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Evaluation of a Pre-Made Expanding Flashcard Tool and Medical Student Performance on Step 1

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Introduction

As medical schools move away from pre-clinical grades, the United States Medical Licensing Examination (USMLE) Step 1 examination has become an increasingly important measure of student performance and candidacy for residency. A host of new and well-designed tools have emerged, one set of which are promoted on premise, spaced repetition flashcards. [10]

They are a departure from the process of studying, re-reading, re-highlighting, and re-annotating flashcards necessary some measure of active recall and afford corrective-feedback, test-enhanced learning. The inclusion of expanding interval spaced-repetition learning algorithms to schedule the reviews of these cards further enhances these efforts.

Expanding interval repetition is predicated on the Birkhoffian forgetting curve, which demonstrates the rate at which learned information decays if there is not subsequent review, but that with each instance of re-learning, the rate of decay decreases.[11] Complicating spaced-repetition learning further, its benefit appears greatest when materials are returned to at the precision of being forgotten, when maximal effort is required for recall, but recall is still possible.

What is Anki...

Anki is an expanding-repetition electronic flashcard program available for desktop and smartphone, capable of word-learning algorithms, and search functionality. It enables content creation, organization, and review in a single application.

After activating cards, students are presented with flashcards daily according to the SuperMemo spaced-learning algorithm. With each card, they are given the option of “Hard,” “Good,” “Easy,” and “Again.” Each corresponds to a different multiplier of the spaced-repetition algorithm, with Anki “retaking” the entire algorithm thereafter.

...and what is the Maimonideck?

Drawing from the most common Step 1 preparation materials, two UMass Medical School students created a 3000-card Flashcard deck covering the full breadth of Step 1 material, known as “The Maimonideck.” Designed for daily use over the 9-month course of second year, students utilizing the deck were instructed to activate cards as their topics were encountered; doing this consistently, they could expect from 50-150 cards of varying ages to review per day. The potential of daily study imposed in the Oath of Maimonides lent the project its name.

“Grant me the strength, time and opportunity always to correct what I have acquired, always to retain in depth, for I know a system and the spirit of man can extend indefinitely to enrich itself daily with new requirements.”

Objectives

1. Are there testing gains in students who used the Maimonideck versus those who did not, and how do those gains vary with patterns of use?

2. Did users consider the Maimonideck an effective, efficient method of Step 1 preparation?

Methods

The 125 members of the UMass Class of 2019 were enrolled before the start of spaced-year courses. The messages included a description of Anki and the Maimonideck and a link to a request access. Those who requested access received a copy of the spaced-year course, study outline, and re-creation of the 3000 cards, a usage guide for new users, a deck index and topic organizer, and a link to a shared website for reporting results.

Baseline Survey

• Administered prior to the start of classes
• Evaluated baseline academic information, demographics, and previous scores

NBME survey

• Administered approximately 12 weeks into second year, following score reporting of a customized NBME exam covering cardiovascular, renal, and nervous systems.
• Evaluated Maimonideck usage and interaction, online survey, and comparison of usage prior to the exam, and validated NBME score.
• “Usage grade” and “Interaction Grade” were given based on table below
• “Primary grade” was based on a 5-point scale asking if user agreed with the statement, “The Maimonideck is your primary study tool for reviewing previously covered material?” Categories included Primary Tool (Agreed strongly), Secondary Tool (Neutral), or Reference Tool (Disagreed / Strongly disagreed).

Usage grading:

- High: 21-30% power; Median: 7-10% power; Low: 4-6% power

Interaction grading:

- High: Absolute interaction excluded; medium: random interaction; Low: 0 interaction

Step 1

• Administered following Step 1 scoring reporting.
• Evaluated primary of Maimonideck among other study resources in the months preceding the Step 1, reading period. Responses were sorted into the following secondary-Reference tool groups after the NBME exam survey
- No Maimonideck
- Maimonideck only
- Maimonideck + reference

Discussion

There has been a proliferation of Step 1 resources, but few address a fundamental difficulty of preparing for the exam: study scheduling. The Maimonideck—a resource created by two medical students—was designed for high-achievers, daily use over the entirety of the second-year curriculum, and appears to be effective in that capacity. The 31 users averaged 248.8% on Step 1 (75%) of all text topics), compared to the 23.5% of non-responding UMSB students (30% of all text test). A second iteration of this study is underway for the Class of 2020 and will seek to address the primary weaknesses of the current project, namely:

- Selection
- We anticipate equal if not increased interest from the 150 students in the Class of 2020
- Improved Conception Tool: ObtainWilson Step 1 data from non-users

USMLE Step 1 scores of U.S. allopathic seniors by Pre-Specialty and Match Status

- National
- UMSB
- Maimonideck

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