

STUDENT ACTIONS WHEN COMPARING FRACTIONS

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PROBLEM/ISSUE

Teachers are teaching using one modality, but students don't necessarily learn in the same modality as teacher instruction. We want to know how instruction modality impacts student performance based on student learning modality.

- MODALITY=LEARNING STYLE

LITERATURE REVIEW

- Main Ideas:
 - Teachers should provide a multitude of learning opportunities, but shouldn't categorize learners (*T.L. Adams, 2012*)
 - Students most often use a multitude of multiple intelligences. (*T.L. Adams, 2012*)
 - A majority of previous research believed modalities should be a major consideration of instruction. (*Forness & Kavale, 1987*)
 - Future studies should look in detail at the mathematical content to determine more specifically how mathematical concepts are conveyed. (*Flevaras & Perry, 2001*)
- Many of the studies focused on how teaching modality affected test scores. We are focusing on the strategy students use to solve the problem.



PURPOSE OF THE STUDY

- The purpose of this study is to explore and describe the relationship between students' learning style preference and problem solving representations after engaging in visual and kinesthetic modes of teaching an introductory lesson on fraction comparison.



RESEARCH QUESTIONS

- How do third-graders choose to represent their solution representations to compare fractions after engaging in learning activities taught using kinesthetic and visual modalities?
- What kind of relationships exist among third-grader learning style preference, third-grader choice of solution representation, and teaching modality?



PARTICIPANTS

- Third grade classroom of 19 students (8-9 year olds)
- Local Primary School
- Suburban District
- 700 students, 100 staff members



DESIGN OF STUDY

Qualitative Research Methods

- Provides us with details about human behavior
- Takes some form of naturalistic observation
- Following data collection, we want to look for trends in the data.

METHODS OF DATA COLLECTION

1. Modality Test: 16 Questions www.schoolonwheels.org/pdfs/3121/Learning-Styles.pdf

Question 1

When you study for a test, would you rather

- a) read notes, read headings in a book, and look at diagrams and illustrations.
- b) have someone ask you questions, or repeat facts silently to yourself.
- c) write things out on index cards and make models or diagrams.

Question 2

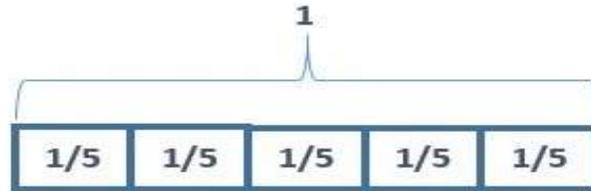
Which of these do you do when you listen to music?

- a) daydream (see things that go with the music)
- b) hum along
- c) move with the music, tap your foot, etc.

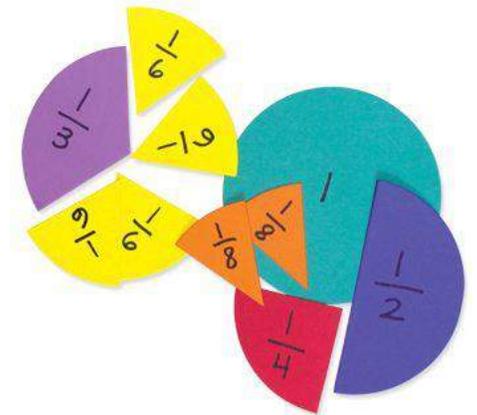
METHODS OF DATA COLLECTION

2. Observations from teaching episode

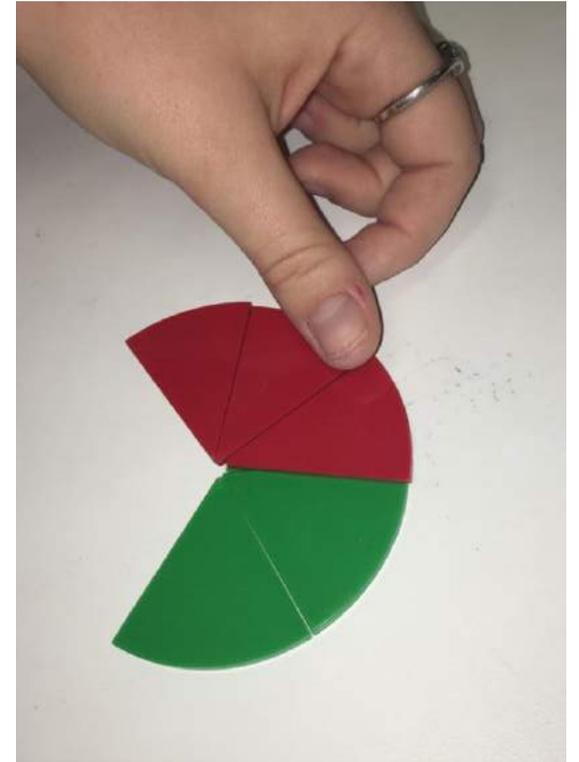
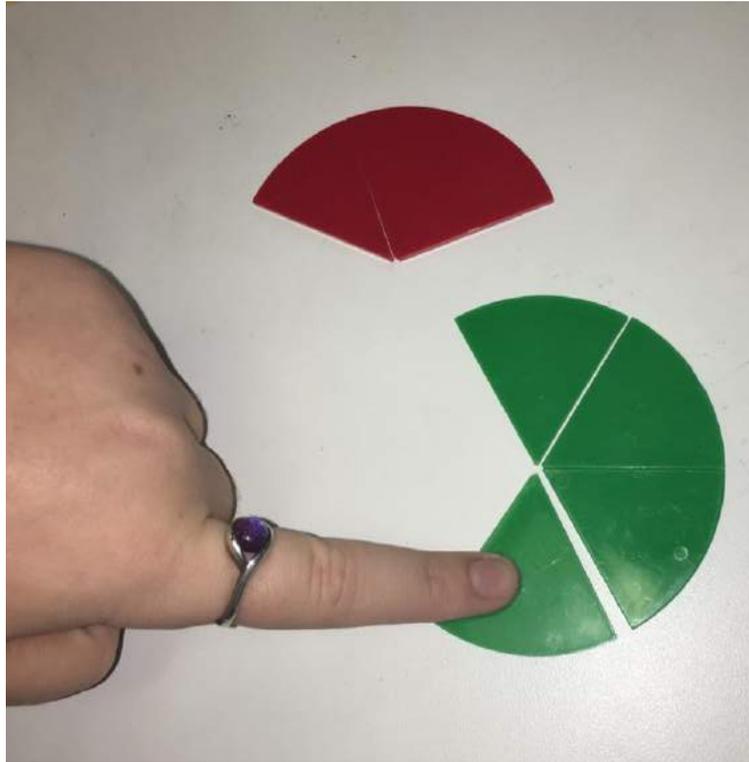
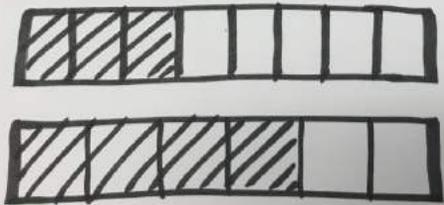
- Between the modality test and the fraction assessment
- Stephanie taught a visual strategy for comparing fractions
 - Fraction strips/ Tape diagrams



- Megan taught a kinesthetic strategy for comparing fractions
 - Pie manipulatives



$$\frac{3}{8} < \frac{5}{6}$$



METHODS OF DATA COLLECTION

3. Fraction Assessment: 4 Questions

1. Circle which fraction is **bigger**.

$$\frac{4}{7}$$

$$\frac{5}{7}$$

How do you know?

2. Circle which fraction is **smaller**.

$$\frac{3}{5}$$

$$\frac{2}{5}$$

$$\frac{2}{4}$$

How do you know?

DATA ANALYSIS

Organization of Data:

Student	A	B	C	% Visual	% Auditory	% Kinesthetic	Fraction Strips	Pie Manipulatives
h	5	6	5	31.25%	37.50%	31.25%	Yes	No
i	6	4	6	37.50%	25.00%	37.50%	No	Yes

RESEARCH QUESTION 1

HOW DO THIRD-GRADERS CHOOSE TO REPRESENT THEIR SOLUTION REPRESENTATIONS TO COMPARE FRACTIONS AFTER ENGAGING IN LEARNING ACTIVITIES TAUGHT USING KINESTHETIC AND VISUAL MODALITIES?

- Only 3 students used the pie manipulatives on the assessment.

Student	A	B	C	% Visual	% Auditory	% Kinesthetic	Fraction Strips	Pie Manipulatives
i	6	4	6	37.50%	25.00%	37.50%	No	Yes
m	6	2	8	37.50%	12.50%	50.00%	No	Yes
o	3	6	7	18.75%	37.50%	43.75%	No	Yes

RESEARCH QUESTION 1

HOW DO THIRD-GRADERS CHOOSE TO REPRESENT THEIR SOLUTION REPRESENTATIONS TO COMPARE FRACTIONS AFTER ENGAGING IN LEARNING ACTIVITIES TAUGHT USING KINESTHETIC AND VISUAL MODALITIES?

- The students with the highest kinesthetic percentages did NOT use the pie manipulatives.

Student	A	B	C	% Visual	% Auditory	% Kinesthetic	Fraction Strips	Pie Manipulatives
d	3	4	9	18.75%	25.00%	56.25%	Yes	No
e	5	1	10	31.25%	6.25%	62.50%	Yes	No

RESEARCH QUESTION 1

HOW DO THIRD-GRADERS CHOOSE TO REPRESENT THEIR SOLUTION REPRESENTATIONS TO COMPARE FRACTIONS AFTER ENGAGING IN LEARNING ACTIVITIES TAUGHT USING KINESTHETIC AND VISUAL MODALITIES?

RESEARCH QUESTION 2

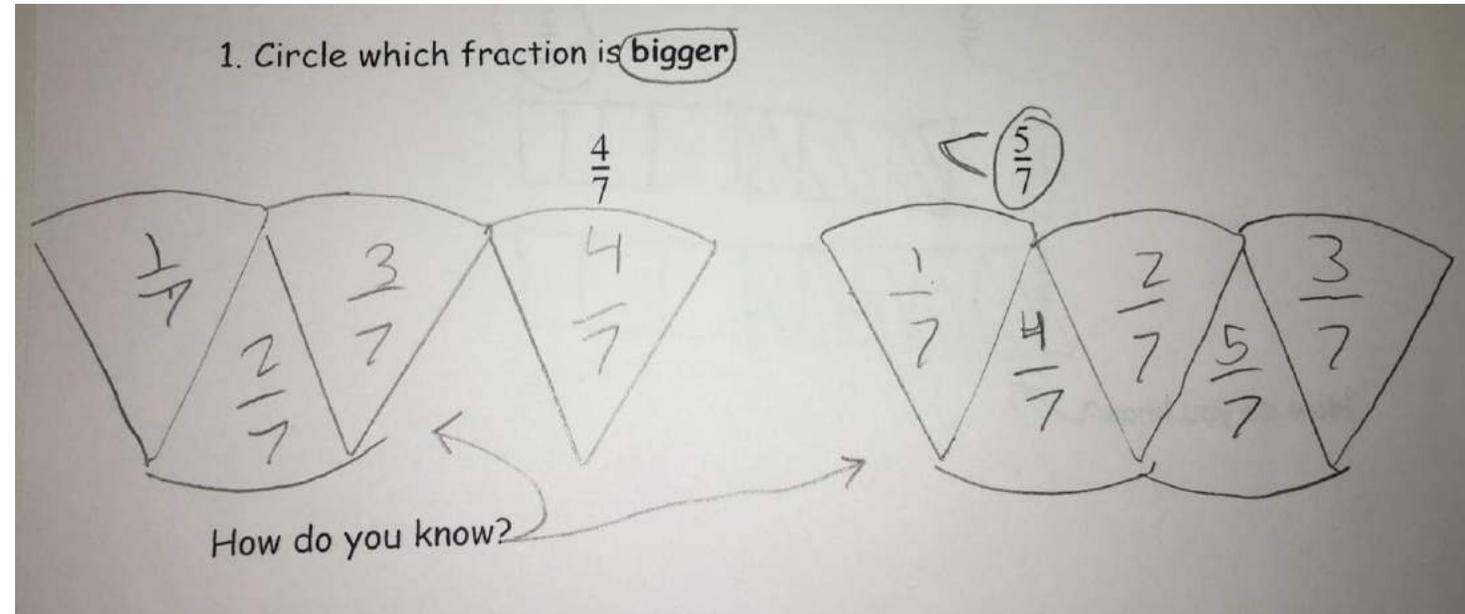
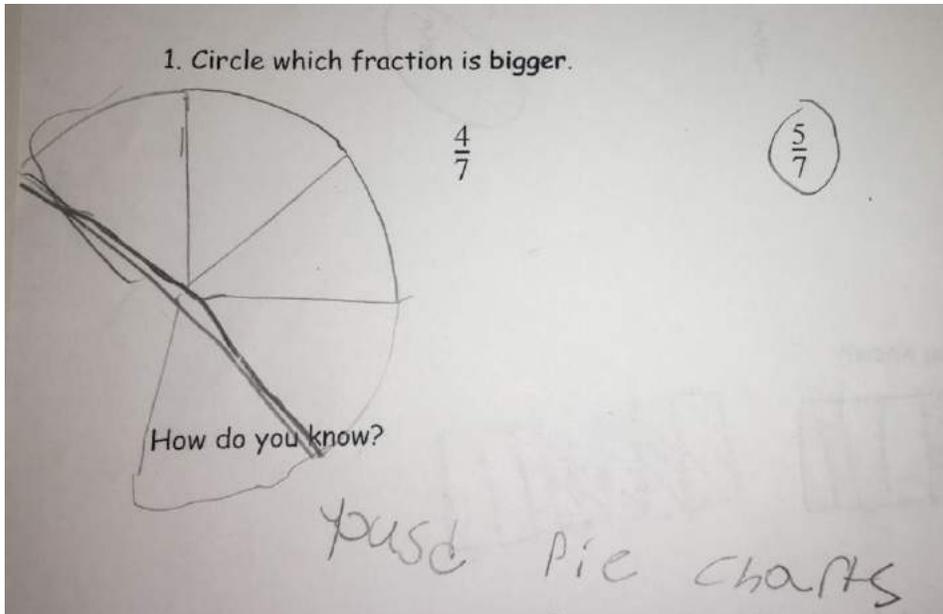
WHAT IS THE RELATIONSHIP AMONG THIRD-GRADER LEARNING STYLE PREFERENCE, THIRD-GRADER CHOICE OF SOLUTION REPRESENTATION, AND TEACHING MODALITY?

- Students who scored the same percentages for Visual, Auditory, and Kinesthetic sometimes used different methods.

Student	A	B	C	% Visual	% Auditory	% Kinesthetic	Fraction Strips	Pie Manipulatives
c	6	2	8	37.50%	12.50%	50.00%	Yes	No
m	6	2	8	37.50%	12.50%	50.00%	No	Yes

IMPORTANT OBSERVATIONS

- The students that chose to use the manipulatives on the assessment tried to trace them to show their work.





IMPORTANT OBSERVATIONS

- Students had a difficult time using the manipulatives.
 - “I don’t know how to use paperclips!”
- 2 out of the 3 students who initially used the pie manipulatives switched to using the fraction strips when they realized tracing the pies was taking too long.
- Bruner’s Theory of Representation
 - 8-9 year-olds are in the symbolic stage of cognitive representation



LIMITATIONS

- Accessibility of manipulatives
- Small sample size
- Students are taught to be efficient



RECOMMENDATIONS FOR FUTURE RESEARCH

- Use a larger sample size and more grade levels.
- Try a different topic with different manipulatives and solving strategies.
- Make manipulatives more convenient/accessible to see if students are more inclined to use them.



RESEARCH QUESTION 1

HOW DO THIRD-GRADERS CHOOSE TO REPRESENT THEIR SOLUTION REPRESENTATIONS TO COMPARE FRACTIONS AFTER ENGAGING IN LEARNING ACTIVITIES TAUGHT USING KINESTHETIC AND VISUAL MODALITIES?

Based on our research, most students preferred the visual method for solving math problems. Only 3 students attempted using the manipulatives.



RESEARCH QUESTION 2

WHAT IS THE RELATIONSHIP AMONG THIRD-GRADER LEARNING STYLE PREFERENCE, THIRD-GRADER CHOICE OF SOLUTION REPRESENTATION, AND TEACHING MODALITY?

We found that students learning style preference has virtually no impact on which strategy they choose because students are flexible and use a multitude of strategies to solve a problem.

SOURCES

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Modality Test:

www.schoolonwheels.org/pdfs/3121/Learning-Styles.pdf