How to improve student-learning using out-of-classroom memory games

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Problem formulation

Problem: Students have to learn numerous new concepts in biochemistry and cell biology. The amount of factual information they are required to learn can be overwhelming. Poor performance was often observed during previous years specifically on the biochemistry section of the course, which is what I teach.

My hypothesis: My hypothesis is that students will feel more engaged with the material using memory games, which involve low stakes competition. High steaks testing could induce a lot of stress but testing with low stakes would be beneficial for storing information in long-term memory, which is of value for their final exam.

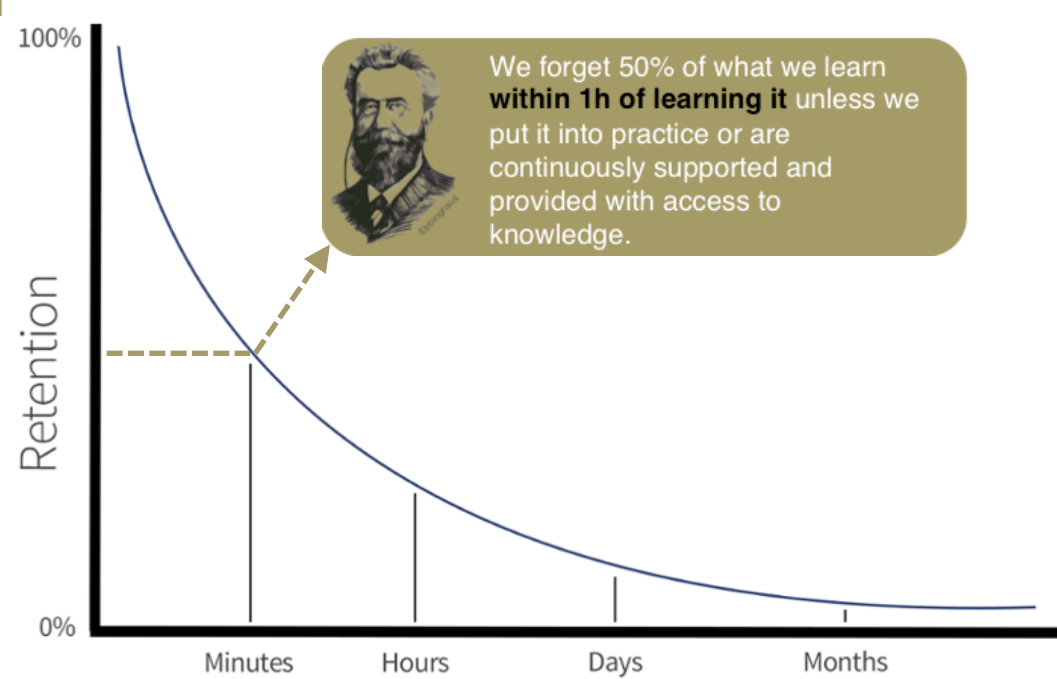A revolution in online learning. Pick something to learn - it's free

Questions:
1. Can students become more engaged with the material if they develop test questions?
2. Does space-repetition have an impact on problem-solving skills?
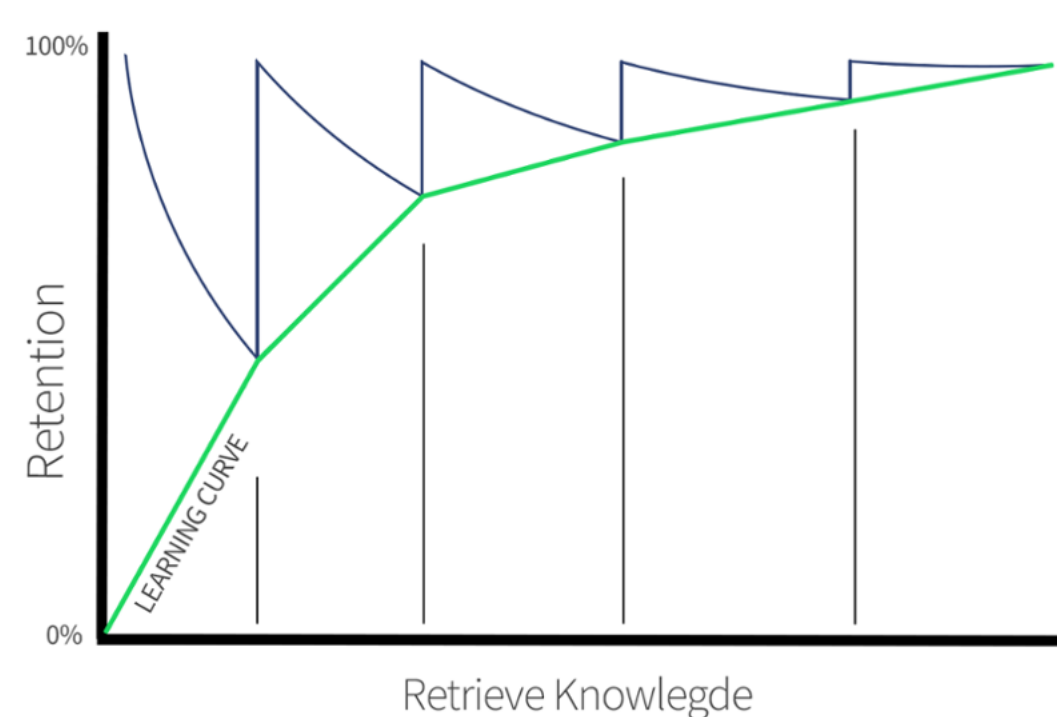3. Does space-repetition have an impact on student grades?

memrise
BETA
GROW YOUR MIND

Background

The forgetting curve

We forget 50% of what we learn **within 1h of learning it** unless we put it into practice or are continuously supported and provided with access to knowledge.

Retention

Minutes Hours Days Months

Spaced repetition

Retention

LEARNING CURVE

Retrieve Knowlegde

The recipe of MEMRISE: Science, Fun and Community

Memrise Science
Memrise is built on three key scientific principles

Elaborate encoding
Memrise helps you vividly assimilate new knowledge, promoting deep encoding and superior memory.
Learn more

Choreographed testing
Testing strengthens memories in variety of ways.
Learn more

Scheduled reminders
By spacing reminders, learning can be made up to x3 more efficient.
Learn more
http://www.memrise.com/

How it was measured?

- Memrise scores
- Student accumulated scores during weekly e-tests
- Student grades in take-home exam (week 39)
- Final exam grades (not included, will be added in the report)
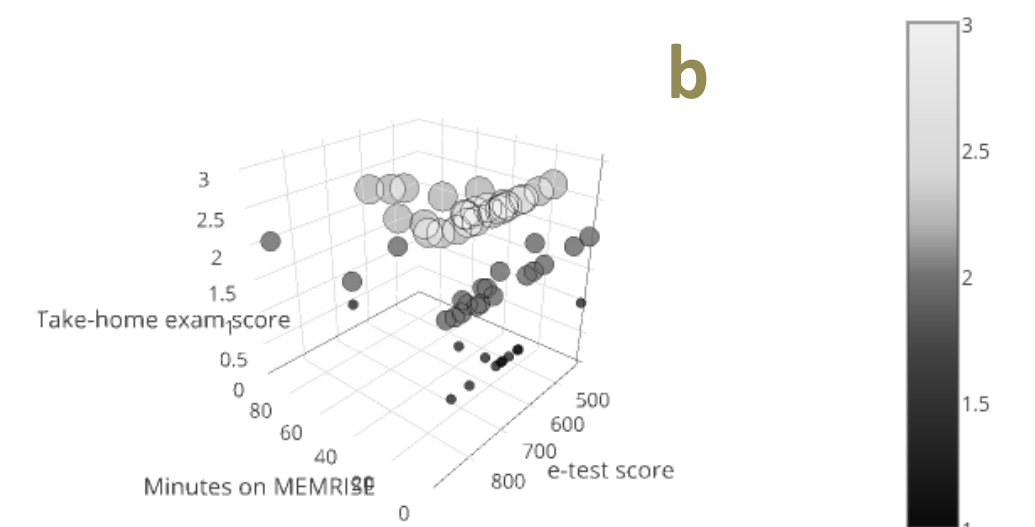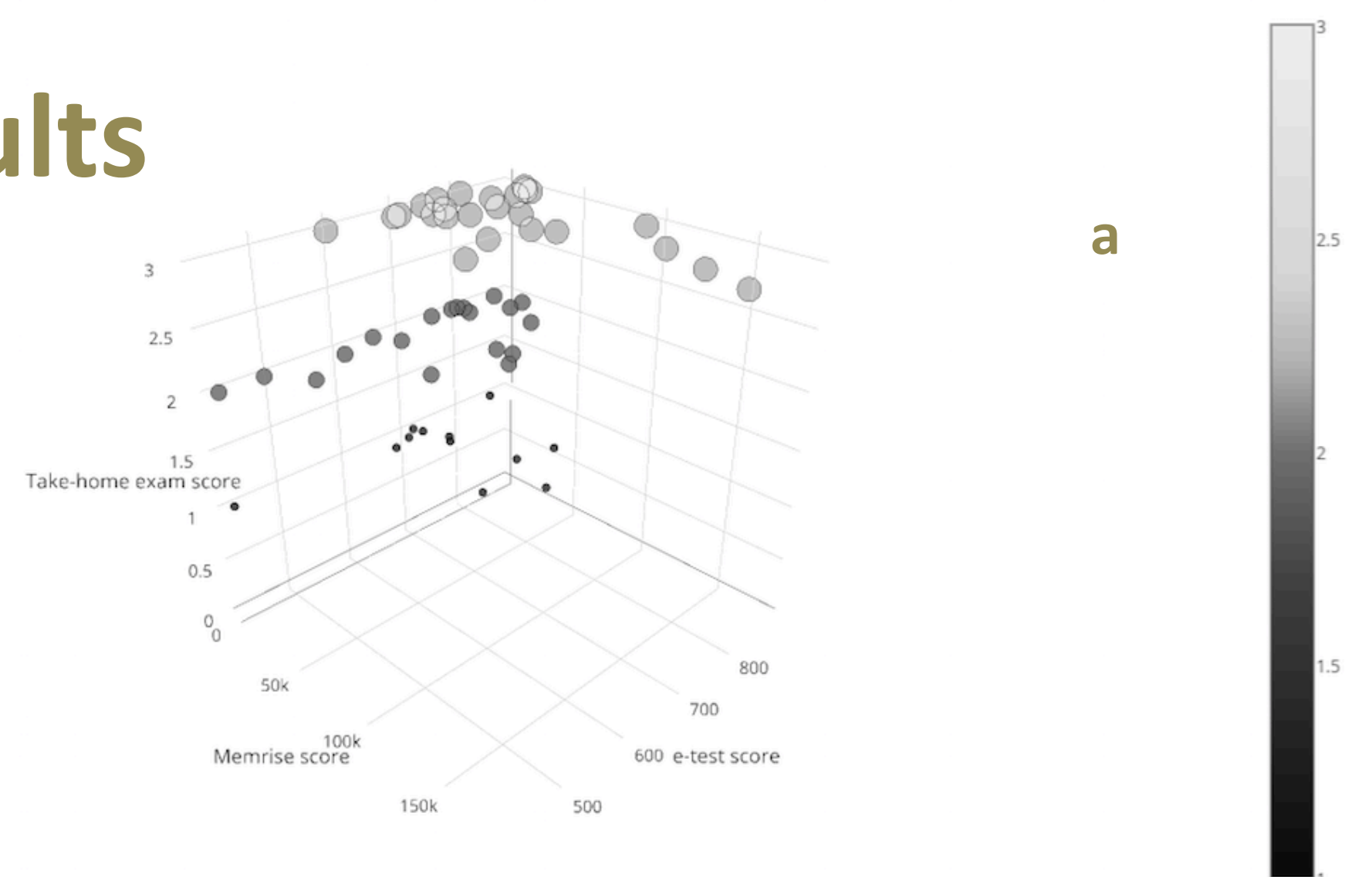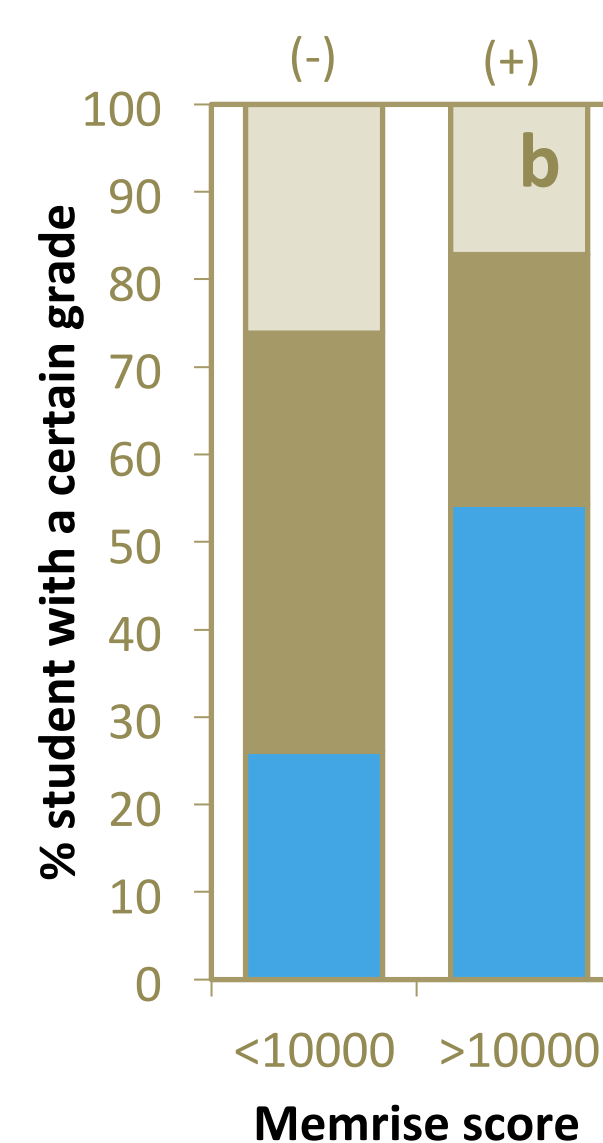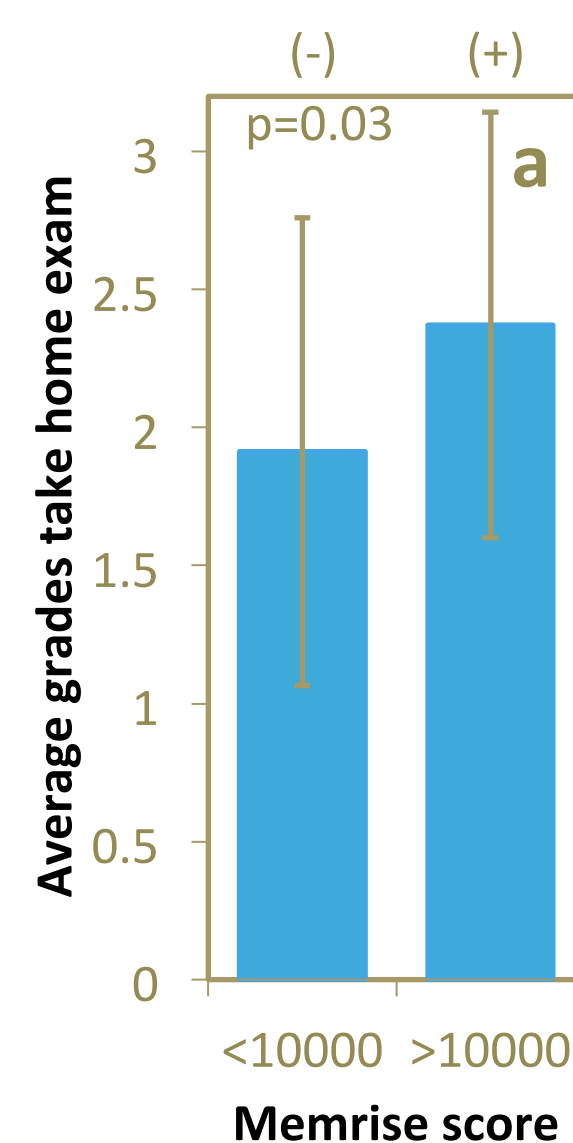
Results

Fig. 1. Correlation between Memrise scores/ time and e-tests or take-home exams.
- Student accumulated scores (z-axis)
- Student grades in take-home exam (y-axis)
- Total Memrise scores (x-axis – panel a) or minutes spent on Memrise (x-axis panel b)

Highest grade
Average grade
Lowest grade

Fig. 2. Without MEMRISE students did worse in their take-home exams. Two major groups of students were observed: (-)Students which did no MEMRISE or did MEMRISE only in class (<10000 points) and (+)Students which continued using MEMRISE outside of classroom. In panel a), the Memrise score is correlated to the average grades in the home-take exam, and in panel b) with the type of grades students got.

Other observations:
- Students thought Memrise **was not** helpful for learning complex concepts in biochemistry.
- However, students used the software for other courses (Zoology) where simpler definitions were provided.

Conclusions

- (+)Students had higher grades than (-)Students.
- (+)Students were 2x more likely to get the high grade.
- (-)Students were 1.5x more likely to get the low grade.

Although correlation does not mean causation, we noticed a correlation between student grades and Memrise scores. This could be because a) Memrise helped students achieve better grades, or b) good students are more disposed to use Memrise.