

COMMIT: A NEW WAY TO STUDY

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by

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ABSTRACT

Commit: A new way to study

Elliot Fiske

Learning applications and platforms such as Polylearn are derided for being difficult to use and not engaging. With *Commit*, we demonstrate that through gamification and by learning from user behavior, we can create educational software that improves retention of course content and improves test scores.

Using novel learning techniques such as spaced repetition and variable rewards scheduling, we created a learning platform that is engaging and compelling for users to use. We took favorite features from existing learning platforms such as Duolingo and Memrise, and refined the app’s design based on feedback and data from users. Overall, we show that with polish and care shown to the user’s motivations, we can create an engaging educational app that students will actually want to use, and enjoy using.

We developed *Commit* for use with several Cal Poly classes. We worked directly with teachers to custom-make questions to be used throughout the app. We tested the app in 5 different classes, with around 50 active participants. We found that students who used the application performed 13% better on tests and recalled 18% more class knowledge 1 month after completing the course.

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Chapter 1

INTRODUCTION

1.1 Learning Technology

Learning technology has a large problem with usability and engagement. Learning technology typically has poor UI that leads to student confusion and low rates of engagement. In addition, it does not use modern approaches to how we understand learning and motivation.

In this paper, we introduce *Commit*, a novel web-based application that uses spaced repetition and gamification elements to educational courses. For this thesis, *Commit* was deployed to a variety of classes at California Polytechnic State University to measure its effect on student engagement and learning.

1.1.1 Why College Classes?

Commit was tested with classes at California Polytechnic State University to facilitate the creation of questions and evaluation of the application. While the app would work with any level of education from K-12 to higher education, using Cal Poly classes allowed us to easily create questions for classes that we had just taken

1.2 Spaced Repetition

One of the key aspects of *Commit* is its use of spaced repetition. Spaced repetition is an idea first brought into the mainstream by Pimsleur in the 1960s. Spaced repetition is a learning technique where students reinforce learned knowledge at specific intervals, improving long-term retention and recall ability.

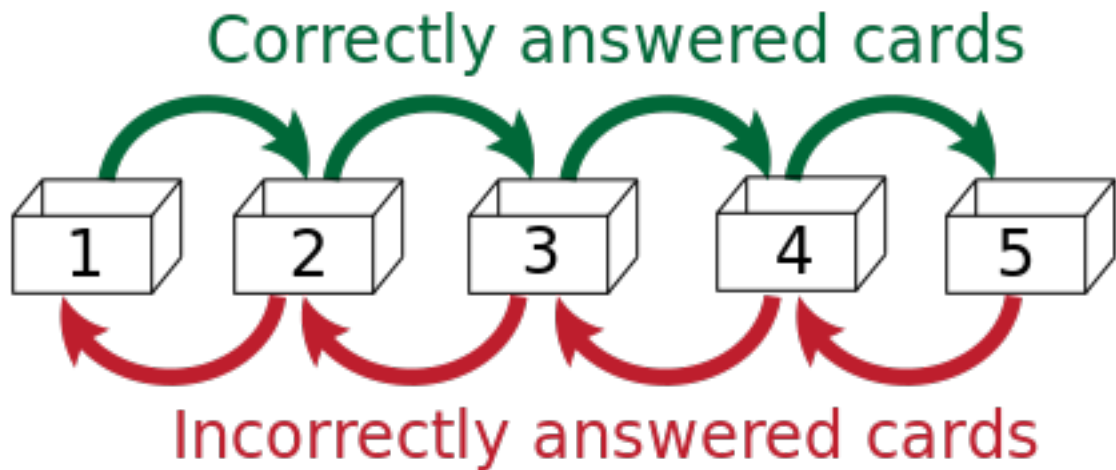


Figure 1.1: The Leitner system. If a student answers a flashcard correctly, it is moved to a higher-numbered box that is reviewed less frequently.

A simple example of spaced repetition is known as the Leitner system. Flashcards are organized into numbered boxes. (See **Figure 1.1**). Each successive box is reviewed less frequently. That is, a student would review Box 1 twice per day, Box 2 once per day, Box 3 every 2 days, and so on. If a card is answered correctly, it is moved to a box that is reviewed less frequently. However, if the student answers incorrectly, the card is moved to a box that is reviewed more frequently.

Thus, tougher cards are reviewed more often, and cards the student knows will be reviewed less often. However, all cards are *eventually* reviewed, and even cards that the student always answers correctly are reviewed in the long term.

There is strong evidence that this idea of "spaced repetition" enhances long-term memory and deepens understanding of subject material. [3]

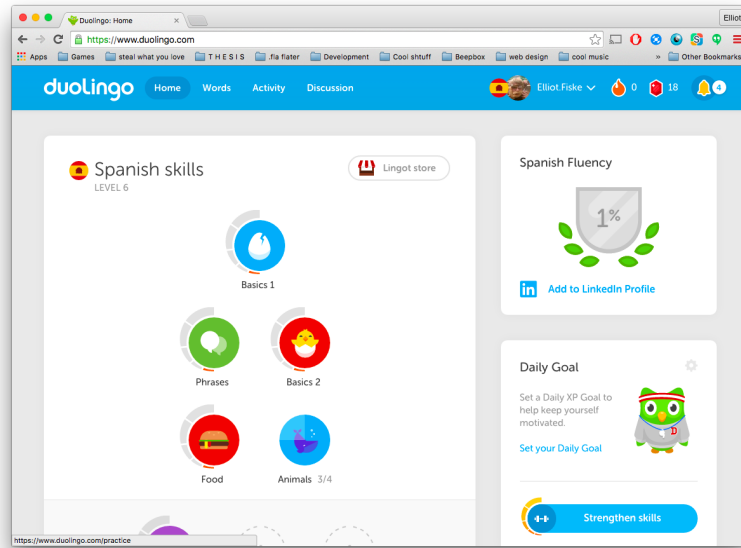


Figure 1.2: The Duolingo interface. Notice the gamification elements and the encouragement to reach a "daily goal."

1.3 Spaced Repetition Apps

1.3.1 Duolingo

Several recent apps and products make use of spaced repetition to allow user to easily gain long-term recall of languages, class content, or any other information that needs to be learned. One such app is Duolingo (See **Figure 1.2**); in Duolingo, users learn a language by repeating small tasks every day.

The app encourages users to spend a small amount of time each day studying useful words and phrases, rather than cramming in a lot of knowledge at once. It encourages this behavior through the use of gamification. Each user earns "experience" in a language, eventually leveling up. Users connect their Facebook accounts and can see their friends' levels and accomplishments, adding a social element to the app.

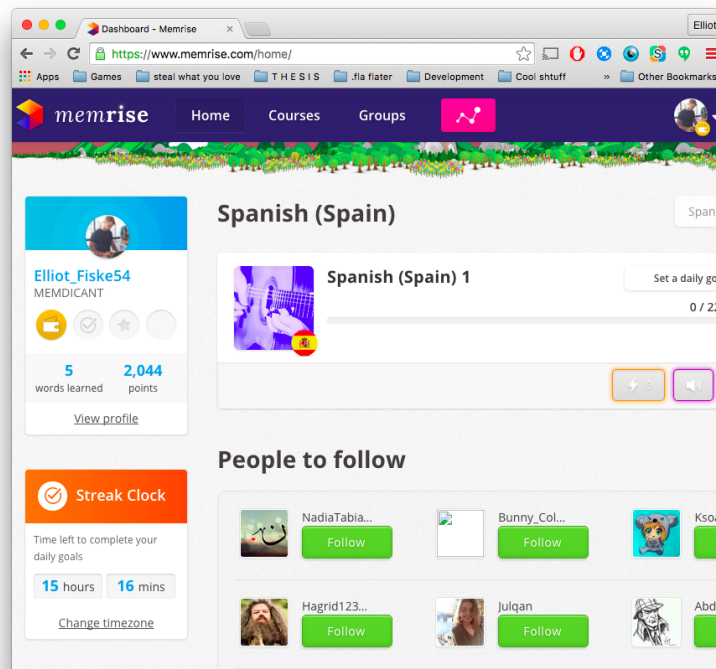


Figure 1.3: Screenshot of the Memrise interface. Note the gamification elements, the social aspect, and the "Streak" clock encouraging consistent use of the app.

1.3.2 Memrise

Memrise (See **Figure 1.3**) is a web app that has very similar function to *Commit*. Memrise takes a series of flashcard-based questions and answers and automatically creates a "study plan" where the application breaks up flash cards and uses spaced repetition to encode the information in the user's long-term memory. Memrise also uses gamification and social elements, as users earn points for every correct answer and can see their friends' scores.

Interesting to note is that users can input any data they choose into Memrise to receive a custom study-guide. This would allow students to easily learn flashcards if they took the time to input them into the app.

Both of these applications heavily emphasize language learning, since the process of learning a language can easily be broken down into a series of small words and phrases, and re-emphasized using the process of spaced repetition. However, *Commit* is scoped specifically to one class, allowing students to easily learn and retain class content without the commitment of adding their own flashcards.

1.4 Gamification

The *Commit* app is structured to incentivize students to enjoy using it. The primary incentive for experimental participants was the chance at winning a \$20 Amazon gift card. However, in order to actually obtain this reward the participants would have to engage with the app's systems.

One powerful technique used by *Commit* is the idea of variable rewards scheduling. Variable rewards scheduling is based off of the idea that it's boring to always receive the same reward for performing the same action. It's far more exciting and engaging to not know what reward you'll receive; several studies affirm that variable reward

scheduling leads to more willingness to perform a desired target action [2].

In order to earn entries into the \$20 gift card raffle, participants are required to earn a certain number of **points**. These points are earned through answering questions. However, far more points are earned if the user returns to the app every day. In addition, "bonus rewards" will be awarded at random intervals to engage users more. The expectation that today may be the "bonus reward" day leads to greater user engagement with the system.

In general, users reported that they enjoyed the gamification sections and the potential to earn rewards. Through the study in general, we note that users showed higher rates of engagement and improvements in test scores over the control group that did not use the app.

Chapter 2

BACKGROUND

2.1 Background

Chapter 3

RELATED WORK

Chapter 4

EXPERIMENT

Chapter 5

VALIDATION

Chapter 6

FUTURE WORK

Chapter 7

CONCLUSION

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