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Assessing Conceptual Knowledge of Differential Equations

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The differential equations and linear algebra math classes at Valparaiso University participate in an online tutoring survey consisting of conceptual questions from the field. The test was originally constructed by a team of math professors from San Diego State University. The questions are available in an online format and most questions provide scaffolding, or a tutoring set of questions when a primary question is answered incorrectly. This project analyzes the effectiveness of the scaffolding on a subset of questions with specific focus on areas of separable variables and Euler's method. Special attention has been given to questions with multiple knowledge components, which may complicate the effectiveness of the scaffolding. In several questions, we have found that the scaffolding is not impacting student understanding of the subject area. We are also discovering surprising anomalies in students' conceptions that the test creators did not predict. Thus, in some cases, it may be necessary to adapt the scaffolding or question wording to maximize test efficiency and overall student comprehension.

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