Teaching Tips/Notes NACTA Journal

Requiring the asking of questions to improve engagement and understanding in online and blended courses

In the experience of teaching both fully online and blended/hybrid courses, where students access content away from instructors, student engagement, instructor presence, and communications are essential. One way that this can be addressed is to include an assignment for students to ask a question about their "muddiest point" from that week's course content (video lecture or reading). This is a relatively simple yet effective way of "on the go" assessment of student content learning. Angelo and Cross (1993) determined that students pay greater attention to lectures if they are expected to identify a muddiest point. It has also been found that addressing misconceptions and concerns is critical for establishing deeper learning (Wandersee et al., 1994). To make asking questions a meaningful reflective activity, students were provided with guidance and examples as to what makes a good question. This tip is to share the guidelines for writing a good question that were developed and to share how students question asking improved after receiving feedback on their questions.

The components that we determined to be necessary for a good question are that the question must:

- Be A Question
- Be Clear
- Be Relevant
- Be Positive
- Use Higher Order Learning
- Have Been Through The 5-Why Test*

* The 5-why concept is an iterative process, credited to Sakichi Toyoda, to assist in getting to the root of a problem by asking yourself to be more specific five times with an end goal of separating out what aspects of a problem are understood and not understood (Moaveni and Chou, 2017).

Table 1. Examples and tips provided to students for the aspects of a good questions defined by course instructors.

	BE A QUESTION	BE CLEAR	BE RELEVANT	BE POSITIVE	USE HIGHER ORDER LEARNING	HAVE BEEN THROUGH THE 5-WHY TEST
DO	Could you provide resources about liming with alternative materials?	Could you provide resources about liming with alternative materials?	How is liming affected by other fertilizers added in a given year?	Could you provide resources about liming with alternative materials?	How would these liming concepts apply to a tropical environment?	Why is pH management difficult in more weathered soils?
DON'T	I would like to know more about liming with alternative materials.	Would more details fixing acidity be good?	What other fertilizers should I add?	Why is there no information on alternative materials?	Could you define liming?	Do all sites need the same amount of lime?
Tips	If you find yourself making a comment such as "I'd like to know more about…" think about how we can help and ask for it.	Asks for a specific thing (resources) about a specific concept (alternative materials). Use professional writing so others can tell what you are asking	Focus here on the current module, course instructors welcome in-person discussion about general fertility concepts at any time.	Focus here on what helps you learn, course instructors welcome in-person discussion about content concerns at any time.	See Bloom's Taxonomy: - Define - Classify - Apply - Analyze - Evaluate - Create	This makes sure you've really thought about the problem and gotten to the root of what you do know and don't know.

The practice was used in several courses in the Department of Agronomy and Horticulture at the University of Nebraska at Lincoln. During the summer of 2018, in the fully online version of the introductory Soil Resources course (AGRO 153, N=25), students were assigned to ask their questions in a public forum using the course discussion boards and then tasked with answering another classmate's question. The activity was mostly scored for completion though the accountability of being conducted in a public forum (and by the more self-directed students that take online courses) and resulted in good quality questions and good discussions.

In an upper level Soil Nutrient Relationships course (AGRO 366, N=60) with a blended (hybrid) design, the questions were required as part of the weekly quiz over lecture videos. In the Spring of 2017, instructors addressed common student questions and shared examples of good questions during course meetings at the end of each week. In the Spring of 2018, instructors continued that practice but provided scored and written feedback to students based on the guidelines that had been provided for writing a good

question. The guidelines were converted to a rubric with up to two points for each of the 6 aspects of a good question.

In both Spring semesters, the scores for questions increased as the semester went on. There appears to be a greater increase in the year that specific, individualized feedback was provided to students than in the year that only group feedback and examples were provided (9.4 to 10.7 vs 7.4 to 8.5); however, the questions in the first year scored lower overall than the questions in the second year so comparison is difficult. All scoring was done during April and May of 2018 by a 3rd party who had neither taught nor taken the course but was familiar with basic soil science concepts and the instructors teaching style.

Example strong and weak questions from AGRO 366 students on the topic of Phosphorus management:

With the P levels in solution being so low and kind of unknown could it be useful to actually monitor those levels and try to know if there is a sufficient amount of P in solution during the growing season?

When applying P, what and when is the best time/source?

The first question demonstrates that the student fully understands the cycling and limitations of phosphorus and is curious about how that information can be applied to help producers. In the second questions, the student asks about basic content that was in the notes without an indication as to whether it was unclear or unread.

Another reason that mean question scores increased during the semester in each year of the AGRO 366 course is that the number of students who completed that part of the weekly quiz decreased by about 10% as the semester progressed. This was the case in both years. The students who formulated questions poorly likely determined that writing a question was not a meaningful activity and stopped completing the activity. Providing individualized feedback did not improve the situation of students who stopped their participation in question asking but it did lead to more students asking about ways to improve their question during in-class meetings. One reason that students may have stopped asking questions is that their questions were not addressed or shared in group feedback. Nearly all questions were discussed in the online AGRO 153 course where they were posted in a public forum and student effort in question asking did not decrease in that course.

In final, we believe the requirement of asking questions was one way to engage the students in course content when they were not present in the classroom and stimulated students to think more deeply about the course content and the learning process. While it would be valuable to include metacognitive training activities to ask better questions as a course requirement, we are not sure that providing feedback on questions encouraged

the students to ask more questions or better questions. However, student questions did seem to spark and encourage group discussion. In addition to its usefulness in online and hybrid courses, it might be wise to allow submission of anonymous questions for instructors to bring to lecture for in-person course meetings as well.

References

Angelo, T. A. and Cross, K. P. 1993. Classroom Assessment Techniques: A Handbook for College Teachers (2nd Ed.). San Francisco: Jossey-Bass.

Moaveni, S. and Chou, K. 2017. Using the Five Whys Methods in the Classroom: How to Turn Students into Problem Solvers. *Journal of STEM Education, 17*(4). Laboratory for Innovative Technology in Engineering Education (LITEE). Retrieved June 18, 2020 from https://www.learntechlib.org/p/174416/.

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