

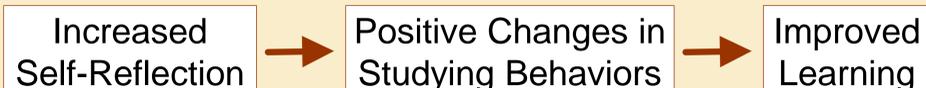
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Abstract

Undergraduates that struggle in STEM courses often ask their professor, 'What is the best way to study for your class?' Many students are not reflective and are unaware of connections between studying and learning. In response, we developed self-reflective learning tools in the form of exam wrappers and implemented them in three STEM classes. Exam wrappers consist of two parts. Before each exam students answer survey questions documenting preparation. After receiving their graded exams, students are guided through an analysis of missed questions. Students reflect in writing regarding the reasons for incorrect answers, and the specific actions they will take in preparing for future exams. We predicted that increasing self-reflection using exam wrappers would facilitate learning, improve exam performance, and increase student satisfaction. Analysis of student survey responses showed positive changes including an increase in time spent studying, greater awareness of requirements for academic success, and higher satisfaction with coursework in some classes. Student performance on exams improved in one class relative to a prior semester in which exam wrappers were not used, but in other courses clear-cut improvements in student learning were more difficult to detect due to fluctuating grades among exams throughout the semester. While sometimes challenging to quantify, the positive changes in student learning behaviors observed support the value of teaching students how to reflect on their learning. Further, deploying the exam wrappers as part of a collaborative action research project reinforced our commitment to our own self-reflective teaching practices geared toward helping students learn more effectively.

Project Goal: Facilitating Learning



Methods

Exam Wrappers – Tool for promoting self-reflection

- Part 1: Reflecting on exam preparation, completed before each exam
- Part 2: Reflecting on exam performance, identifying future studying/learning actions, completed after reviewing graded exam

Evidence

- Self-reported studying & learning behaviors/activities collected from exam wrapper responses.
- Exam performance

The Courses

- PSYC 100 – Principles of Psychology (SUNY Brockport)
- BIOL 214 – Microbiology (SJFC)
- BIOL 321 – Anatomy & Physiology I (SUNY Brockport)

Impact on Studying & Learning Activities

Increase in time spent studying

- BIOL 214 – Students spending 6+ hours studying for an exam increased from 54% of students for exam 1 to 74% for the final exam.
- BIOL 321 - Increase in student preparation time seen (Fig. 1)
- PSYC 100 – No statistically significant change in amount of time spent studying, but individual students did report studying longer or beginning their studying earlier.

Implementation of new studying methods/strategies

- PSYC 100, BIOL 214 – Students reported creating their own study materials and studying with others as new activities after exam1.

Greater awareness of why exam questions were missed and more accurate self-identification of skills that need to be developed

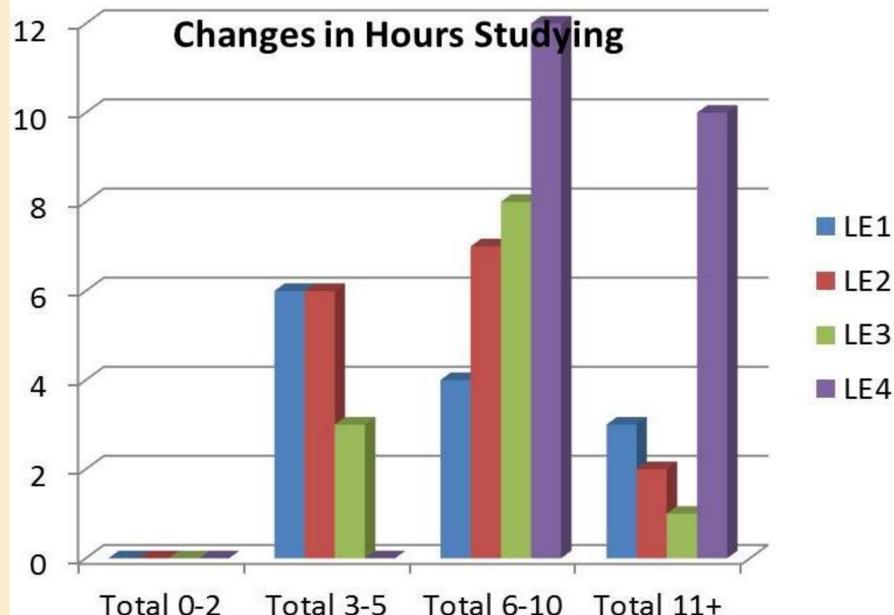


Figure 1. Self-reported hours spent studying for exams in BIOL 321. LE = lecture exam. X-axis – hours, Y-axis # of students.

Evidence of Student Learning

Class performance on exams did not dramatically improve over the course of the semester, however, in BIOL 214 student performance on the comprehensive final exam is consistent with improved student learning when compared with final exam scores from a semester where structured self-reflection (i.e., exam wrappers) were not a formal course component. (Fig. 2)

BIOL 214 Final Exam Grades

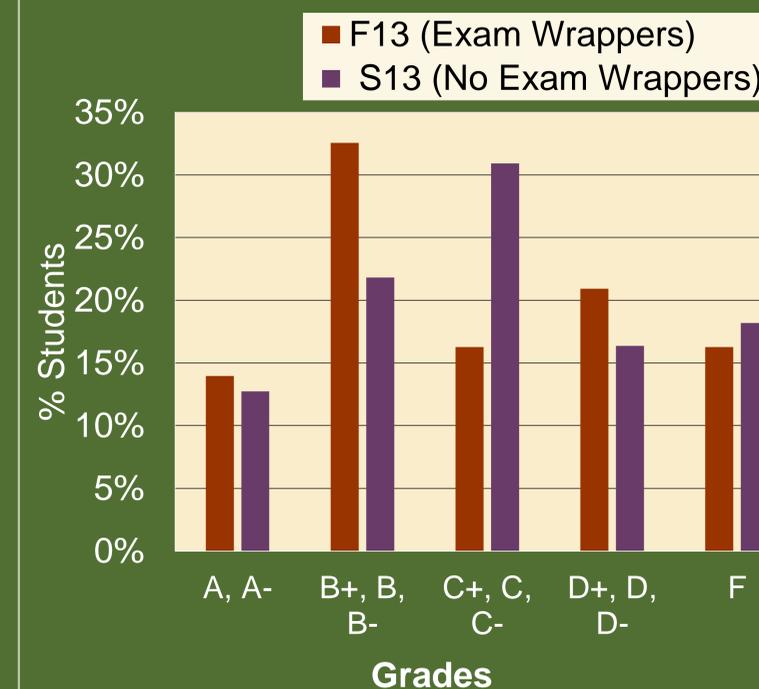


Figure 2. Comparison of exam scores on comparable comprehensive final exams administered in BIOL 214 classes where exam wrappers were (F13, n=46 students) and were not (S13, n=57 students) used.

Other Outcomes

- Student empowerment & increased course satisfaction.
- Reflective practice by instructors, greater knowledge of student learning behaviors.
- A collaborative faculty network for supporting high impact pedagogies.

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