Avatars in the Classroom: Promoting Understanding of the Active Learning Process Through Gamification

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Abstract

This paper describes a long-term CLIL class project that reinforces awareness of study behaviors that may influence the understanding and retention of course concepts and vocabulary. The project turns the learning process into a game in which student teams curate the knowledge accumulated by their team's avatar, an imaginary student that is participating in the class alongside them.

Using a simplified version of cognitive psychology's model of short and long-term memory, the teams shuffle bits of information into different categories of their avatar's body of acquired knowledge. Some of this information is transient and subject to removal. More firmly internalized material is shifted to long-term memory and becomes safe from mishap. Over the course of gameplay, specific actions, events, and random occurrences help or hinder the learning process and serve as tangible examples of how various factors affect retention.

In the gamification of the learning process, the project seeks to take advantage of the human impulse to be a "backseat driver." By "teaching" the avatar and making critical judgments about what must be done to help the avatar to succeed, students gain insight into their own learning processes.

Introduction

Games in language learning are certainly not new and there is robust interest in gamification and game-based learning as ways to make education more intrinsically motivating. Gamification involves adding game elements such as badges to target content, while game-based learning involves integrating target content with game mechanics (Findlay, 2016). Both seek to increase engagement by increasing the entertainment value of otherwise mundane tasks.

The Avatar Project was a class game-based learning project that incorporated aspects of both gamification and GBL. It was initially developed and run in the freshman CLIL Introduction to Literature course at Miyazaki International College in Spring 2017. With the invaluable support and advice of Dr. Katherine Bishop, the content professor in this course, this long-term project ran for a period of almost 2 months and has since undergone considerable evaluation and revision over the years

since its initial development. This paper will explain the rationale, activity framework, and pedagogy underlying the project as it was conceived, and also outline variations that make the parts of the larger project useful in shorter time frames.

Project Objective

The primary objective of the Avatar Project is to reinforce students' awareness of study behaviors that may influence their understanding and retention of course concepts and vocabulary. The term "avatar" in the project's name is a reference to the computer term that describes the image or figure that a person may choose as their online representation.

In this project, students create an avatar to be a virtual student whom they guide through the learning process. Participant students work together to "pilot" their avatar through modified versions of the same lessons that they are themselves experiencing in class (e.g. literature content). To do this, students must understand the class material well enough to decide what their avatar will need to learn. The avatar's learning can be affected by random game events as well as actions that the human students choose for their avatar. Will the avatar form a study group, or go to a movie with friends? Will the avatar try to cram for the next quiz, or spend short amounts of time studying daily?

The success or failure of the team is measured by applying the avatar's accumulated body of knowledge to an assessment task, such as a quiz, prepared by the instructor or project manager. In other words, it is not the human students who must answer the quiz. Rather, the avatar must "know" enough to pass without any additional information provided by the students once the quiz has begun.

In short, the project turns the learning process into a game in which student teams teach their avatar what is important, and help them to maintain that body of knowledge in preparation for an evaluation.

Simply packing as much information as possible into the avatar's memory would be effective, but hardly realistic. Therefore, as a major game mechanic, the project uses the co-opted terms "short-term memory" (STM) and "long-term memory" (LTM). Atkinson and Shiffrin's (1968) multi-store memory model describes short-term memory as lasting up to 30 seconds and long-term memory as anywhere from minutes to years. Within the project, teams shuffle bits of information into the different

categories of their avatar's body of acquired knowledge. Some of the information is short-term: transient and subject to removal. For the purposes of gameplay, this vulnerable information is said to be in short-term memory. More firmly internalized material is stored in long-term memory and is safe from mishap. Over the course of play, specific actions, events, and random occurrences help or hinder the learning process, shift information around, and serve as tangible examples of how various factors affect retention.

Putting project participants into the position of "backseat driver" offers several advantages. Foremost among these is the benefit of learning by teaching. In making critical decisions about what their avatar needs to know in order to do well on the assessment task, students come to understand what they themselves need to know. Furthermore, shifting assessment from the student to the avatar allows project participants to explore the effects of a range of activities that may be either positive or negative without suffering real-world consequences. This makes it possible for avatars to fail spectacularly and thereby create object lessons of what *not* to do for the team's members.

The Avatar Project Overview

The initial incarnation of the Avatar Project incorporated a number of factors to make the experience more nuanced. Creating a scenario in which study is valued to the exclusion of all else is unrealistic and pre-determines in-game choices about appropriate behavior. With this in mind, avatars scored points in 3 ways. First was the STM/LTM system in the category of Knowledge. The second was a category of Fun/Health (F). The last was a category called Life/World (L).

Within each category, teams rolled on a table of random events that awarded points for that category. Events in the Knowledge category included "Review Notes +1STM," and "Study Session +5 STM." Events in the category of Fun/Health were determined by the avatar team when the avatar was first created and could include entries like "Learn to Cook +2F," or "Hiking +1F." Similarly, entries in the Life/World category could include "Neighborhood Cleaning +1L," or "Coach Soccer Team +2L."

However, some of the items on the event list were negative. A long vacation could cause the avatar to lose all accumulated STM, a broken arm could reduce

Fun/Health points, and getting into an argument with someone might cause a similar reduction in Life/World points.

Every day, teams would roll once for each category and 3 more times in any category of their choosing. They would then record the resulting events in their avatar's journal. The 3 free rolls in any category were important because they provided a means for students to prioritize the category of their choosing.

When STM was accumulated, teams were instructed to write something important from class on a notecard, one card per STM gained. The note cards were kept in an envelope designated for STM and which represented everything in the avatar's current short-term memory. When events dictated that something be lost from STM, cards were drawn from the envelope at random and put into a "Forgotten" envelope. Forgotten items could be restored to STM when new STM points were earned.

Once each day (and also when dictated by the Knowledge category on the random table of events) one STM card could be chosen for conversion into LTM. The information on the STM card was either copied or taped into an LTM record and was no longer subject to loss due to events.

Project teams were also encouraged to keep a separate notebook for their avatars. They were allowed to put anything they wanted into the notebooks. The notebooks were useful for keeping track of what information should eventually go into STM when points became available, and were also available for use during open-book quizzes.

At the end of the project, avatars were evaluated with questions that could only be answered if the necessary information was in current STM, or LTM. Simply accumulating points in the Knowledge category was not enough to ensure success. The teams needed to be selective about what information went into STM/LTM since available space was limited. It is worth noting that while this system identified an academic "winner," it also recognized the value of fun, health, and life experience.

It may help to understand the flow of the game by examining a greatly simplified version that focuses on vocabulary review within a 30-minute timeframe.

Avatar Project: Quick Game Rules

In this short version, the game is more interesting if set up competitively. Pairs of students manage a single avatar and compete with one or two other avatars seated at the same table. The content focus is on vocabulary review.

Terms

- STM = short-term memory (may be forgotten/flipped)
- LTM = long-term memory (always remain face up)
- Add* = draw STM cards from the vocabulary pile (or restore forgotten cards)
- Forget = flip STM card over (flipped cards do not count for points unless they are restored)
- Restore = flip a forgotten card right side up

Set Up

- Each player/team designates a space for STM and LTM cards in their area. (An avatar sheet with space marked for each type of card can help to avoid confusion later.)
- Each player/team receives a sheet with the Avatar Actions Table and the Challenge Table.

Table 1. Avatar Action Table (Quick Game)

Avatar Actions Table		
2d6	Description	Effect
2	Long vacation	Forget 5 STM
3	Other priorities	Forget 3 STM
4	Skip a class	Skip one turn
5	Ignore homework	Forget 2 STM
6	Zone out in class	Forget 1 STM
7	Daily homework	Add 1 STM
8	Review before class	Add 2 STM
9	Vocabulary building	Add 3 STM
10	Study Session	ALL players add 2 STM
11	Reorganize notes	Add 3 STM & move 1 STM to LTM
12	Epiphany!	Move 3 STM to LTM

Table 2. Challenge Table (Vocabulary)

Challenge Table (OC=opponent's choice)		Vocab
Card #	Description	STM Reward
A	Give the definition for a word (OC)	1
2	Mime & guess a word (OC - team guess)	2
3	Spell a word (OC)	1
4	Sketch & guess a word (OC - team guess)	2
5	Provide a synonym or antonym for a word (OC)	1
6	Correcctly guess the word based on a definition (OC)	2
7	Divide a word into syllables (OC)	1
8	Give another form (n, v, adj, etc.) of a word (OC)	2
9	Provide a synonym or antonym for a word (OC)	1
10	Correctly use a word in a meaningful sentence (OC)	2

- Each player/team gets one set of vocabulary memory cards (either prepared by the instructor or written by the students at the instructor's direction). Shuffle and place face down in the center of the play area.
- Each player/team gets 2 6-sided dice (2d6).
- Shuffle and place Challenge cards (numbered 1-10) face down in the center of the play area.
- Each table receives a master vocabulary list of words and definitions.
- A player/team is chosen to go first and play proceeds clockwise around the table.

Actions Taken on Player/Team's Turn

1. Player/team rolls 2d6, checks the Avatar Actions Table, and applies any effects.
    1. Study Session – All player/teams add* rewards as indicated.
    2. Skip a class – The player/team's turn ends immediately. (Skip to 4 below.) Play resumes normally with no further penalty.
2. Player/team draws a Challenge Card and fulfills the action described. The opposing team selects challenge words when appropriate (OC = opponent's choice). Guessing tasks are fulfilled by teammates. Reward cards need not match the words chosen in an OC challenge. Guessing tasks may be disregarded and a new card drawn if players are not teamed. If the Challenge is fulfilled successfully, player/team adds* rewards as indicated. Note: If Challenge Cards are drawn from the top of a shuffled pile, all of the challenges will be issued,

albeit in a random order. For truly random challenges, use a spinner, 10-sided die, or simply shuffle the cards before pulling a card.

3. After all other actions are completed, player/team transfers 1 STM to LTM.
4. Dice are passed to the next player/team.
5. Play continues until a number of turns or a specified amount of time has passed.

** Note: whenever cards are drawn from the stack, draw one extra card. Choose one card to return the bottom of the stack and add the remainder to STM. This does not apply to forgotten words that are selected for restoration to active status.*

Winning the Quick Game

At the conclusion of play, the teacher conducts a "quiz" on the material from the vocabulary memory cards. (More open-ended games may be played with blank, write-in memory cards. If this is the case, the scope of the material should be announced beforehand.) Avatars score points when their avatar has words in STM or LTM that match material on the quiz.

Discussion

The basic game mechanics of the project lend themselves extremely well to variation. More time, less time, broad content coverage, narrow focus, cooperative work, and competitive formats can all be accommodated fairly easily. The goal of raising and reinforcing awareness of beneficial study behaviors can be addressed with a fair amount of subtlety by adjusting the rewards and penalties applied in the Avatar Actions Table. Actions that the instructor deems to be most desirable can be assigned more beneficial rewards, while those that are seen as harmful can be assigned appropriately disastrous penalties. Targeting specific behaviors and referring to them by name will help to reinforce them as students play.

This process of deciding what to reward, what to penalize, and the relative values of each pushes the instructor to make thoughtful decisions about what is really important. Game design can be a delicate undertaking, and as McGonigal (2011) points out, it requires looking at the world from a somewhat different perspective. Game designers must balance effort and reward, advancement and failure, and always consider the maximization of engagement.

Since the project's avatar is a virtual construct, novelty can be increased by mixing in fanciful elements if the instructor feels that doing so will increase engagement for a given group of participants. For example, extraordinary events might have an effect on LTM causing the avatar to lose information that should otherwise be "safe." Perhaps the avatar is struck by lightning or abducted by aliens resulting in some form of selective amnesia as an extraordinary event? The point of introducing elements like these would be to increase the entertainment value of the game.

With additional time and energy, it would be possible to expand the avatar's portfolio of knowledge and skills beyond a single course or discipline. The avatars could then compete with one another in academic challenges or other skills that they would need to balance against their STM/LTM development. What if the STM gains for a given period had to be divided between two or more areas of study? Additional elements like these increase the learning curve, but have the potential to greatly increase entertainment value for the right group of project participants.

Entertainment value should never be underestimated as a motivator. In his book, *Wonderland*, Steven Johnson points out that "you will find the future wherever people are having the most fun" (2016, p. 13). He means that innovation is often inspired by the quest for entertainment. There is little reason to think that his conclusion is unfounded and a lot of reason to believe that combining education with entertainment can have a profound impact on society at large.

The notion that a project like the one described in this paper might be converted into a computer-based educational tool is a provocative one. Large portions of modern society today participate in social discourse through a computer screen. Goldberg (2011) points out that videogames represent a huge commercial force that outstrips movies, music, and DVD sales in the digital marketplace. Games are compelling, and immersive virtual experiences provide some of the richest and most intoxicating examples of this. If we could bring even a small portion of that interest to the realm of classroom education, the results would be profound.

Although the project described here is not a videogame, the two do share some benefits. Increased engagement, critical evaluation of the relative value of course content, and a greater awareness: those behaviors that are most valuable for achieving academic or personal goals.

References

Atkinson, R. C., & Shiffrin, R. M. (1968). Chapter: Human memory: A proposed system and its control processes. In Spence, K. W., & Spence, J. T. The psychology of learning and motivation (Volume 2). New York: Academic Press. pp. 89–195.

Findlay, J. (2016, August 12). Game-Based Learning vs. Gamification: Do You Know the Difference? Retrieved from https://trainingindustry.com/articles/learning-technologies/game-based- learning-vs-gamification-do-you-know-the-difference/

Goldberg, H. (2011). All Your Base Are Belong to Us: How 50 Years of Videogames Conquered Pop Culture. New York: Three Rivers Press.

Johnson, S. (2016). Wonderland. London: Macmillan.

McGonigal, J. (2011). Reality is Broken: Why Games Make Us Better and How They Can Change the World. New York: Penguin Press.