What Aids Grades? Examining Student-Generated Questions

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- these decisions.¹
- centered learning.

Motivation 60% Students belong to a society that votes, makes personal health choices, and purchases goods and services. An understanding of science is beneficial in 50% တ္တိ 40% Student-Generated Questions (SGQs) could be used as an instructional tool to total %05 identify misconceptions, assess student understanding, and promote student-20% ی ط 10% **Research Question** Response Category How does question complexity relate to student performance throughout one Pre-Course Survey semester of a biology lab for non-majors? • Upper tertile had the fewest *No Questions* • Lower tertile had the fewest *Reflective* Methods Statements • Lower tertile had the most *Factual* • Concepts of Biology Lab (BIOL 111L) Spring 2017, a course for non-biology majors, 195 students enrolled in course Students responded to the following prompts in a weekly online assignment **Paired Data Post-Course Survey Pre-Course Survey** Pre: 43 SGQs tertile 40% What new biological questions do N=109 Students (56% of course) What questions Post: 44 SGQs Sample population differs from course you now have after taking the lab about biology do within %00 course? What questions do you still population (higher incoming GPA, higher you have? lab grades, unrepresentative of class year) have about biology? တို့ 20% Week 2 **Week 14** ຍິ 10% Tertiles calculated from final lab grade Two coders coded responses based on the rubric

- IRR as measured by Cohen's Kappa = 0.84
- Lab TA had an effect on question complexity

Coding Rubric



rtile	Students	Final Grade
W	37	62.2% - 89.4%
iddle	36	89.4 % - 95.2%
oper	36	95.2% - 104.5%

Post-Course

Responses

"I will forever question what other factors play into certain things." "I am incredibly curious about antibiotic resistance because it sounds like it could and will become a big problem for people."

"In biology can you study something that is not living and still be considered biology?"

"I am wondering how we could tighten a lot of experiments up so that [they] were less 'inconclusive'." "What can I do to further the diversity among animals in areas such as Fargo?"

"I wonder how fertilization works between sea urchins without contact like most other animals."

"How many times must you perform an experiment in order to state your results as facts or as true?" "I want to see more impactful research being funded and would like to know how to fund it or help."

Lower Tertile

No Questions: 21% decrease

R F C Response Category

РΧ

CX

- *Procedural* : 20% increase
- *Factual:* 12% decrease

Conclusions & Implications

- *Reflective Statements* may indicate genuine curiosity and could be related to success. Engaging student curiosity could result in better learning outcomes and may motivate students. If students are required to relate material to their lives, will student participation and motivation increase?
 - How does instructor response to student questions change student responses, motivation, and performance?
- SGQs can be used as an instructional tool to evaluate student understanding and course goals. Tracking individual students can show individual changes.
- - Further qualitative analysis of responses could show differences in topic, question specificity, and reveal misconceptions.

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[2] David R. Krathwohl (2002) A Revision of Bloom's Taxonomy: An Overview, Theory Into Practice, 41(4), pp. 212-218.











