

Student-Led Discussions to Engage Students in Deeper Learning in Horticultural Courses

In an ever-evolving field of agricultural education, fostering deep and meaningful learning experiences has become essential, especially in specialized fields like horticulture. In college courses, lecture-based teaching methods are standard and valuable, yet they often fall short in promoting active learning and critical thinking (Miller et al., 2013). Additionally, lecture format instruction primarily focus on presenting course content and have relatively less student engagement (Russell et al., 2016). Hence, there needs to be more innovative engaging activities for students in traditional lecture-based courses.

The horticultural field is undergoing a significant shift through innovative agricultural technologies like vertical farming, controlled environment crop production, and sustainable crop management. These developments require students to apply theoretical knowledge and keep up with the latest research and technological innovations. One of the effective ways to achieve substantial student engagement is through student-led discussions, where students take the initiative to explore and discuss new technologies and research findings within the context of horticultural science. By placing students at the center of the discussion, this class activity will encourage a deeper understanding of concepts in horticulture and allow students to develop essential skills such as communication, public speaking, and critical thinking. Additionally, this activity promotes ownership of learning, encourages peer-to-peer teaching, and fosters an overall more inclusive classroom environment. Moreover, discussing emerging technologies—such as hydroponics, sustainable solutions to climate change, or novel crop management strategies—helps students appreciate the interdisciplinary nature of modern horticultural science, encouraging them to see the connections between horticultural concepts and real-world applications.

The following teaching tip explores how incorporating student-led discussions can change the learning experience in horticultural education, leading to a deeper understanding of the subject matter. The author implemented student-led discussions in two advanced-level (i.e., 3000-level) undergraduate courses; Hydroponics and Soilless Crop Production and Commercial Vegetable Production, during the spring and fall semesters of 2024, respectively. The hydroponics class had about 25 students, while the commercial vegetable class had around 15 students, and both courses were held in person. The course instructor provided a rubric for discussion leaders during the first week of classes, which outlined key areas of grading such as understanding of the topic, preparation, engagement, communication, and time management. Each student was required to read the scientific paper or fact sheet provided by the instructor on the chosen topic, develop at

least five discussion questions, and lead a 15-minute discussion. Students selected a topic of interest within the course material by the second week to lead discussions. Each week, 1 to 2 students led a discussion based on the reading material provided by the instructor.

In the hydroponics class, reading materials topics included various hydroponic systems, improving the efficiency of hydroponics crop production, and technological advancements. Alternatively, the commercial vegetable production class focused on topics like crop rotation, sustainable practices, and market trends in vegetable farming. Most students used Microsoft PowerPoint presentations to display their questions and provide context for the discussion. Participation was mandatory, with each student expected to contribute at least once by offering insights or asking questions to the discussion leader about the reading material. However, many students participated several times, suggesting their interest in specific topics. The in-class mid-semester feedback and end-of-the semester class evaluations have shown that this class activity was well-received among the students of both courses, with many expressing that they felt "more comfortable sharing their thoughts in a less formal setting." Additionally, numerous participants indicated that discussing novel research findings and technology related to the course material with their peers significantly enhanced their understanding.

In the instructor's opinion, when students took on the role of discussion leader, they focused on understanding of the topic, preparation, organization of their thoughts, and anticipated potential questions from their peers. Several students appeared to have done the research online on their assigned topic before the discussion, which was evident from their follow-up questions on the reading material and their responses to peers. Hence, this process deepened their knowledge and encouraged active learning. By being a leader, students gain a sense of ownership over their learning and contribute to the shared knowledge in the classroom. This approach to learning helps bridge the gap between theory and practice and encourage peer-to-peer learning and creates a classroom environment where students become active contributors to the learning process. Student-led discussions facilitated an environment where students deepened their subject matter expertise and cultivated critical interpersonal and communication skills, providing them with the confidence needed to succeed in their career. Some challenges with the implementation of successful discussions are lack of participation from some students and excess participation from some. The instructor emphasized the importance of these discussions early on and their contribution to the students grades. After a few reminders at the beginning of the semester, students fell into the natural habit of offering their insights. Another challenge was the choice of reading material for the leader. It appears to be of more interest to students, when the reading material is based on new innovations and advancements and less enthusiasm when the reading material is about fundamental subject matter. Hence, the instructor recommends finding appropriate reading materials based on their students' interests.

Lastly, incorporating student-led discussions in horticultural and related courses could allow students to actively connect theory with the most recent findings and technology, fostering a deeper understanding of how these developments are shaping the future of agriculture. When discussion-leaders shared their understanding of current research and responded to questions from their peers, they practiced sharing complex scientific ideas in accessible ways. These skills

are vital in horticultural science and other related fields, where communicating complex, field-specific information to broader audience is often necessary to influence real-world outcomes in research, policy, or industry. By honing these skills in the classroom, students are better prepared for the demands of their future careers.

Keywords: Leaders, Hydroponics, Technology, Undergraduate, Teaching

References

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