The goal of our transformation project is to develop and enact a three-dimensional learning as a vision for science and engineering education. A 2012 National Research Council report introduced the idea of three-dimensional learning (Laverty, 2016). We are characterizing changes in instruction (video observations) and assessments (exams).

DATA COLLECTION & ANALYSIS – ASSESSMENTS

- We collected four years of midterm and final exams from all major introductory biology, chemistry, and physics lecture courses (Table 1).
- In total, we analyzed 4,023 questions from 134 unique exams, fully representing all 185 course sections of the eight relevant courses.
- Disciplinary coding groups achieved acceptable inter-rater reliability as measured by Gwet’s AC1 (Gwet, 2008) and percent agreement.

RESULTS – ASSESSMENTS

RQ: How has the fraction of assessment items that reflect scientific practices, crosscutting concepts, and core ideas changed over time?

CONCLUSIONS

We have shown that assessments in some gateway courses increasingly reflect scientific practices and core ideas as the result of a system of transformation efforts at Michigan State University. Additional ongoing work includes studying persistence rates and the relationships between three-dimensional assessment, instruction, and student learning.

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