



Students' Understanding of Equality & the Equal Sign

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Background Information

- Understanding of equality influences students' success in Algebra
- The equal sign is introduced in Elementary grades with little attention in Middle School and High School
- Elementary students have a weak concept of equality

Research Question

- How do Middle and High School students interpret the equal sign and equality in written task solutions?

Conceptual Foundation

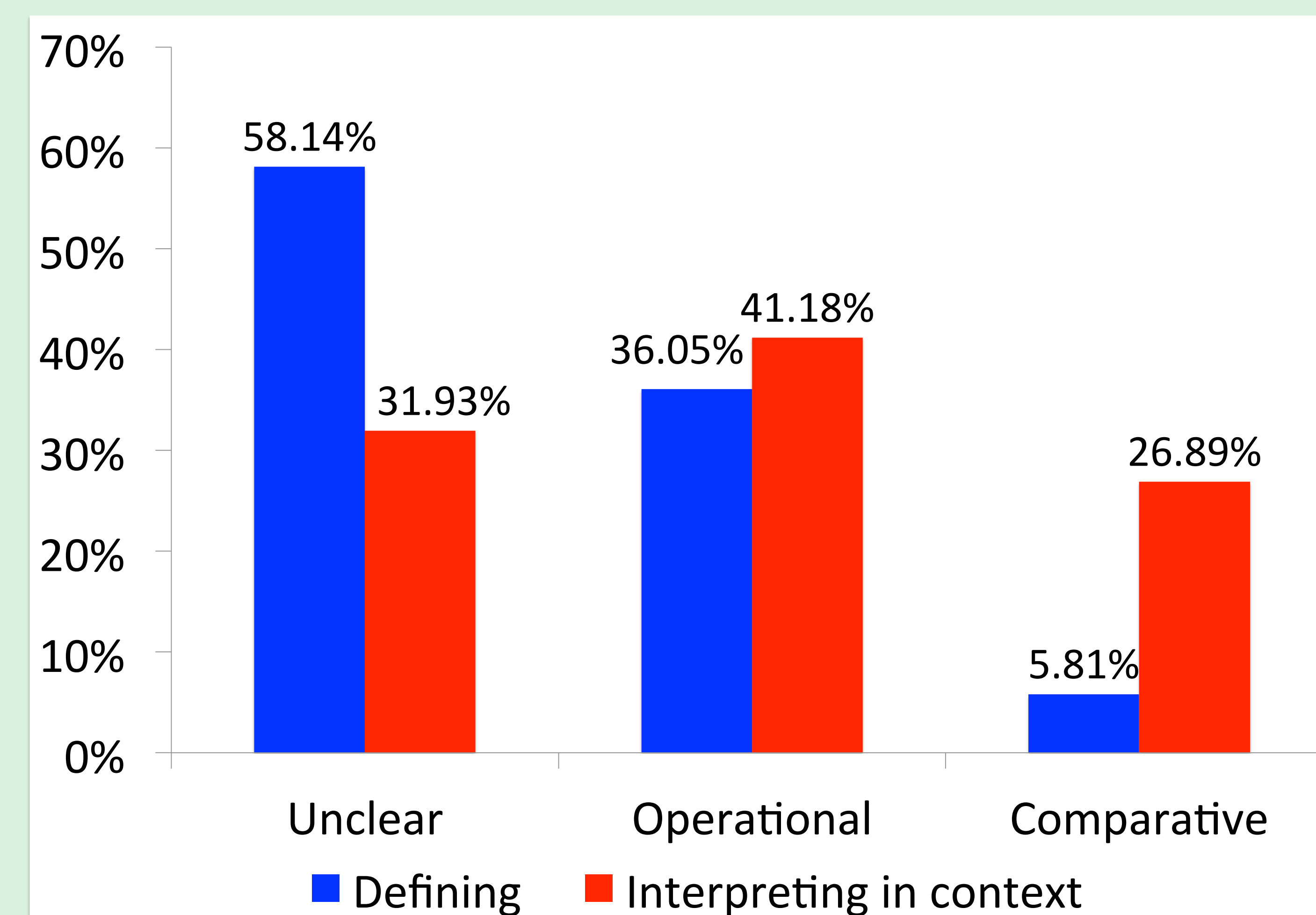
- Map of Knowledge of the equal sign (Matthews et al., 2012)
 - **Level 4** Comparative Relational
 - **Level 3** Comparative Computational
 - **Level 2** Flexible Operational
 - **Level 1** Rigid Operational

Methodology/Data Analysis

- Written survey (10 questions)
- 607 Students
 - 248 Middle School
 - 359 High School
- Developed task specific rubric (0-4 scale)
- Coded interpretations of equal sign in students' written solutions

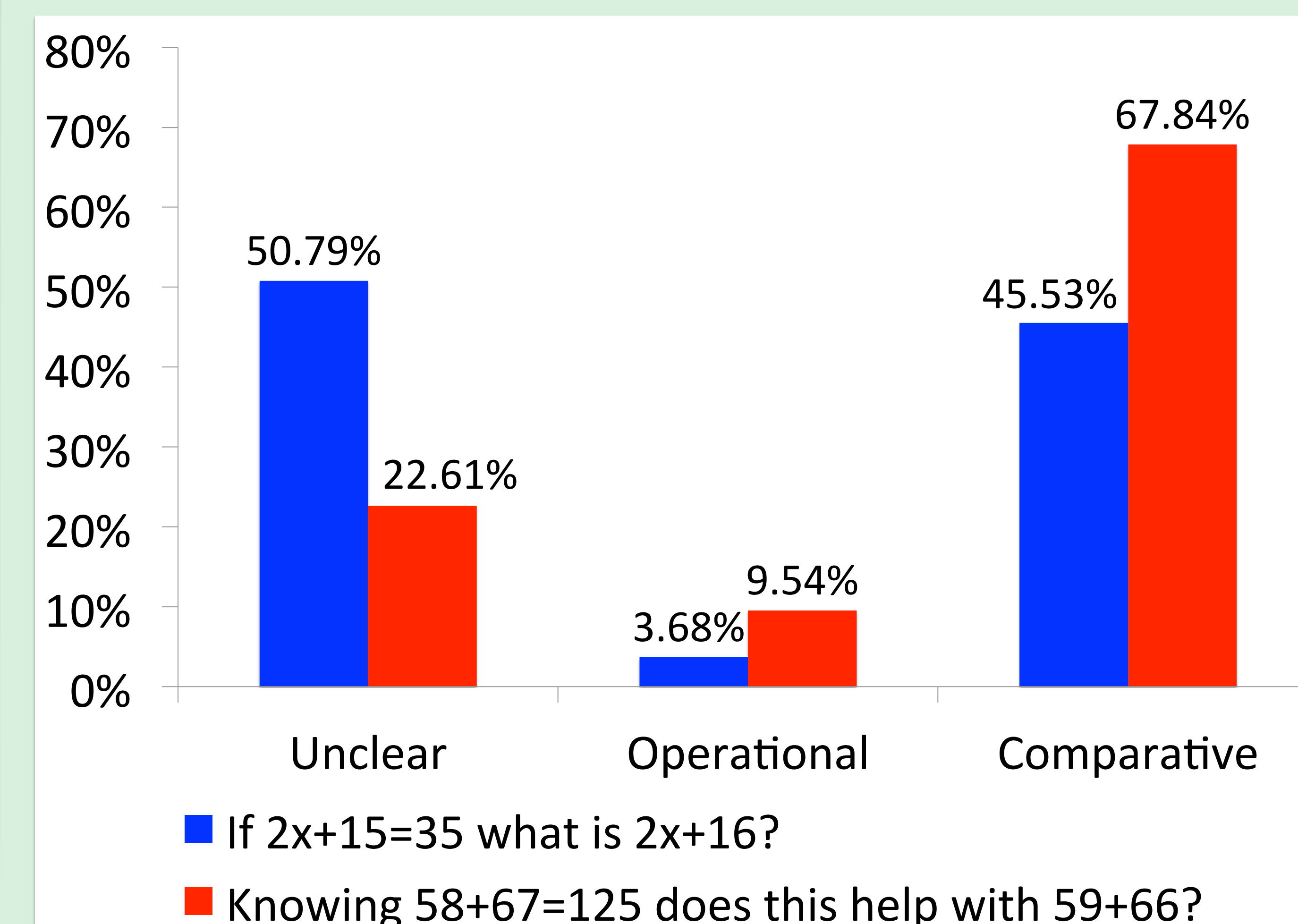
Selected Results

Interpreting the Equal Sign



- 58% of students had difficulty articulating the meaning of the equal sign
- Students predominantly define, and interpret the equal sign in context operationally
- Significantly more students interpreted the equal sign comparatively in context than defined it comparatively ($z=10.26$, $p<0.05$)

Comparing Quantities



- Significantly fewer students interpreted the equal sign comparatively in the algebraic context than arithmetic context ($z= 7.79$, $p<0.05$)

Conclusion

- Students have limited understanding of the equal sign and the concept of equality
- Both Middle and High School teachers should foster students' understanding of the equal sign and equality

References

Matthews, P., Rittle-Johnson, B., McElدون, K., & Taylor, R. (2012). Measure for measure: what combining diverse measures reveals about children's understanding of the equal sign as an indicator of mathematical equality. *Journal for Research in Mathematics Education*, 43, 316-350.