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Chua, Boon Liang; Wu, Yinkang

Designing technology-based mathematics lessons: a pedagogical framework.

J. Comput. Math. Sci. Teach. 24, No. 4, 387-402 (2005).

Summary: In order to effectively integrate technology into mathematics teaching and learning, teachers could create a technology-based learning environment which provides students with opportunities to experience the process of mathematical investigation from exploring with mathematical ideas to making and testing conjectures, as well as extending their conjectures to a general form if possible. Additionally, the learning environment should support students in ways that encourage them to articulate not only what they know about the mathematical ideas in their exploration, but also how they arrive at their conjectures and how they generalise the ideas. This article offers a framework that encompasses the processes of exploring, conjecturing, verifying and generalising to help mathematics teachers plan and design effective technology-based lessons to create an environment which engages students in meaningful learning in the mathematics classroom. An interactive spreadsheet template based on a popular mathematics problem commonly found under the topic of calculus involving finding the maximum area of a rectangular enclosure given a fixed perimeter was designed to illustrate the framework.

Classification: U50 U70 I40
Keywords: computer as educational medium; mathematics education; technology-based learning environments; CAI; computer aided instruction; educational technology; inclusive education; instructional design; calculus; extreme value problems; media technology