EDUCATION

AAI Education Committee Highlight: Teaching Tools

In 2016, the AAI Education Committee initiated a new session focused on improving immunology education: the Immunology Teaching Interest Group (ITIG). The ITIG is an informal group comprised of past speakers and attendees of the ITIG sessions, including current immunology educators spanning a range of institutions and levels. It serves as a resource for novel teaching tools and practices that can be implemented in courses to enhance immunology education. The session has grown from an audience of 20 in 2016 to more than 100 participants in 2019. Because of the great interest in this topic, the AAI Newsletter *features "Teaching Tools" articles highlighting ITIG presentations.*

Promoting Critical Thinking through Writing in a First-Year Immunology Course

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Increasingly, employers consider critical thinking as an important and sought-after skill in potential hires. Studies have suggested that critical thinkers are more engaged learners than those who are passive recipients of information. For students, the writing, revising, and reflecting process is one way in which they can showcase and practice critical thinking skills as they research, analyze, and make sense of difficult information.

At times it appears students simply regurgitate material from lectures or readings in their written assignments. Are students truly applying the material or just telling the professor what they assume he or she wants to hear? To encourage students to dive more deeply into the current knowledge on a topic in immunology, a research paper on a controversial issue was incorporated into the *Pharmacochemistry of the Immune System* course as part of the first year program at the University of Saint Joseph School of Pharmacy. This assignment was intended not only to encourage students to practice critical thinking, but also to get them to engage with the material on a deeper level. After establishing a background on the topic, students then began to research several existing perspectives to determine which arguments held more weight and to synthesize an evidence-based conclusion.

On the course's first day, 12 student groups were presented with a writing assignment involving six immunology topics. Each subject was randomly assigned to two student groups. These were controversial issues about which scientists have multiple and competing views, forcing students to gather research articles, make sense of conflicting data, and draw conclusions. Topics included the possible use of IL-17 inhibition in rheumatoid arthritis (RA); the use of IL-2 treatment in autoimmune disease; the possible role of newly-approved baricitinib in RA; treatments for immune thrombocytopenia; justification of the high cost of Kymriah™ for acute lymphoblastic leukemia; and weighing PD-1/PD-L1 inhibitors (pembrolizumab vs. atezolizumab) for metastatic urothelial carcinoma.

While some lecture time was allocated each day explaining difficult mechanisms, approximately three-quarters of the class time was devoted to working in groups on the papers. Groups were tasked with producing a first draft that reflected contributions from all group members; each group then swapped papers with another group for peer feedback. After this, the professor also provided the groups with feedback. The group then made revisions, with each member assigned one section, and worked together to prepare a cohesive and comprehensive final paper to submit on the last day of class.

Peer and professor feedback stimulated discussion among the individual groups and with the professor, who took on more of a "guide" or "mentor" role that extended beyond

that of a traditional lecturer. Students asked more refined questions, such as “what if,” “how does,” and “in which situation does this happen?” Outcomes from this exercise were that students improved their exam grades and achieved a deeper level of understanding the material. Students’ efforts to improve the rigor of gathered evidence and the logic of conclusions drawn made them more likely to ask the professor to review references for their papers.

This type of assignment could be applied at any postsecondary level, from undergraduates to postbaccalaureate and graduate or professional students. As an alternative to students writing in groups, this exercise can be assigned to individuals. Similarly, while the assignment described here was given in a modular course, it can likewise be incorporated in a semester-long curriculum.

Additional information on how to set up critical thinking assignments and methods of grading them can be found at https://www.thecriticalthinkinginitiative.org/.

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