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Change at the Core: An Initial Implementation of Active Learning Strategies in Large, Lecture Science Courses

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INTRODUCTION

Research demonstrates the need for an alternate to lecture based learning that is lecturer-centered. Due to being uninspiring and removed from what students need to learn general concepts on their own, lecture based instruction is not as effective as other methods. The number of students graduating with a degree in the science, technology, engineering and mathematics (STEM) field seems to remain relatively constant (Rask), however the number of incoming undergraduates intended to major in a STEM field is falling. Most faculty are used to teaching in the way that they were taught, a passive model that is cost effective for large classrooms. This study is to seek an improvement to student comprehension when students are more responsible for their education in class, compared to teacher-oriented instruction. It has been shown that "active learning increases examination performance … and that lecturing increases failure rates by 55%... these increases in achievement hold across all of the STEM disciplines and occur in all class sizes, course types, and course levels" (Freeman).

QUESTIONS

1. What sort of strategies are faculty deciding to implement, after their meeting and summer workshop and why?

2. What sort of challenges are being faced, and what support is felt amongst faculty about the implementation of C-Core.

3. How are students responding to C-Core implementation?

EXPERIMENTAL DESIGN

This study took place at 3 institutions: a mid-sized master's granting university, and two smaller associates granting colleges in the Pacific Northwest. We are exploring the effectiveness of utilizing student centered activities (SCA's) in lecture science classes. We selected a few case study participants to observe their classes in detail to collect data for this study.

REFERENCES

Freeman, Scott. "Proceedings of the National Academy of Sciences." *Proceedings of the National Academy of Sciences* 111.23 (2014): 8410-415. *PNAS*. Web. 18 Mar. 2015.

Rask, Kevin. "Attrition in STEM Fields at a Liberal Arts College: The Importance of Grades and Pre-Collegiate Preferences." *Cornell University*. ILR School, Mar. 2010. Web. 18 Mar. 2015.

CASE STUDY PARTICIPANTS

- Chemistry (CHEM 121-123)
- Biology (BIOL 204)
- Geology (GEOL 101)
- Variable (ENVS 101, CHEM 123 at WCC)

DATA COLLECTION

Methods of Data Collection
Interviews
Filming Lectures
Student Evaluations/Focus Groups
Student Exam Recording

Table I. Methods of data collection.

Implementation Techniques
ABCD Card / Clicker Questions
Class Worksheets
Group Work
Visuals and Demos
In-Class Discussions
Providing Powerpoints
Making Predictions

Table II. Examples of implementation techniques used in observed case studies.

DATA PROCESSING

Coding Scheme	Useful For	Data Received
COPUS	Quantitative Data	Actions occurring from lecturer and students for each 2 minute time interval.
HRI	Qualitative Data	Reviewer perception of actions seen in COPUS data.

Table III. Methods of coding schemes used to collect/organize data, and how each were useful.

DISCUSSION

Although this study is relatively new, we are seeing a variety of student centered learning techniques being implemented in our case study classes. Through many different data collection methods, we are collecting many types of data to be able to get a broad overview of the nature of student centered activities, how they are implemented and the student/faculty response. This study is ongoing.