

Teaching Excellence at Yale

Acting in an immunobiology class increases student engagement and retention of new concepts.

Paula Kavathas (pictured right), Professor of Laboratory Medicine and of Immunobiology and of Molecular, Cellular, and Developmental Biology, uses acting in her “Immunology and Microbes” course as a way to help students retain new concepts.

“We know that images of concepts can enhance learning,” said Kavathas. “This is a variation on that concept, as a drama is also visual. I hope the concept will be more memorable and enhance student learning.” Kavathas has students perform two to three times a semester to illustrate new concepts that she thinks are particularly well-suited to this type of engagement.

“Students like to get out of their seats and do something different. I usually ask for volunteers to act out the concept and I have no problem finding willing students,” said Kavathas.

Kavathas tells students that scientists are always trying to answer a question. For example, when wrestling with, “How does an immune cell know which cells are infected with a pathogen and need to be destroyed?” students act out a scenario as a mechanism for learning the answer. Kavathas asks volunteers to form two circles (with six to seven



students per circle) representing two cells. Another student assumes the role of “HIV virus.” Kavathas asks everyone to look carefully at the ‘virus’.

In the first act of this drama, the student representing the virus enters one of the circles and Kavathas asks the “cell” to hide the student and asks the students observing the drama to close their eyes as this happens. When the students open their eyes, they cannot identify the cell hiding the virus. In the second act, she asks one of the students in the circle to take a piece of clothing, such as a scarf or hat and hold it on the outside of the ‘cell’ to indicate where the virus has hidden. Students can now figure out which cell is infected using the visual cue from the clothing.

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“This illustrates the scientific principle of how killer immune cells can recognize and destroy infected cells,” said Kavathas. “When a cell is infected, peptides from pathogenic proteins come to the cell surface in the groove of a host protein called MHC-1 – so a little part of the pathogen is revealed to the killer immune cells – in our acting, the scarf represents a peptide.”

Research indicates that the explanation, analysis, and evaluation of concepts presented in a visual format is essential to increase depth of understanding. After the scene with the cells and the virus, Kavathas discusses the scientific concept in detail and uses the drama as a framework for the discussion of the salient points.

Research exploring the power of visualizations in the classroom:

In a chapter from *Essentials of Teaching and Integrating Visual and Media Literacy* (2015. D.M. Baylen and A.D. Alba, Editors), faculty from several institutions offer evidence that developing scientific visualization skills – in conjunction with face-to-face instruction – allows STEM students to better understand foundational concepts.

Read “Using Scientific Visualization to Enhance the Teaching and Learning of Core Concepts” online via Springer: <http://rdcu.be/zSGs>

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