What Children's Sharing can Teach us about their Understanding of Rational Numbers

Presented By:

Cate Gulyas, Zack Hawes & Shauna Kochen

Background Information

There is little research on young children's understanding of division

The limited research on this topic looks at division of whole numbers (e.g., 4 brownies shared with 2 children)

There is very little research on rational number understanding (e.g., 4 brownies shared with 3 children)

Children (and even adults) have a difficult time understanding rational numbers (Chen, 1999; Charles & Nason, 2000)

Educators have stated that the learning of fractions is one of the most serious obstacles to the mathematical maturation of children (Charles & Nason, 2000)

Some researchers even suggest that teaching fractions should be eliminated from the primary mathematics curriculum (Watanbe, 2001)

Background Information

Evidence suggests that children come to school with an intuitive understanding of equal sharing

Children as young as 3 can demonstrate an understanding of division through sharing activities (e.g., 4 brownies shared with 2 people) (Chen , 1999; Roberts, 2003)

Children's invented equal-sharing strategies lay the foundation for reasoning about equivalence by connecting ideas of

Measures: The Bobby Test

The Bobby Test:

Pre-test – Division of whole numbers

Concept of 1/2

Concept of 1/4 and 3/4

Concept of 1/3 and 2/3

Comparison Questions

Questions we asked:

Can you share the brownies fairly?

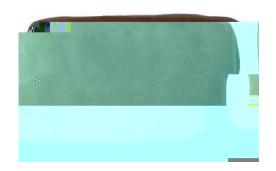
How much did everyone get?

Is it actually fair?

Does everyone get more or less than a whole/half?

Measures: Materials

Brownie



Children

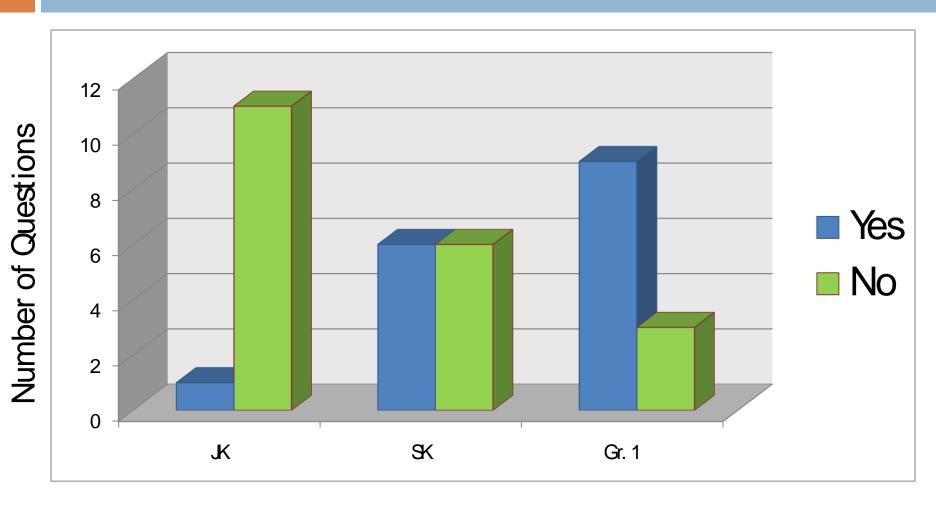








Findings: Overall Concept of Sharing With Rational Numbers



Grade

Findings: JK

Underdeveloped number sense
Focused on number of pieces, not size
Unsure of what to do with remainders
Disconnect between what they said and did
Emerging understanding of a half

Findings: SK

- Good number sense
- Starting to grasp that size matters, not just the number of pieces
- Sometimes required prompting to deal with remainders
- Understand the difference between a half and a whole
- Used the term "half" but over generalize it
- Relied on halving strategy
- No concept of 1/3 and 2/3
- Difficulty approaching problems with big numbers

Findings: Grade 1

Focus shifted from the number of pieces to the size

Solid concept of a half and "half of a half"

Used the term "half" & "quarter" but over generalized it

Sometimes required prompting to deal with remainders

Understand that ¼ and 1/3 are less than a half, and that
¾ and 2/3 are more than a half

More flexible in their approaches

Conclusion

Developmental progression from JK to SK to Grade 1

- Language used
- Understanding the importance of size (not just quantity)
- Dealing with remainders
- Dealing with big numbers
- Understanding the concept of ½, ¼, and 1/3
- Young children demonstrate an emerging understanding of rational numbers through sharing
- They lack the language to explain their thinking
- They are able to show but not tell
- Manipulatives and context help elicit their understanding

ications

References

Charles, K., & Nason, R. (2000). Young children's partitioning strategies. **Educational Studies in Mathematics**, **43 (2)**, 191-221. Chen, P.-C. (1999). Early understanding of rational numbers: Sharing

and proportional reasoning. **Dissertation:,...**

