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**A three-fold approach to the heat equation: data, modeling, numerics.**

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Summary: This article describes our modeling approach to teaching the one-dimensional heat (diffusion) equation in a one-semester undergraduate partial differential equations course. We constructed the apparatus for a demonstration of heat diffusion through a long, thin metal rod with prescribed temperatures at each end. The students observed the physical phenomenon, collected temperature data along the rod, then referenced the demonstration for purposes in and out of the classroom. Here, we discuss the experimental setup, how the demonstration informed practices in the classroom and a project based on the collected data, including analytical and computational components.

*Classification:* M55 I75 I65

*Keywords:* mathematical modeling; partial differential equations; student projects

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