Characteristics of divergent mathematical thinking in eighth grade students

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Abstract: This research examined the characteristics of eighth grade students who exhibited divergent mathematical thinking during problem solving. Divergent mathematical thinking is defined as creative, efficient, and accurate engagement in the cognitive processes of reasoning, problem-solving, communicating, representing, and proof. Using modified talk-aloud protocols, real-time naturalistic analysis of a group of eighth-grade students' mathematical problem solving were conducted. In total, 344 video-taped episodes were analyzed from six students who completed "mathcam video diaries" of their problem-solving during homework completion. Results suggest that students who exhibited divergent mathematical thinking tended to engage error analysis and mathematical analogy more often than those that did not. Furthermore, those students tended to benefit from productive failure from ill-defined mathematical problems more so than students who did not exhibit divergent mathematical thinking. Implications for student learning, classroom instruction, homework, and for further research will be discussed.