

## Effects of Entertainment on Knowledge Retention

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### Intro and Importance:

Technology is extremely prominent in today's and will continue to become a more prominent part of people's lives. This can be seen with the ratio of electronic device to person where in 2000 there were 0.03 devices per person, in 2010 there were 1.8 devices per person, and in 2020 there were 6.6 devices per person [4]. This increasing usage of technology has also made its way into the education system where students are using computers, laptops, tablets, and smartphones for watching lectures, taking notes, completing assignments, and more. This is a fundamental change to the education system and affects the way students learn and retain knowledge. The goal of this project is to explore how knowledge retention is affected by how entertaining the learning platform is. This can be used to learn about how well knowledge is retained and if the user returns to the learning platform based on the entertainment value of the platform. The results from the experience can hopefully be used to make better decisions in education and better prepare the next generation.

### Previous Work:

The first piece of paper that we will take inspiration from is a paper by Luca Chittaro and Fabio Buttussi assessing knowledge retention of safety material learned through an immersive serious game and traditional learning methods. The paper used traditional learning method (safety) cards with an HMD-based immersive game. The authors gathered information on memory retention by conducting a knowledge test before, right after learning the material, and one week after the experiment. This paper stood out because it has a focus on knowledge retention from different learning mediums and assessed knowledge over a longer time period than most studies [2]. The second piece of paper that we will take inspiration from is a paper by Meng-Tzu Cheng, Yu-Wen Lin, and Hsiao-Chint She which focuses on using a video game to facilitate learning. This paper uses a game called *Virtual Age* to facilitate learning of biological evolution. The topic was chosen due to potential learning barriers around evolution. The subject of this experiment was 62 7th graders. This paper stood out due to having a similar premise of exploring learning through a traditional and more entertaining medium. However, this experiment differs in what is being researched where this paper explores the learning process and in-game behavior while our experiment will focus on memory retention [3]. The third paper we will explore is an evaluation of the impact of interactivity and entertainment during educational conferences. This paper uses a control conference using PowerPoint lectures and a more interactive and entertaining conference with multimedia, audience participation, and faculty

mentorship. This paper stood out due to a similar premise of exploring knowledge acquisition through a traditional medium and a more entertaining medium. Even though this paper revolves around conferences rather than online learning, it has a similar premise [1].

### Plan:

With the introduction of technology into our school systems students have been relying on websites like Quizlet to help them easily share and study flashcard sets. It is so prevalent that it is unlikely to find a student over the age of 12 that hasn't at least heard of Quizlet. The issue with quizlet however is that it is just an online version of a set of notecards without a high entertainment value. We plan to introduce more entertainment into the proven technique of studying with online notecards and will explore the effect on memory retention and desire to continue studying at different entertainment values.

In order to test if there is an improvement on knowledge retention while using a form of studying that is more entertaining than current options, we plan to create a flash card like app to quiz users in an engaging way. There have been studies testing the effectiveness of video games and their effect on learning [1], but it isn't scalable when you think about how many different classes there are and how each of them would need their own game relevant to the content of the class. The goal of our experiment is to show that a more general medium of entertainment, like a flash card game, could have the same effect on the retention of knowledge in users. This would allow teachers to tailor our app to something that would fit into their personal teaching.

### Visualization and Technology:

For our demo, our current plan is to make a computer based interface designed to be similar to the popular online study tool Quizlet. The main use of Quizlet is digital flashcards that people can interact with. We plan on creating a similar scenario but with more interactive elements and different forms of sensory input. We will have a basic layout of a flashcard in the middle of the screen that can be flipped by the user. The Flashcard will have a question on the front and the answer on the back. Below the flashcard will be multiple choices for the answer to the question that the user must choose before they can move on to the next flashcard. Above the flashcard will be a progress bar and a points total for the current user. Everytime the user chooses a correct answer, there will be a positive chime sound effect that will play, and there will be points awarded to their total. The user will be able to flip the flashcard and see the answer, but they will not receive any points for answering that flashcard on that attempt. Anytime the user selects the wrong answer to the question, a small number of points will be taken away from their total. The goal of the exercise is to fill the progress bar by getting points selecting the correct answer. The order of the flashcards and the answers below each flashcard will be randomized. Once the user completes the progress bar by getting enough points, they will be rewarded with a "win screen" that will congratulate them on their success.

0 347 points! 1200

**What is the  
capital of Peru?**

Flip card - NO points

**Cusco**

**Lima**

**Puno**

**Iquitos**

(Basic layout of the interactive interface)

#### Experiment Description:

Our experiment will involve the random assignment of two test groups, an experimental group and a control group. These two groups should be similar in any relevant factors that may affect memory retention for example age, gender, and education level. Our experiment will hopefully use CS-464 students at Colorado State University to provide a common background of being university level Computer Science or Computer Engineering students. Between these two groups, our independent variable will be the entertainment value of the learning form. Our dependent variable will be the short term and long term memory retention of the study material. For the stimuli, we will develop a study tool with high entertainment value and another with low entertainment value. The material covered in these should be of similar length, content, and difficulty. After the stimuli has been presented, we will administer a short quiz to test for memory retention. This will be measured immediately following the use of the stimuli as well as a week following the use of the stimuli. We will then average the scores and use statistical methods to determine if there is a significant difference in memory retention between the groups.

#### Conclusion:

Our experiment's goal is to explore the relationship between the entertainment value of a learning medium and the effects on memory retention and desire to use the platform again. We will do this by developing two online note card applications where one is the control with low entertainment and a more entertaining version. These will be given to two separate groups to learn new concepts and gather results. This research can be used by teachers to better help students learn and understand how to keep students engaged in a world with an increasing reliance on technology as a learning medium.

References (used IEEE citation format)

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