A Three-Year Effort to Improve Exam Scores by Motivating Students to Adopt Research-Backed Studying Strategies

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ABSTRACT

We attempted to improve student performance in a P2 integrated renal module by offering incentives to engage in better learning strategies.
In 2021, we offered bonus points if students **wrote their own practice questions** mapped to course learning objectives and supported by links to a therapeutics textbook. In 2022, we offered bonuses if students **wrote thoughtful annotations** for the assigned readings prior to class. The annotations needed to relate to a personal experience, something learned in another course, or explain how the text corresponded to course learning objectives. In 2023 we added incentives for students to **review first-year course content** related to the learning objectives to be taught that day. Links were provided to the P1 courses' lecture recordings and slides. Before the new material was taught, students took a quiz based on the content from the previous year's classes.
Less than 10% of the class wrote practice questions. There was no improvement in exam scores. Many students commented they felt it was too much work. Participation was over 90% when students were asked to annotate textbook chapters prior to class and there was a 6.8% (p<.01) increase in exam performance (before adding the bonus points). We continued the annotations in the third year and saw an additional 4% average increase in scores on the first two renal exams when students were quizzed each day on learning objectives from courses they had taken the year before. The most significant improvements came from having students annotate their textbooks readings prior to class. There was additional benefit from quizzes on material from prior classes. Asking students to write their own practice questions did not improve exam performance

OBJECTIVES

Several years of a P2 "renal" module showed that many students had poor study habits.
- Did not look at learning objectives
- Did not read textbooks
- Shallow processing of information
- Faculty forced to "throw out" exam questions to achieve acceptable pass rates

2021 - SELF-GENERATED TEST QUESTIONS

Offered bonus points on exams if students submitted questions they had written themselves.
- Mapped to a learning objective
- Higher than "Knowledge" or "Comprehension" on Bloom's Taxonomy
- Link to documentation in "Access Pharmacy" for correct answer
- Provide feedback for incorrect answers
- Questions made available to class for practice

Ninety-three Students in the Class

Week 1	Two Students	Two Questions
Week 2	Three Students	Twenty Questions
Week 3	Seven Students	Forty-nine Questions

No difference in exam performance. Four students failed class.

2022 - ANNOTATING PRE-CLASS READINGS

Offered bonus points on exams if students annotated assigned textbook readings prior to class
- Five points for original annotations
- Five points for replies to other students' annotations
- Used Perusall® with students in groups of 15-20

Requirements
- At least 25 words
- Thoughtful and relevant to content
  - Discussion of how passage answers a learning objective
  - How information builds on content seen in other classes
  - Relate information to a personal experience or reflection

Ninety-four Students in the Class

Week 1	87 Students
Week 2	90 Students
Week 3	91 Students

6.8% increase in exam scores (p<.01)
Did not need to curve or throw out questions.
Three students failed class.

2023 - BONUS QUIZZES ON PRIOR CONTENT

Students offered bonus point quiz at the start of each class session
- Questions based on learning objectives from P1 classes
- Posted video and slides from the P1 class
- Ten questions per quiz
  - Seven minute limit
  - Required answer
  - No backtracking
  - Submissions blocked 10 minutes after hour

All 73 students participated.
Additional 4% increase scores on first two exams.
Three students failed course.

CONCLUSIONS

Offering bonus points to students for generating exam questions was not sufficiently motivating and did not result in an increase in exam scores. Annotating pre-class readings and quizzes on prior learning was most associated with increased exam performance.

DISCLOSURES

The authors have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

REFERENCES

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