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STUDENTS' METAPHORS FOR MATHEMATICAL PROBLEM SOLVING (244 pp.)

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The purpose of this study was to determine the metaphors used by students to describe mathematical problem solving. This study focused on identifying how students interpret and perceive mathematical problem solving via conceptual metaphors (Lakoff & Johnson, 2003). These perceptions and interpretations were coded and analyzed qualitatively and quantitatively in search for a coherent structure embedded in the student's experiences with problem solving.

The participants for this study were 14 students of honors geometry and both honors geometry teachers at a suburban high school in Ohio. The students were interviewed for 10-30 minutes after completing one of three honors geometry common assessments agreed upon by both teachers. Students were interviewed more than once independent of prior interviews if appropriate to the interview criteria. A total of 22 independent student interviews were collected. Both teachers were interviewed before grading each assessment, totaling 6 teacher interviews.

The design of the study revolved around Interpretative Phenomenological Analysis (IPA) of semi-structured interviews. IPA was applied through Conceptual Metaphor Theory (CMT) to identify the metaphors students used in solving mathematics problems. CMT coded participants' language by interpreting the conceptual metaphor involved. A conceptual metaphor is a mapping from a target domain to a source

domain. This research qualitatively identified and verified the source domains associated with the target domain of problem solving. The frequency and popularity of each source domain was tallied for numerical analyses. A quantitative analysis verified the significance of the source domains and identified correlations between these domains. Data collection and analysis were validated internally via correlations with the student's score and T-tests variance between teachers.

The results confirmed that the metaphors used by students were not random or isolated, but coherent. A set of coherent metaphors were identified, which verified the existence of a conceptual metaphorical system for mathematical problem solving. A coherent conceptual metaphorical system is valuable in the teacher's classroom. CMT analysis educates teachers in being more receptive to the language of students. CMT analysis and the results of this study can educate teachers on how to listen for student understanding.