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**An integrated powerpoint-Maple based teaching-learning model for multivariate integral calculus.**

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Summary: In this paper, we present and evaluate a symbolic package based teaching-learning model for triple integral calculus. The model utilizes presentation and visualization technologies to assist in the teaching and learning of mathematical concepts and methods. The key mathematical concepts and integration techniques for triple integrals are introduced to students utilizing the animation feature of PowerPoint display supported by the graphic visualization function of the Maple software. To enhance students' learning process, a series of workbooks and symbolic tools are developed utilizing Maple 10 to guide students step-by-step in their studies. The developed symbolic tools also enable students to display the 3D integration domain graphically and to check their calculation results. An investigation undertaken shows that with the proposed teaching-learning model, a higher percentage of students achieved a better understanding of the concepts and a better capacity in evaluating triple integrals with complicated integration domains, compared to traditional teaching and learning with no technology use. We purport that our technology model supports understanding by showing the 3D figures in integration from different angles, and also facilitates independent learning by reducing the need to draw these figures by the students themselves.

*Classification:* I65 R25 D45

*Keywords:* symbolic package; integral calculus; multivariable calculus; Maple; graphic visualization; tertiary education

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