

1035-U1-1691      **Nicole M Engelke\*** ([nengelke@fullerton.edu](mailto:nengelke@fullerton.edu)), Department of Mathematics, P.O. Box 6850, Fullerton, CA 92834-6850. *Using Computer Simulations to Facilitate Calculus Students' Understanding of Related Rates Problems*. Preliminary report.

There is little research that has been conducted on how students understand and solve related rates problems in calculus, and not much is known about the mental model which supports a conceptual approach to this type of problem. To address this gap in the research, a teaching experiment consisting of six teaching episodes was conducted with three first semester calculus students. It was expected that the students would develop covariational reasoning abilities which would foster their ability to construct mental models of related rates problem situations. By using dynamic computer simulations of related rates problem situations, the students explored the concept of rate and developed language and notation to talk about rates. The students developed an approach to solving related rates problems which was centered on the idea of relating the rates by creating a "delta equation." The delta equation was a restatement of the problem in terms of the chain rule and used to figure out what each piece of the equation represented. From the delta equation, students more readily determined an appropriate functional relationship between the variables in the given problem situation and could subsequently identify which variables should (if possible) be eliminated through function composition. (Received September 20, 2007)