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 (the last time the session was held in person due to the cancellation of IMMUNOLOGY2020™). Because of the great interest in this topic, the AAI Newsletter *features "Teaching Tools" articles highlighting ITIG presentations.*

Employing Self-Paced, Feedback-Infused Learning to Facilitate Mastery of Basic and Clinical Immunology

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For medical students, integration of basic immunology concepts with relatable clinical cases/diseases helps students understand the "why" behind clinical phenomena. An effective way to achieve this conceptual coherence is by designing learning activities that not only emphasize the causal aspects of the disease, but also test knowledge and provide feedback.[1] Providing timely feedback on assessments can lead to greater rates of knowledge acquisition, especially when the feedback appropriately accounts for the difficulty level of each question.[2] Learning activities that both integrate content and reinforce learning in this manner can also make the experience more engaging and the knowledge retention more durable, particularly if prior knowledge (i.e. from pre-reading or prior lectures) is reactivated.[3]

To promote conceptual coherence for first-year medical students, we designed self-learning modules (SLMs), which present clinical scenarios interspersed with assessments linked to relevant basic immunology learning objectives. For example, the topic of antibody effector functions and cross-reactivity is presented in the context of acute rheumatic fever, CD8^{+} T cell function in the context of chronic and acute viral infections, or immune checkpoints in the context of cancer immunotherapies. These SLMs were developed for Foundations of Disease (FOD), a required 6-week transdisciplinary flipped course covering immunology, medical microbiology, microbial pharmacology, and infectious disease at the Dell Medical School, University of Texas at Austin.[4] In FOD, SLMs were completed by small groups (five to seven students), with faculty facilitators present to assist as needed.

SLM cases can be delivered on paper, but purpose-built digital platforms such as kuraCloud or Smart Sparrow allow for the inclusion of A/V media (for example, a video of a clinical procedure or patient presentation) and a diverse array of assessment types beyond simple multiple-choice questions (for example, image annotation, matching, completing a table, graphing). SLMs can also be created and delivered using learning management systems like Canvas or Blackboard; however, available question types may be more limited. A major advantage of using digital platforms to present SLMs is the integration of immediate feedback for each assessment item, creating a mechanism for students to correct their mental model of a concept in real time. Students can reattempt missed questions and correct their responses, helping to reinforce critical concepts. Furthermore, with some digital platforms, adaptive algorithms can be used to tailor content to the abilities of the student(s), providing advanced content or remediation as needed.

Student evaluations indicated that SLMs were well received because the student group could set the pace of learning, as opposed to traditional cases presented by an instructor who set the pace for the entire class. Students appreciated immediate guidance if they had questions and said they benefited from the support of faculty facilitators. One issue raised by our medical students was whether SLMs could be moved to pre-class work rather than in class. The "portable" nature of these digital activities means they could easily be converted to an out-of-class/homework activity. It's unclear if this shift would impact knowledge attainment, but it would certainly rob students of in-class faculty support and the opportunity for valuable teamwork/socialization skill building.

These exercises are an effective mechanism to promote conceptual coherence, not only for medical students, but for immunology students at all levels. The SLM design has also been successfully adapted for undergraduate and graduate immunology students, with cases centering on published articles instead of clinical scenarios.

References

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