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

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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 ½

    Concept of ¼ and ¾

    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?

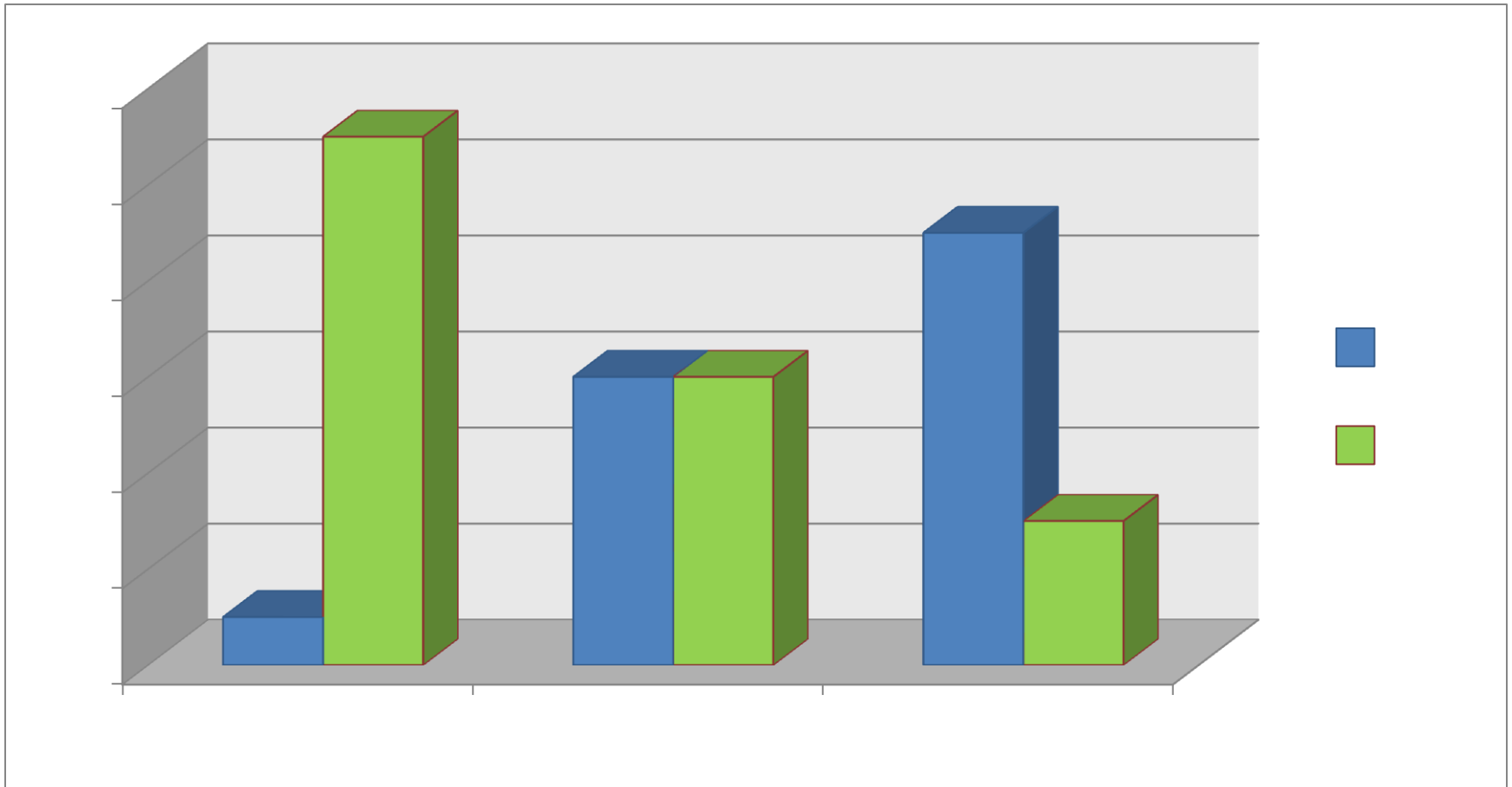   Does everyone get more or less than a whole/half?

Measures: Materials

Brownie

Children

Findings: Overall Concept of Sharing With Rational Numbers

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

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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 :,…**