

How scientists think: Fostering creativity in problem solving

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Profound discoveries and insights on the frontiers of science do not burst out of thin air but often arise from incremental processes of weaving together analogies, images, and simulations in a constrained fashion. In cutting-edge science, problems are often ill-defined and experimental data are limited.

To develop an understanding of the system under investigation, scientists build real-world models and make predictions with them. The models are tentative at first, but over time they are revised and refined, and can lead the community to novel problem solutions. Models, thus, play a big role in the creative thinking processes of scientists.

Dr. Nancy J. Nersessian has studied the cognitive processes that underlie scientific creativity by observing scientists at work in their laboratories. She says, "Solving problems at the frontiers of science involves complex cognitive processes. In reasoning with models, part of the process occurs in the mind and part in the real-world manipulation of the model.

The problem is not solved by the scientist alone, but by the scientist - model combination. This is a highly creative [cognitive process](#)." Her research is published in an upcoming issue of *Topics in Cognitive Science*.

Her study of the working methods of scientists helps in understanding how class and instructional laboratory settings can be improved to foster creativity, and how new teaching methods can be developed based on this understanding. These methods will allow [science](#) students to master model-based reasoning approaches to problem solving and open the field to many more who do not think of themselves as traditional "scientists."

Source: Wiley

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