematics Teaching

- Can you give examples of contexts in real life where students do better mathematics than in classroom?

- Why are they better in these contexts as compared to mathematics classroom?

Contexts in Mathematics Teaching

- How can we use contexts to develop mathematics using students' own reasons?
- What do we need to know to develop mathematics in this way?
  - Know how students of particular age think, common misconceptions/errors
  - Know which contexts they are familiar with
  - Develop and design contexts in which mathematics can make sense to students
  - Use contexts where we not just introduce maths but develop it through mathematization

Mathematization of childs thought

- Students perform actions while doing activity
- Students are able to translate their actions into mathematical language
- Students explore activity through variations possible within the activity and explore mathematics related to it.
- Students make observations/conjectures
- Conjectures lead to verification/generalization

Fraction wheel Activity

- What teacher needs to think and plan before doing this activity in class?
- What concepts student should know before doing this activity?
- What should a teacher do with students responses?
- What other questions can be asked after this activity?
- What mathematics students can learn by doing this activity?

FRACTION CHART

1UNIT										
										$\frac{1}{2}$ $\frac{2}{2}$
								$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{3}$
							$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$
						$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$
					$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	$\frac{6}{6}$
				$\frac{1}{7}$	$\frac{2}{7}$	$\frac{3}{7}$	$\frac{4}{7}$	$\frac{5}{7}$	$\frac{6}{7}$	$\frac{7}{7}$
			$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{4}{8}$	$\frac{5}{8}$	$\frac{6}{8}$	$\frac{7}{8}$	$\frac{8}{8}$
		$\frac{1}{9}$	$\frac{2}{9}$	$\frac{3}{9}$	$\frac{4}{9}$	$\frac{5}{9}$	$\frac{6}{9}$	$\frac{7}{9}$	$\frac{8}{9}$	$\frac{9}{9}$
	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{8}{10}$	$\frac{9}{10}$	$\frac{10}{10}$
$\frac{1}{11}$	$\frac{2}{11}$	$\frac{3}{11}$	$\frac{4}{11}$	$\frac{5}{11}$	$\frac{6}{11}$	$\frac{7}{11}$	$\frac{8}{11}$	$\frac{9}{11}$	$\frac{10}{11}$	$\frac{11}{11}$
$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$ $\frac{12}{12}$

Fraction Chart

- What are the different ways you can think of for using this fraction chart to develop concepts related to fraction?
- Using Fraction Chart students can
  - Represent Unit fractions
  - Represent Composite fractions
  - Compare fractions magnitude
  - Generalize that size of fraction becomes smaller as number of pieces increase.
  - Find equivalent fractions
  - Compare composite fractions with 1/2

Context for developing measure meaning of fraction

Context to develop sharing meaning of fraction

Example of student reasoning using contexts

- Comparison of fractions with the same denominator:
  - As the number of children to share the chapaties are same, children from the group with more number of cakes get bigger share.
  - As the unit piece is same in both the fractions more number of pieces represents the bigger fraction.

Student Responses : Equivalent fractions to half

- 8/16 is equal to ½ because 8 X 2 =16
- 8/16 equal to ½ because *16 parts banaye hai aur adhe shade kare hai.*
- *2 Rs me se 1 Rs kharch kiya toh ½ kharch kiya*
- *Paper folding activity to show equivalent fractions allowed students to check if 2/4 is equal to 1/2.*

Student Responses : Equivalent fractions to half

- *Teachers question: 3/4= 6/8 = ---/16*
- *Responses from students : 12/16 , 8/16*
- *Both students asked to explain their answer*
- *12/16: 8X2 =16 isliye 6 X 2 =12*
- *Teacher used the strip used in paper folding to convince second student that his answer is equal to ½ and not ¾. Student was able to relate how 12/16 is equal to ¾ and 6/8.*

Another context

Marks: 40/100 understood as 40 marks out of 100 marks.

Some questions to ponder

- What possibilities does a context offers for doing and understanding mathematics?
- In what way does the context help students overcome the common misconceptions/ errors related to the concept?
- How comfortable are students while working with a context?
- Is more than one context needed to get deeper understanding of the concept?
- When and how rules should be introduced to students?