

Short-Term Memory Analysis through RPG-Based Language Immersion

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INTRODUCTION

UPDATED-8 December 2018. This project will focus on the short-term memory retention process through a language immersion video game based on a Pokémon turn-based Role Playing Game (RPG), where a quiz will be given to the user upon completion of a playthrough.

An RPG is a type of gameplay style where the player assumes the role of imaginary characters, who often utilize specialized skills in order to advance through an adventure-centered gameplay. While many traditional role-playing games have the player assume roles such as a Warrior (combat skills), Mage (magic skills), Thief (stealth skills), etc., players in Pokemon games play under the guise of a Pokemon Trainer as the main protagonist, who is typically a child seeking to become the Pokémon Champion by traveling around their country, befriending people and Pokémon alike. This budding Pokemon Trainer's specialized skills involve not much more than building and utilizing the perfect Pokemon team to beat every gym leader (the boss-battles scattered throughout the games).

The Pokémon games take place in a world with monsters that have special powers named Pokémon. The name Pokémon is a portmanteau of the original Japanese title “Poketto Monsutaa”, which is just the Japanese transliteration of “Pocket Monsters”. In these games, you take control of a young character that ranges from 10-16 years old as they explore a country with their Pokémon and befriend new ones, and use them to fight against others. It's a lot like cockfighting, except it is somehow ethical within the digital scope of the universe of this series. At their core, the appeal of Pokémon games is that they allow the player to explore, engage in turn-based battles and catch Pokémon. It also helps that Pokémon designs are known for being aesthetically “cute” and visually appealing and can be marketed for the creation of merchandise quite easily.

To immerse in a target language means to place oneself directly in an environment where the target language is predominantly used. All of the senses—speaking, writing, listening, and reading—are engaged, and this can only be fulfilled by being present in an environment where the language dominates the course of daily life. Ideal immersion would be to completely detach oneself from their native tongue and live life exclusively through the target language. A common method of immersion is when people travel to the country of their target language (e.g. traveling to Japan for Japanese-language immersion) as it forces the learner to learn the language the natural way that children do: through living daily life communicating only in that language.

While most video games oriented towards language learning add video game elements to a language learning program, our project is a video game that adds language learning elements. This way, we are seeking to more effectively keep the attention of the user and attract audiences that might not otherwise be interested in language learning.

Many people in other countries have learned English by playing widely available Pokémon games, and this game is the logical extreme of such a phenomenon. Our game will immerse players by switching words from one language to another as they progress through the game. Additionally, players will have a readily accessible dictionary within the menus of the player interface so they can reflect on and review previously learned words. We will take a somewhat conventionally different approach to language learning by having a player immersed in their target language through a video-game.

Upon the completion of the project, we will test players with an end-game short-term memory test in order to see how effectively they retained the words they learned in-game. We would also like to assess whether or not memory retention of foreign language

words is guaranteed or at least *probable*. Ultimately, The aim for our language-immersion game is to help the end user get an experience close to immersion digitally without having to immerse in real life since few have the resources, money, and opportunity to travel.

PREVIOUS WORK

Analysis of Short-Term Memory Retention through Acquisition and Instruction

Since our project relies on reading and quizzing the player as the end of their play sessions in order to see how well they retained those words through reading, it would not be ideal for “language-immersion” in the sense of *total* immersion—through reading, listening, speaking, and writing. The scope of this project will focus on reading along with interactivity so that the player can confirm and reinforce each new word learned through direct interaction (e.g. the player just learned the word *tienda* for ‘store’ and they cannot advance to the next part of the game without purchasing something from the *tienda*). Elvira Sanatullova-Allison, in her paper “Memory Retention in Second Language Acquisition and Instruction: Insights from Literature and Research,” [5] helps to highlight the fact that solely relying on reading and listening for vocabulary retention is highly inefficient (Sanatullova-Allison 3). Thus she has helped us clarify a shift in the goal of this project—at first we wanted to use procedural generation to change words, but her perspective made us carefully examine short-term memory retention in the player after applying the semantics of their new information acquisition in the *context* of the game.

From my observations, the acquisition of most explicit knowledge comes by rote memorization of vocabulary and language exposure. In this case, introducing and reinforcing explicit knowledge seems straightforward: introduce the player to a new word, quiz them on that word hereafter, and see how well their short-term memory retains that word after one playthrough. Though this sounds direct in theory, it is still a flawed approach since it takes advantage of only the reinforcement of explicit knowledge, where only the word itself is being reinforced through rote memorization while neglecting context and immediate interactivity.

This is where the idea of implicit knowledge as “corrective active, retrials, [and] continual communicative practice comes in” (Sanatullova-Allison 3)—with this in mind, we will introduce language dynamicity throughout the game. It is much too dry and ineffective to learn a new word, then see it randomly pop up throughout the rest

of the game while having no relevance in one’s progress of the game. In order to advance to the next part of the game, the player must *prove* their knowledge retention, and if they managed to forget the word after having been introduced, hints and clues will be given. This way, the player’s information processing would be much more implicit as shown through the trial-and-error nature of their actions.

“Not all input becomes intake,” and the learner may be conflicted on “whether to achieve communication or acquire knowledge” (Sanatullova-Allison 5) upon learning a new word in the game. This directly ties into the fact that “comprehension of input [does not lead] to learning, but rather a lack of comprehension and a gap in knowledge leading to mis- or non-understanding” (Sanatullova-Allison 5) of the word. Through these connections, it can be implied that learning a new word and continuously reinforcing it through context is simply not enough—and the potential cognitive conflict of the user not knowing whether to treat the new word as *knowledge acquisition* or *communication acquisition* could definitely be a deficiency on our part of our initial approach. This cognitive conflict could very well backfire on our goals for the project—in the worst case scenario, the user does not retain any of the words because they are treated as non-contextual *knowledge*, as if they were random, meaningless strings of words, with no immediate relevance in the context of the game. When designing and coding the game, later on, we must be aware that this conflict of *knowledge* vs. *communication acquisition* exists, and we must take precaution to eliminate or minimize that conflict while emphasizing our central approach of second language implementation through *context*.

As promising as this approach may be, immediate context and interactivity are still not enough. The user also must associate that learned word with vivid things such as “imagery mediation” and “semantic mediation” (Sanatullova-Allison 5), in the best effort to have the user associate a word with an *image*, *situation*, and/or *emotion* rather than as another passing, trivial piece of explicit knowledge to be processed then dumped by the short-term memory.

Later on, Sanatullova-Allison shifts her focus from the problems of memory retention to instructional approaches of second language acquisition. The main question that may be posed is the following: is incidental or intentional vocabulary learning more conducive or effective to second language acquisition?

Learning new words in context and extensive reading is also “neither necessary nor sufficient for efficient

vocabulary expansion" (Sanatullova-Allison 6), and this sentence helped us understand that in addition to *context*, the frequency of repetition is needed. Encountering a new word in context and being exposed to that word repetitively directly relates to the processing and retention of new information since words "that are difficult to learn should be overlearned to ensure long-term retention" (Sanatullova-Allison 6). But, in order to emphasize that causality of the game and to not treat it as a high-expectation, academic test, the words in the target language will focus on simple words like *store*, *bag*, and *person*, among others. We will therefore make sure that the words we choose are simple, directly related to the context of the in-game situation, and that its proper retention plays a key role in the player's progression in the game.

More than One Way to Learn?

Nian-Shing Chen et. al [1] has helped us discover the presence of a few flaws in our initial plan. First of all, it was ignorant of us to assume that people would learn vocabulary from pure text-based guidance. This paper along with Sanatullova-Allison's paper [5] made a very clear point that only using one form of learning actually hampers memory retention. We realized that we still need to provide visual or other types of aids in order to reinforce certain vocabulary words in the player's mind, especially in the case of static menu elements. Using indicators to reinforce the translations of particular words would allow the player to have a reference point when looking at an unfamiliar word. Another method to reinforce particular vocabulary words in a player's mind would be to force the game to switch to the target language for particular words and base the gameplay around them.

An extremely important part of good game design is that the design of the game should influence the player in subtle ways to take particular actions. A great example of this subtlety is in Megaman X for the SNES (Super Nintendo Entertainment System, Nintendo's main system from the early to mid-90s). During the title screen and introduction stage, it is shown multiple times that the player can charge their weapon for a more powerful shot. This is done by showing other characters doing the same which gives the player the impressions that they can use this attack if they want, which leads them to the path of discovery. Game design can be extremely subtle, but if utilized properly, it can be an extremely powerful indicator and thus give the user a better experience as a whole. If certain words relevant to the plot or the UI (User interface, which includes menus and dialogue

boxes) are forced to change, the player is forced to be exposed to them. This gives us two solid methods of subtly leading the player to memorize words rather than changing them around and hoping for the best. Beyond this, the paper made me realize that people have multiple methods of learning and one cannot assume that there is one perfect method through which anybody can learn, but rather that there are many different types of learners that we as designers have to consider. Lastly, this paper [1] reinforced our idea to quiz people by using a very similar approach discussed earlier, where the effectiveness of *immediately* quizzing people after finishing the game would be evaluated.

Gaming Subcultures and Modern Technology

While Godwin-Jones [3] aimed to define certain subcultures and media types, a very important takeaway from his paper is that modern technology (especially video games and the Internet) naturally lead users to *want* to learn from them. In this paper, Jones makes the point that socially oriented online games (such as World of Warcraft and other MMORPGs) are "sites for socially and materially distributed cognition, complex problem solving, identity work, individual and collaborative learning across multiple multimedia, multimodality 'attentional spaces' and rich meaning-making and, as such, ought to be part of the educational research agenda" (Godwin-Jones 18) and that media can lead people in particular communities to enhance their fandom with academic pursuits, such as in the case of anime fans learning to write in order to contribute to fanfiction websites. Fans are extremely passionate people and will do just about anything (within reason) to show their love for the series that they enjoy.

Godwin-Jones [3] closes by explaining that millennials (and therefore also Gen Z) are extremely interested in online games and that by implementing language learning aspects into these games, many younger people can benefit by learning languages while playing games in their free time. This concept ties into the heart of our game—the idea that a video game can be a good video game in its own right while still being educational. Many educational games (or edutainment games as they are known among game fans) are developed as educational tools first and games second, which leaves a foul taste in the mouths of many players and give them little incentive to continue playing. Having said this, this paper makes it abundantly clear that the demand for a game that is developed *as a game first* with educational content added in as a secondary thought,

perhaps players will overlook the stigma of edutainment and perhaps use it as a legitimate learning tool in the future, which is our ultimate goal.

APPROACH

In today's world, being bi- or multilingual is a highly valued skill as it can make one more competitive in the job market for a vast array of industries—economics, finance, STEM fields, among others. Even though learning another language would not be a big requirement for somebody who grows up and chooses to stay living in a monolingual environment (e.g. most Americans), knowing more than one language can still make any future travel prospects or communication with foreigners more feasible and fun. Without regard to the job market, multilingualism has been proven to be a high beneficiary for health as it delays Alzheimer's disease [6] and strengthens neurological connections in the brain, thereby making one sharper and mentally alert. Therefore, there is nothing to lose with learning a new language—you gain the two benefits of being more highly valued as an employee and having sharper, prolonged mental dexterity.

We both have a vested interest in language learning and we have grown up playing the Pokémon games. We became friends in Chinese class, and this project is the culmination of our interests from childhood into the modern day. By creating a Pokémon game that is focused on language immersion, we hope to combine all of our interests into a new implementation of language learning.

Design Philosophy

In this game, words from text boxes and UI elements will gradually change in-game from one language into another until the game is being played in an entirely different language. While we do not have the resources or time to make a full game that completely transitions into another language, we are still able to research the efficacy of the effect that this idea will have.

Visually and aesthetically, the games will resemble the fourth generation of Pokémon games that debuted on the Nintendo DS in 2006 and ended in September of 2010 when the fifth generation was released, which signified a visual overhaul in the series. This approach has players locked on a two-dimensional grid with three-dimensional assets here and there to simulate the illusion that the world is more full and immersive, despite having extremely simple gameplay.

Our game will be a Role Playing Game which has you take control of a player character, talk to other

characters, battle, and explore. There are many different types of RPG games, but the main ones are JRPGs (Japanese RPGs) and WRPGs (Western RPGs) with other minor subgenres. While the differentiation between Western and Japanese RPGs might seem irrelevant, Japanese and Western RPGs greatly differ in terms of implementation due to different attitudes surrounding game design in their respective countries. JRPGs generally take place in a fantasy setting with over the top battles, teenage protagonists, and superpowers. JRPGs are famous for turn-based battle (which I will define shortly) sequences, over-the-top action and heavy reliance on story. Examples include Final Fantasy and Chrono Trigger. WRPGs are generally much more realistic and interactive and focus on exploration and have older cast members. Some famous examples include the Elder Scrolls series and the Fallout series. Both tend to focus on story, but JRPGs generally focus on story elements much more frequently.

The Pokémon games were pivotal in establishing Nintendo's continued success to this day and helped solidify JRPGs as a genre since they came out in the mid-90s which are considered by many to be the golden age of the genre. Turn-based combat is a means of combat that is slightly strategy-based. While many games that utilize turn-based combat use flashy animations to engross the player, it's really just putting lipstick on the pig that is a text and a math-based battle system. One player chooses an attack for their Pokémon to use against the AI player or a second player (we will not be implementing two players for this.) and upon using an attack, the opponent makes their move, then the player character is given control back, and the cycle continues until the battle ends. The means to win is to reduce the hit points (HP, or more technically a numerical representation of how many hits it will take to defeat a Pokémon) to zero. This battle cycle continues until whoever has the most Pokémon at the end wins.

Battles are the cornerstone of any RPG, and Pokémon is no exception considering it made Pokémon's owners \$15 billion with these battles at the center of it. By their very nature, RPGs are interactive and use a large amount of text. After taking these considerations into account, we decided that it would be best to use an RPG for these purposes. We decided on making a Pokémon fan game because (as previously mentioned) we both grew up with the series and the worldwide success of Pokémon GO makes the series attractive to a wide range of people who might not otherwise be interested in language learning.

The game will be created through a fan-made cross-platform Unity engine (MacOS/PC) in C#.

Technical Approach

We will be coding in C# through the Unity cross-platform game engine. Our assets include a Pokémon fan engine named Pokémon Unity as well as multiple game assets from around the Internet. The software we will use in creating mockup map designs is another fan-made Pokémon game creation tool within RPGMaker named Pokémon Essentials which also provides us with in-game assets. While Nintendo has killed this project, the source code and forums can still easily be found. We bought and downloaded RPGMaker directly from Steam and have nearly all of the assets ready. Because we are working with Unity, we want our game to be compatible with MacOS and Windows.

In order to expose the player to Spanish vocabulary, certain words will be changed from English into Spanish. We initially considered changing UI elements as well as procedural generation, but the game engine allowed for neither. Given the scope of this project, reverse-engineering an entire game engine seemed like a recipe for disaster. By forcing particular words to change, it allows us to design the game around the idea that this word changes and guide the player into memorizing it by using context and reasoning, thus forcing them to think about the word before memorizing it. This creates a much more complex method of vocabulary reinforcement compared to “this one word is suddenly another language now, good luck”. Each word that changes will be recorded and then added to the menu dictionary for players to review at any time.

Different areas of the map and different levels of gameplay will be toggled through different game states. Exploring a single map would require a differentiation in local space vs. world space, where the camera follows the player as the player navigates through the map. Entering new levels of the game would require instantiating new game states and disabling all others that are not in use—for example, merging from the starting area (level 1) to level 2 of the game (the first route) would require disabling the level 1 map and enabling the level 2 map. This same pattern of logic will be followed for every successive level hereafter, and it is relatively simple and straightforward logic to implement.

The player should ideally learn at most 25 new words at the end of their playthrough. Upon game initialization, an array of 25 words will be linked to the game’s script, and if any new word in that array is

introduced as covered in-game, every word in the script containing an instance of that word will be changed to that word. For example, if the user learns that *estantería* means bookshelf, the word for “bookshelf” on the user dictionary will change to *bolsa*, along with every other word in the script that contains an instance of the word *bag*. Through this approach, the script will be flexible—any new addition of the word *bag* will be automatically linked to that word in the array, and there will be no need for procedural or static word-changing.

As new words are picked up throughout the game, there will be an option for the player to review all new words at any time they wish. To quiz themselves, all the user has to do is click on a button that pulls up the dictionary, which allows users to switch previously learned words from English to Spanish and vice-versa at will.

Target Audience and Benefits

The target audience for this would comprise mostly of people from the ages 18-25 who enjoy video games *and/or* people who want to learn a new language. Generally, we will be focusing on college students because many of them fit this demographic, even though it is quite specific. While children and teenagers could theoretically benefit just as much from this, getting people who are younger than 18 as test subjects would be troublesome and take time and resources away from actual game development.

Many people use video games as a coping mechanism or as a form of escapism in order to cope with the tribulations of life. Unfortunately, many turn to living as what is colloquially known as a NEET, (a young person who is Not in Education, Employment, or Training). This lifestyle is generally unintentional and people with mental illnesses are more likely to live as a NEET. The term is also commonly used in nerd communities, especially those that focus on video games, anime, and other types of East Asian media. If our approach to language learning actually has promising results, helping NEETs buff out their resumes with language experience could be an unintended benefit of our system, as it is a game before anything else.

This is a problem that is rapidly increasing among young people, with a whopping 15% of Americans and 13.2% of Canadians under the age of 25 qualifying as a NEET [4], according to Time. This is likely caused by the Great Recession, which has caused an immense amount of despair among young people who have been promised the world by baby

boomers only to arrive at the point in their life where they realize that the economy is broken and that surviving in a capitalistic society is extremely difficult. By keeping our game as a game rather than a self-help app, it allows people to use it for escapism while subtly teaching them language skills.

While this may seem idealistic and is not one of our core goals in developing this game, it is still a possible means of helping people that could need help developing professional skills. More realistically, our game will most likely be an interesting alternative to people who already want to learn a new language, but its potential does not have to stagnate there. I feel like I would be doing our work a disservice by saying that it would just end up on a Github page and end up being forgotten later on. While that possibility is certainly realistic, I want to have faith in our idea and implementation.

RESEARCH QUESTIONS

LONG TERM RESEARCH QUESTIONS

“Are people who have prior experience in Pokémon games more likely to perform well with this type of language learning approach compared to their peers who do not have past experience with Pokémon games?”

This is a tricky question to answer as it is impossible to measure with complete accuracy one’s level with a language. There is only an estimate that can be given for the language level: a classification of beginner, intermediate, or advanced, which is still highly varied and subjective. A “beginner” may mean something different for one person compared to another, and so there needs to be a clear distinction between somebody with “no experience” and “some experience.” But in the scope of our project, we are looking for people with no experience in the target language so that our focus group will all start at the same base level in the target language, and our short-term memory test results will thus be reliable and consistent.

If somebody had some exposure to Spanish in the past, the results of our short-term memory test would be skewed in favor of the participant, and their score would reflect their competency in the language rather than their short-term memory retention. Knowing the vocabulary beforehand before being tested will most certainly not reflect the results we are looking for—which focus on memory retention of new words through immersive learning, and not the reinforcement of existing knowledge. The ideal participant pool would reflect 100% the short-term memory quiz scores representing their acquisition for

new words, and it will have to be assumed that they have never learned the words they will learn in-game. A commonly spoken language in this case, such as Spanish, would be difficult to implement as the target language of this project especially in a place like Florida. Even a little bit of exposure to the target language in the past could have a vast influence on the skew in our results, not to mention the added inability to distinguish between the learning of new words and reinforcing of existing knowledge through the results.

“Does the age of the participant have any bearing on if they retain more vocabulary in the end? That is to say, are certain age groups more likely to do well if they are in one of the groups mentioned in the other research questions?”

To elaborate on the above, particular age groups may have been more exposed to Pokémon, since the series has had many highs and lows during its run, as indicated by sales. During roughly 2005 to 2016, the series was much less popular than it was in 1996-2004 and from 2016 to today. If age is shown to have a correlation with one’s exposure to the franchise, if a positive correlation is shown in the first research question it may shed light on whether or not particular age groups are more suited to participate in this study.

RESEARCH QUESTION FOR THIS PAPER

“Which leads to a higher number of retained works at the end: a higher immersion level, or a higher score on the pregame Spanish test?”

This research question will help us measure the correlation between immersion and retention. Each user will be given 2 tests: one before playing the game, and one after playing the game. The pregame test will test the users on the amount of Spanish words they know, and the end-game test will test the users on the amount of Spanish they acquired through the game. Both tests will have the same set of 25 Spanish words used throughout the game. We will compare and evaluate the user’s scores on both tests. This way, we will have a concrete frame of reference in assessing the user’s before- and after short-term memory retention, which will help us have a clearer picture of how effective our language immersion strategy is.

DESIGN AND ITERATIONS

We will be designing 3 separate maps—Tutorial Town, Route 1, and the Healing Town. Various NPCs (non-player characters) will be scattered

throughout these maps, with whom the player can interact.

Tutorial town (3 words)

The town that the game starts in will be shaped like a square that opens to the first route at the top of it. It will have two houses (one for you and your neighbor) and the laboratory where you receive your first Pokémons. There are 4 NPCs: the player's mother, the professor, a young boy, and a researcher.

Route 1- (1-2 words)

The first route will be a straight path with trees to block the way and force the player to take a more complex route. Along the way, there will be a couple of NPCs to talk to who will give dialogue along with a 1-2 new vocabulary words for the player to digest. The 3 NPCs present here are a teenage girl, an old woman, and a young adult male.

Second Town (3 words)

A second town will be implemented in order to let the player rest and replenish the health of their Pokémons before moving to the next route. It will have 2 locked houses, a school, and a Pokémon Centre (a location in the Pokémon games that allows you to heal). This town would be entered from the first route to the bottom, and the exit to the next route would be on the left but it is blocked by a giant Snorlax (a bear Pokemon that is well-known for blocking paths in the Pokemon franchise). The 8 NPCs present here will be Nurse Joy (the nurse healing the player's Pokemon), the player's dad, a schoolgirl, a young boy trying to push Snorlax, and 2 NPCs outside and inside the Pokemon center.

Once we have completed Route 1 and the Healing Town, if and only if there is enough time, we will go on to implement the following 2 maps.

Preliminary Results of Iteration 1: Paper Prototype

We randomly divided our focus group of 5 people into 3 groups: low, medium, and high immersion. For the low-immersion group, we told them to go from beginning to end without inspecting anything or interacting with any NPCs. For the medium-immersion group, they completed the game from beginning to end while inspecting and interacting only with things that seemed interesting to them. For the high-immersion group, they went from beginning to end while inspecting and interacting with all objects and all NPCs.

User Directions

The users were told to move the player with the + cutout to move up, down, left, and right, that they can

navigate through the game with the A and B buttons (A to select, B to go back) and how to use the menu buttons. They were given a rundown of how Pokémon RPGs work and were separated into their groups. The low immersion group was told to get from the beginning to the end and to only inspect objects or people in the overworld if they had a strong urge to do so. The medium immersion group was told to take their time and interact with anything they personally find interesting and to not stress about inspecting every single item in the map. The high immersion group was told to be extremely meticulous and to inspect every single item in the world with no exceptions. Players were given a general guideline of where to move the player character to get to the end, how to navigate battle menus, and which objects are available to interact with.

SUS Evaluations

All SUS Evaluations of each user in the paper prototype are labelled in images [1] to [5] under the Appendix at the end of this paper.

SUS Justification

SUS forms were chosen in order to give participants a convenient and easy to understand means of providing feedback on our game. As we will have tested fifteen participants by the end of this project, writing down the oral feedback of every participant would become tedious. The SUS forms are a compromise between making sure the participants' opinions are heard and that their concerns don't take up a large portion of the paper.

Focus Group Demographics

We ensured that our focus group would consist of a diverse set of people with varying backgrounds in Pokemon games, RPG experiences, and previous Spanish exposure. With a focus group encompassing varying these experiences and backgrounds, we made sure that our end-game memory test results were as varied and reflective of the group as possible.*Memory Test Results*

We tested 5 people, 3 of which had prior Spanish experience but have since lost the ability to communicate in that language (classified under Forgotten), and 2 of which had absolutely no Spanish background. Upon completing the game, every choice they made regarding interactions with objects and NPCs added extra words into the end-game memory quiz. The idea is that just like in real life language immersion, the more effort you put into learning a language, the more you will personally benefit.

By taking this philosophy and applying it to our game, users are given the choice to either explore the world to their own liking and thus learn more Spanish words, or just rush from beginning to end while picking up a minimal amount of words.

In the group of 3 people with some background in Spanish, a lot of the Spanish words they had forgotten resurfaced and were reinforced in the game. They only learned about 3-5 new words but easily recalled roughly 5-10 words that they had previously learned depending on immersion level. The 2 people who had no prior Spanish experience learned roughly 5-7 new words each in the end-game short-term memory quiz. We were surprised to see that people with very basic Spanish education from many years ago performed so well in the short-term memory test.

While we initially had reservations as to whether or not our approach would work, through this prototype we learned that switching certain English words to Spanish in real-time as the user explored the world largely benefited the user in short-term memory retention. Contextual learning in an immersive, interactive world indeed contributed a large part to memory retention as seen through our results.

User Feedback

Players 2, 4, and 5 have never interacted with a Pokemon game before and required a thorough explanation of how a Pokemon game works. They also mentioned that they would benefit from an in-game tutorial.

Player 3 was familiar with Pokemon games and commented that our prototype was well put together with a design that included an intuitive layout and navigation. The interface was not “clunky” or complicated. The menu was also easily navigable and the addition of accessing the dictionary of learned words is very helpful for people who might not remember a Spanish word in-game and need a quick reference. Switching words between English and Spanish gave players a context clue of learning words in pieces instead of forcing the player to learn entire new grammar structures and sentences, which would add unnecessary stress and be counterintuitive to our approach.

Because of the limited context of the Pokemon world, Player 5 who had RPG experience but no prior Pokemon experience commented that our game covered only a very small range of words applicable to daily life. As this player said, “it’s not a really ‘advanced’ Spanish tutorial, but more like a level above Dora the Explorer.” Players 1, 2, and 3 (all

previous Spanish learners) were also worried about how verb conjugations would be effectively taught.

Player 2 with no prior experience in RPGs or Pokemon felt slightly overwhelmed by the openness of the world, and they commented that it was hard to choose which direction to go in.

Player 1 commented that people with no previous Pokemon or RPG experience would not know that you can interact with objects and NPCs. Therefore an inexperienced player could unintentionally blaze through the game and learn only the minimal amount of words.

Images of the paper prototype

Image [6] in the Appendix depicts the basic setup of the overworld. The user uses the directional pad cutout to move the player character or cursor, presses the A button to accept, and the B button to exit. I based this design off of the Nintendo Entertainment System’s controller, and will most likely use a modified one (so that the A button is green, as it is normally red.) in the final iteration to make the functionality clearer to users.

Image [7] in the Appendix depicts the layout of the battle sequences. The player moves the arrow cursor to the action they would like to select and presses A if they want to select that action, and B if they want to undo a previous action, such as selecting “Fight” and deciding you would rather run away.

Image [8] in the Appendix depicts the mockup for the dictionary. Every word the player learns gets moved here, and is stored within the menus for easy access. By moving the arrow to a particular entry and pressing A, it will go from English to Spanish, or if it is already in Spanish, it changes to the English meaning.

Justification for the Paper Prototype

Before the paper prototype, the idea for the maps were largely conceptual other than a couple of poorly scribbled concepts which we ended up throwing out. The paper prototype gave us a means of visualizing our idea for the world that our game would inhabit as well as the means through which to engross the player in said world. In terms of design for our prototype, I drew everything out on graph paper and represented every “tile” that would show up in the game as a 2x2 square region. Inside the game proper, the user will be locked to grid-based movement, and each tile represents an area where the player can move. Each tile is the size of the player, and only one may be occupied by the player at a given time.

By future-proofing our design like this, it would take away a large portion of the labour that goes into game design and map creation. Upon creating the digital wireframe of the game, the design represented by the paper prototype will easily translate into the Unity map creation software bundled with the game engine we are using.

Paper Prototype User Instructions

We instructed the user to use the paper representation of the controller (as seen in Figure 6) to move around. Depending on their immersion level, we either told them to examine only what is necessary. For the medium immersion group, we told them to examine anything they think is interesting. After this, we explained to the players that they have access to a dictionary of every word that has changed, and can review these words whenever they would like with the press of a paper “button”. For the high immersion group, we made them examine every single item the prototype had to offer. While still pressuring them to inspect everything, we guided them through the route, the dialogue in the and how to survive, fight or run from a wild Pokémon battle. Lastly, we told the players to heal their wounded Pokémons at the healing center, talk to every NPC and finally talk to their father and thus, end the game.

Iteration 2: High Fidelity Prototype

Introduction

Just like the last iteration, we randomly divided our participant pool of 5 people into 3 groups: low, medium, and high immersion, all with the same instructions regarding gameplay.

Controller justification

Image [9] in the Appendix depicts Participant 2 using the NES controller that we modified

While we were testing our game in Unity, we realized that keyboard controls are extremely clunky and would make our project look poorly designed. Considering this is a design class, we decided to order a USB controller off of Amazon. I chose one based on the Nintendo Entertainment System’s (or the NES for short) controller because it is iconic and has very few buttons. We spray painted the A button (the button that allows the player to select or confirm something in the game) green in order to give the player the idea that green is yes and red is no. A and B are also marked under the buttons and are engraved into the respective buttons in order to make the distinction clear.

The + button or the D-Pad (Directional Pad) was revolutionary in terms of game design. For games that are locked on a grid, such as ours, a D-Pad is

perfect, since every player movement in the game corresponds to a tap of the respective direction of the D-Pad. The start button is used to bring up menus, and Select will be used to pull up the dictionary. We took the simple, effective design of the most iconic controller and made it more intuitive so that the players of our game can focus on language immersion, rather than working within the constraints of clunky controls.

User Testing

This time, only two of the participants had prior experience in Spanish, but three participants had a background in Pokémon games.

Memory Test Results

There seems to be a correlation between the amount of words that the player remembered at the end of the game and the immersion level, but it is too soon to say since this would require some statistical inference and the wireframe is too incomplete to answer the research questions with. While the amount of reinforced Spanish words is lesser compared to the results of the paper prototype, the incomplete nature of the wireframe does not allow us to showcase every dialogue event that we plan on implementing in the final game. With a participant pool encompassing the diversity of people regarding their experience with Pokémon games, RPG games, and Spanish-language exposure, varying these experiences and backgrounds, we made sure that our end-game memory test results were as varied and reflective of the group as possible.

SUS Evaluations

Figures [10] to [14] in the Appendix show the SUS Evaluations of each participant in our participant pool. These answers are evaluated under the following *User Feedback* section.

User Feedback

Users 2, 4 and 5 had experience with Pokémon games in the past and were given a short refresher on how the games work. We plan on putting the tutorial inside of the game itself to avoid clunky explanations and naturally guide the player with little other than the game itself to go off of. The users who were familiar with Pokémon were surprised at how well the visual style of a Pokémon game was replicated but showed confusion with some of the elements that are still unfinished. User 5 had a few gripes with random houses that you could not enter but we’re glad to hear that we are fixing it in the final iteration.

Every user enjoyed the idea of the dictionary, but two of them (users 1 and 4) thought that the fact that the

dictionary was on paper detracted from the overall experience. Player 3, who studied Spanish in middle school and forgot it mentioned that some of the words that change are fairly easy to figure out, such as videojuegos and la televisión, to which we responded that these are there to ease the player into thinking about Spanish and that we put them in the beginning intentionally to accomplish that end.

The players who had no previous experience in Pokémon games needed a heavy explanation of how the game mechanics work but eventually picked it up despite initial confusion from Participant 1.

Every participant except for Participant 2 mentioned that they would prefer to have the dictionary inside of the game itself, and we are currently implementing this. Users 1, 3 and 5 praised the visual style of the game and said that the design and music were fun touches to keep the player interested in the game's world.

Images of the wireframe

Images [15] and [16] show the differences in flavor text between English and Spanglish. When the player interacts with an object or NPC and the dialogue contains a word that is in our English-Spanish database, the flavor text changes from English to Spanglish, then stays in Spanglish for the rest of the game so long as the dialogue contains that English-Spanish word.

Image [17] depicts the moment when the player triggers the first event. In this event, the main character's mom prompts them to have a conversation upon leaving their room. In the final version, she will tell the player to go to the northern town to see their dad.

Image [18] depicts the first town, Primavera Village. Primavera is Spanish for Spring, and primavera is the first of something, so it seemed appropriate to name the first town this. This is intended for worldbuilding, and not actual language learning.

Image [19] depicts the second event. A custom event forces the player to walk to the lab (building with a green roof) where the player will be given a tutorial of how the game mechanics work from a professor, and a Pokémon battle with the protagonist's sister begins upon the finale of the professor's speech.

Image [20] depicts the opening to the first route, Ruta Uno. Pokémon games name their routes "Route 1" or any other number depending on the game, so we figured this would be a nice touch.

Image [21] depicts an example of an NPC interaction. Upon selecting an NPC, dialogue is shown, and a word will change to Spanish.

Image [22] depicts more of Ruta Uno, we included this tall grass in order to hopefully force the player into an interaction with a wild Pokémon so that they can have a battle or two.

Image [23] depicts the Pokémon battle screen. Fight allows you to choose an attack, bag lets you choose an item to heal or power up your Pokémon, Poké allows your currently active Pokémon, and run allows you to leave the wild encounter.

Image [24] depicts the flavor text to make the player feel attached to their Pokémon, which is a core concept of the main games.

Image [25] depicts more examples of NPC interactions, which includes the interaction with the old lady walking her Pokémon.

Image [26] depicts the healing townl, Roca Batón. Fun fact: switch the R and the B for our inspiration for the town's name.

Image [27] depicts the player progression being intentionally blocked due to us not having time to do a second route or a city.

Image [28] depicts the menu of the player's Pokémon, who have been hurt in battle.

Image [29] depicts the doctor in the Pokémon Center (the hospitals within the Pokémon universe) offering to heal the player's party.

Image [30] depicts success! All Pokémon are healed to full health.

Image [31] demonstrates how certain Pokémon will evolve into bigger, more powerful forms if they reach a high enough level. This is in its infancy, but it is a core tenant of the Pokémon games and we had a strong urge to include it in the game as a nod to the fans who are testing this game.

Image [32] depicts a successful evolution of the Pokémon Piplup to Prinplup. There is an animation too.

Wireframe instructions

The instructions given to the users who tested the wireframe did not change exponentially from the instructions given during the paper prototype. The paper controller was replaced with a real controller (seen in Figure 9) and the majority of the functions that were implemented in the paper prototype appear in the wireframe, save for the dictionary.

Iteration 3: High Fidelity Prototype

Introduction

Taking into account the glitches and issues with our previous wireframe prototype and user feedback, we created the game to the specifications of our initial vision as outlined in our proposal. In order to accomplish this end, we added a cutscene with character dialog at the beginning to help those who may be unfamiliar with Pokémon games by giving them an overview of the Pokémon world and what they should expect to gain from the gameplay. An excerpt from the exposition of the game is depicted in Figure [38].

Changes Made & Images

One of the major changes made is the implementation of the dictionary. When the player presses the SELECT button on their controller, a dictionary interface toggles on the screen, where all the English-Spanish words shown to the player are displayed for easy review sessions. When the player presses on a button with an English word, it switches to Spanish and vice versa. This is a major accomplishment for our prototype since the player will need to review all encountered words should they come across a word in a piece of dialogue and forgot the meaning. If the player interacts with everything and everyone and triggers the Professor Lab event in the hometown, the total number of word encountered will be 25. The English version of the dictionary is depicted in Figure [45] with the Spanish version being Figure [46].

While Iteration 2 did not have a fully functioning Professor Lab event in the beginning town, Iteration 3 saw to its completion. After the player is told by their NPC mom to visit their dad in the school (*la escuela*) up north, the player is interrupted by the village's professor telling them to battle their sister first, as seen in Figure [39]. Assuming that it has been a long time since the protagonist has participated in any Pokémon battle (this dialogue was implemented so that new players do not feel alienated and those who played as kids can have a review), so a refresher is necessary. Once the professor pulls the player into the lab they are greeted by their NPC sister. The professor then gives a brief overview of how a basic Pokémon Trainer battle works (Figure [40]), after which the player has a basic Pokémon Trainer battle with their sister, whose dialogue of defeat is shown in Figure [41].

After the completion of the sister and the player wins, the professor tells them to go north and find their dad in *la escuela*, further reinforcing the Spanish word for school. If the player makes the choice to interact with their sister and professor again, the professor will

remind the player to go north in case they forgot their objective. The sister will make a request to tell their dad that she says "hi," and the dialogue for this request is depicted in Figure [42].

Once the player leaves the lab, treks through the first route (*Ruta Uno*) and makes it to the town of Roca Batón, they have the option of entering the school. After interacting with the dad who is a teacher of their school, the game ends. Figure [43] depicts the player interacting with their NPC dad who indicates that the player has reached the end of the game. Although it is the end of the game, the player still has the option to freely roam around the world and interact with any and all NPCs & objects that remain, hereby having the chance to pick up words never encountered before.

User Testing

For Iteration 3, we made a massive renovation in how to evaluate the correlation between immersion level and short-term memory retention. For the first 2 iterations, we took the results only of the amount of Spanish words the player accumulated after playing the game.

Iteration 3 takes exactly the same method from Iteration 2, but only with the additional feature of assessing pre-game Spanish knowledge and exposure. Each player was assessed with 2 short quizzes: their Spanish knowledge before playing the game, and their short-term memory retention after playing the game. This way, we had a clearer frame of reference since we could more directly measure not only how much the user learned, but the net gain between how much they knew before and after gameplay. This correlation is measured by *words learned after (A) - words known before (B)*. Therefore, net gain NG = A - B, and this result will directly assess the correlation between immersion level and short-term memory retention.

Memory Test Results

Below is a table depicting the immersion level each participant was placed in, along with their corresponding background experiences and net gain of words retained after gameplay.

Participant #	Age	Played Pokemon Game before	Played an RPG before?	Spanish level?	Immersion group	Pre-existing vocabulary test results-	Words reinforced (end-game test)	Vocabulary Gain
1	20	Yes	Yes	Forgotten	High	10	22	+12 words
2	23	No	Yes	None	Medium	9	15	+8 words
3	19	Yes	No	None	Low	6	12	+6 words
4	20	Yes	Yes	None	Medium	11	20	+9 words
5	22	No	No	Forgotten	High	9	19	+10 words

Every single participant has had a positive net gain of Spanish language retention, and this is groundbreaking news for us. These results of the before- and after-game short-term retention quizzes help us directly measure the correlation between immersion level and retention.

As expected, the participants in the High immersion group had the highest net gain of words learned and retained in short-term memory—+12 and +10 words. The players in the Medium immersion group had the median net gain of words among the groups—+9 and +11. Lastly, the one person in the Low immersion group who had no prior Pokemon or spanish background had the lowest net gain of words learned, which is +6. This is fantastic, seeing as this person learned these words with no previous frame of knowledge, proving that our game can teach anyone. These results came exactly as we expected to be, and we were even taken aback at how perfectly circumstantial and coincidental these results turned out to be.

It seemed that previous experience with Spanish and RPGs were much less relevant than the level of immersion group the participant was placed in.

SUS Evaluations

All SUS evaluations of our final product were filled out by our participants, as depicted in Figures [33] to [37]. These results reflect how satisfied the players felt with the turnout, implementation, design, and language reinforcement aspects of our game.

User Feedback

As indicated in the video submitted with this paper, our friend who played through the final product of our game had a few concerns regarding the functionality of our game. These include dictionary

toggling involving the mouse rather than the controller, battle animations, and collision detection troubles with the Professor Lab event upon leaving the hometown.

Firstly, the fact that the player has to use a mouse—external input besides the controller—to toggle English-Spanish words in the dictionary is highly problematic. This is because having to take your hand off the controller to press on the dictionary buttons on the screen can distract the player from walking, interacting, and doing whatever they have set their minds to in the moment in-game. In addition, it is just highly inefficient to take your hand off the controller to review words when you can just as easily perform the same task with the arrow buttons on the controller. Initially we wanted to make the buttons on the dictionary navigable with the arrow buttons, but we were unable to figure out iterative button functionality in Unity on time.

Also, our friend (who shows up in the video) did not like how there were no battle animations in the Pokémon battle scenes encompassing wild Pokémon encounters and Trainer battle. In the Pokémon games, during the battles both the player and opponent{s} pokemon do specialized animations for each move in order to immerse the player more into the game and gain a sense of familiarity and comfort with the world.

Another problem that our friend encountered in the game was the collision detection trouble at the beginning of the game. There is a design flaw in our game—the indoors of all buildings are considered a different “world” than the overworld outside. When you go inside a building, the overworld resets. Similarly, when you leave a building, all indoors reset. When the player leaves through the route, they are interrupted by the professor to battle their sister inside the lab. However, when the player emerges and steps onto the middle part of the road leading to the route, the event gets triggered again and the professor calls to the player to battle their sister. Though the event gets disabled once the professor enters the building, the overworld “resets” when the player enters the laboratory, so when the player surfaces back out, the event trigger collider is enabled again. An event trigger collider is simply an invisible object that if a player crosses it, an event is “triggered.” In order to avoid this unnecessary repetition of the same event, all the player has to do is avoid the collision object—the event trigger collider. Though this is easily avoidable, it was nevertheless still irksome and irritating on both our parts and the player’s part to have to clarify every single time to

veer left/right just to avoid the collision object at the beginning of the first route.

In addition to our friend whom we recorded, the participants in our participant pool also provided a variety of different feedback.

The participants belonging to the High immersion group (participants 1 and 2) felt that the game was a little overwhelming, since they were being made to retain 25 words in a span of 10-15 minutes. However, the ugly truth of language-learning is that there is no shortcut to learning a language—and it is in our philosophy that we believe feeling overwhelmed is a sign of being challenged. And as it turns out, the High immersion group participants felt the most overwhelmed, yet they also had the highest net gain of words learned throughout all the groups.

Participant 1 pointed out specifically that the clunky, inefficient dictionary navigation with the mouse could restrain people from actually retaining the Spanish words immersively. We took note of this, since immersion breaking takes a player out of their realm of gameplay, thus making them feel a strong sense of disconnect from the world they're supposed to be immersed in. Therefore, we wonder if the net gain of all participants could potentially increase should they navigate the dictionary in an easy, accessible way, and thus strengthen their sense of immersion. This is a question that could be examined in the future.

When we asked the participants in the Medium immersion group how they felt about the game design and language-immersion aspect of gameplay, they both gave similar answers on an individual basis. Participant 2, who had no previous experience with Pokémon games, quoted, “I felt like the maps were easy to go around, but I don’t know why the professor called me twice.” They also went to say that map navigation was intuitive, but the repeated event bug completely frustrated them and demotivated them from feeling “free” in exploring the world over the fear of encountering another bug. Participant 4, with a high amount of Pokémon game experience, surprisingly had the same sentiments. The repeated event bug rendered them from any enthusiasm in exploring the world over the fear of encountering a new bug, and so both participants were anticipating negative things throughout their entire gameplay. This is completely immersion breaking.

Though the net gain of words learned between participants 2 (+8) and 4 (+9) only has a difference of 1, we concluded that it is not previous experience in

RPGs or Pokémon games that matters, but the *sense of ease* that the user feels when exploring the world. Comfort breeds relaxation, and people often focus better in comfortable environments.

Participant 3, who happened to be the only member in the Low immersion group, commented that the game was fairly straightforward. The only annoyance that they encountered were the Dictionary toggling and the repetitive event collision—the same concerns as shared by the other two groups. But this user particularly was not all too concerned about immersion, and seemed in a rush to complete the game.

The frustrations, discrepancies, and confusions expressed by these participants represent only a factor of the external variables present in affecting our results of each participant’s net gain of words retained. We can only draw correlations between the quantitative results of Table [3] and type of immersion group, but we cannot measure how these external factors of immersion-breaking, fear of bugs, and frustration could have affected the results. These concerns can be addressed for future study outside the scope of this iteration.

NAME OF GROUP MEMBERS

Marc Angelo Acebedo

I focused on programming the game logic and UI-handling through the Unity 3d cross-platform game engine while collaborating with Serena on creating mockup map designs, importing assets, and dialogue script-writing. Though I am less familiar with the whole video game industry than Serena, I would say that my programming skills are pretty strong, and I have more experience creating applications through Unity, as over the summer I created a Galaxy Shooter and a Sci-Fi First-Person Shooter Demo with Unity.

Serena Bonci

I focused on asset usage and discovery, game design and map creation in unity as well as collaborating with Angelo on programming. I’ve played through nearly every Pokémon game (except for Green, which was only released in Japan), for a total of 28 games. Including replays, I’ve played through these games from start to finish nearly 50 times. So suffice to say, I have an idea of what makes these games tick and what makes each one good.

CONCLUSION

As alluded to in our *Memory Test Results* subsection of the iteration 3 writeup, the biggest descriptor of how somebody would perform on the post-game

memory test is the level of Spanish immersion that they were sorted into. Many different variables were tested, as seen in the entirety of the Graph Appendix section. While previous knowledge of Spanish words have led to the most impressive results, these users are not learning as much, as it is just review to them. The most impressive results in our opinions is that the people with no prior Spanish experience (such as User 3 in Table 3) actually ended up learning a few words. It is much easier to remember pre-established knowledge than it is to establish an entirely new base of knowledge, and it seems that our game performs surprisingly well in that regard. The level of Spanish immersion has a positive linear relationship to the number of words learned by the player. While many other visualizations had these relationships as well, the visualizations of how players performed with prior Pokémon experience and without were also positive and linear, and thus any relevant takeaways cannot be worked out within the scope of our study. Having said this, since those two were both positive and linear it implies that they have no bearing on one another and should be discarded seeing as there's little to no difference between the two.

Since our graphs show a positive linear trend in the players' scores pre- and post-gameplay, it is concrete proof that we have laid a foundation that is ripe for future research. Our philosophy of creating a fun game first with language-learning elements rather than forcing rote memorization and boring grammar drills implies that it is worth researching more this approach of game design on a larger and more ambitious scale.

Taking this into account, we can answer the research question of “Are people who have prior experience in Pokémon games more likely to perform well with this type of language learning approach compared to their peers who do not have past experience with Pokémon games?” with a resounding no. While there may be a couple of minute differences, they both perform extremely similarly. Conversely, age is also completely irrelevant. I failed to find any correlations between player age and performance on memory retention. This can be justified by looking at Graphs 2A, 2B and 2C. The distributions are all over the place and it seems as if age does not determine the effectiveness of our approach by a longshot.

Finally, we see in Graph 5C that while the two perform similarly, higher immersion level (green) is a better descriptor of how many words a person will retain compared to pre-established Spanish knowledge (purple). While pre-established Spanish

knowledge looks promising, its results gradually turn downward.

As a whole, this approach shows much more promise than we had initially anticipated. While our first two research questions ended up being inconclusive at best, our final question showed that while pre-existing Spanish knowledge is a great start when playing this game, the most important indicator of how much a player would learn is their exposure level. Seeing as this is a immersion game, this is not unbelievable. When one immerses themself into a foreign country, they can only learn so much by looking at the same things over and over. Yet, if someone takes life by the horns and does as much as they can to learn about the culture, they will perform better. Our game provides a simple means of learning basic Spanish vocabulary, but if we completely flesh it out into a full game, it could serve as quite the fun a cute and fun language immersion tool.

FUTURE WORK

While our game turned out exactly as we expected with only minimal glitches (e.g. collision detection and words not appearing at first in the dictionary) that don't impact overall gameplay at all, there are a plethora of directions that our idea can take. For example, we could segment entire phrases and, to test the player's retention in-game, have NPCs speak entire sentences in only Spanish. Take, for instance, the phrase *no me gustan* (I don't like), *los doctores* (the doctors), and *aquí* (here), an un-introduced word. When those word fragments are scattered at first, there could be an NPC that would say “*No me gustan los doctores aquí,*” and this could hint to the overall story and lead the player to new objectives and missions.

A few participants have commented on how innovative our language immersion approach is, and we think that it would only be more effective on a larger scale. Therefore, there is further room to expand on our idea which we believe is an innovative idea. While 15-20 minutes of gameplay is not enough time to fully immerse in a language, the majority of our user participants still retained a surprising amount of vocabulary as indicated by their quiz scores.. If the implementation of our language immersion idea has proven so effectively in short-term memory retention in only 15-20 minutes, we can only imagine the lengths if the gameplay were to be 30-50 hours, which is the norm of a Pokémon game.

Some interesting future research questions would expand our idea beyond a Pokémon game and account for players' engagement in reading, writing,

listening, and speaking. Our Pokémon game limited players to only reading dialog in the target language, and we are very curious to see how different combinations of language input would be most useful. For example, do users retain short- and long-term information best through reading, speaking, writing, or listening? Furthermore, which combinations (either in 2 or 3s) would show the strongest correlation between both long- and short-term memory of vocabulary words and phrases?

REFERENCES

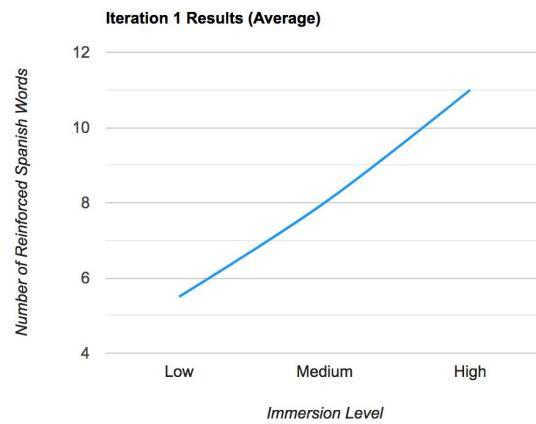
1. Nian-Shing Chen, Sheng-Wen Hsieh, Kinshuk. 2008. Effects of Short-Term Memory and Content Representation Type on Mobile Language Learning. (October 2008). Retrieved 11 October, 2018 from https://scholarspace.manoa.hawaii.edu/bitstream/10125/44157/1/12_03_chenet.pdf
2. Robert Godwin-Jones. 2011. Emerging Technologies: Mobile Apps for Language Learning. (June 2011). Retrieved 10 October, 2018 from <https://www.semanticscholar.org/paper/Mobile-Apps-for-Language-Learning-Godwin-Jones/767e710ce0895c5989919c9bb0b821e1c10b20b3>
3. Robert Godwin-Jones. 2005. Messaging, Gaming, Peer-to-peer Sharing: Language Learning Strategies & Tools for the Millennial Generation. (January 2005). Retrieved 11 October, 2018 from https://scholarspace.manoa.hawaii.edu/bitstream/10125/44003/1/09_01_emerging.pdf
4. Peter Gumbel. 2012. Why the U.S. Has a Worse Youth Unemployment Problem than Europe. (November 2012). Retrieved 4 November, 2018 from http://business.time.com/2012/11/05/why-the-u-s-has-a-worse-youth-employment-problem-than-europe/?fbclid=IwAR18GeUJOkssXR4m4ERgr5eZc_i9NRSOyfx49NRzLOaaq4cG3DQo8M_IxNs
5. Elva Sanatullova-Allison. 2014. Memory Retention in Second Language Acquisition and Instruction: Insights from Literature and Research. (Winter 2014). Retrieved 11 October, 2018 from <http://iafor.org/archives/journals/iafor-journal-of-language-learning/10.22492.ijll.1.1.02.pdf>
6. Alissa Sauer. 2014. Bilingualism May Delay Alzheimer's by More than 4 Years. (December 2014). Retrieved 4 November,

2018 from
<https://www.alzheimers.net/12-11-14-bilingualism-delays-alzheimers/>

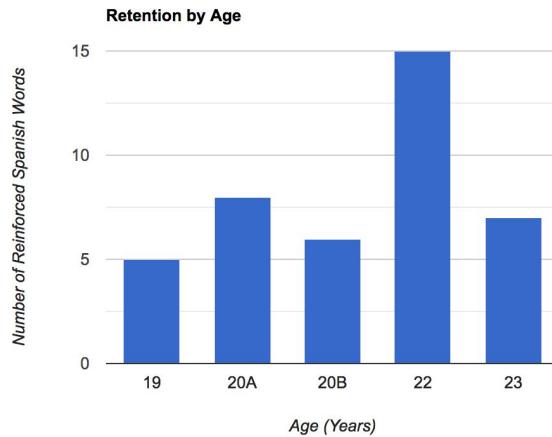
Graph Appendix

Iteration 1-

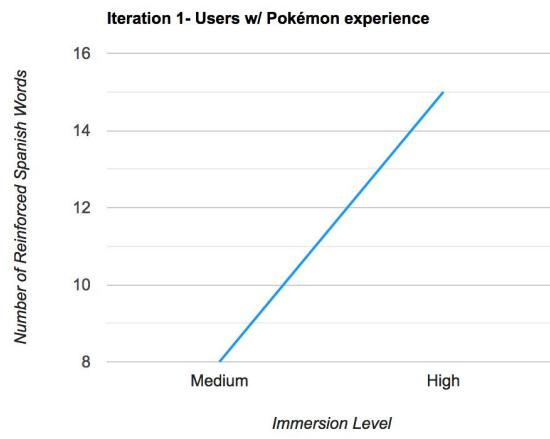
[1A] Immersion Level vs. Short-Term Memory Retention



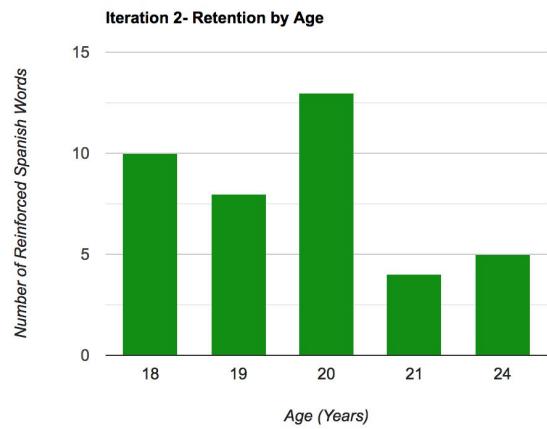
[2A] Retention Level by Age



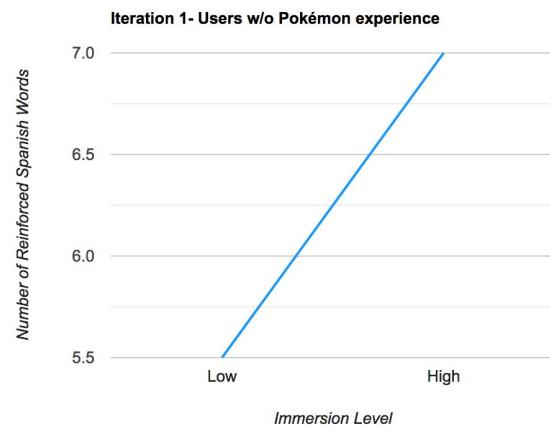
[3A] Immersion Level vs. Pokémon Experience



[4A] Immersion Level vs. No PokéMon Experience

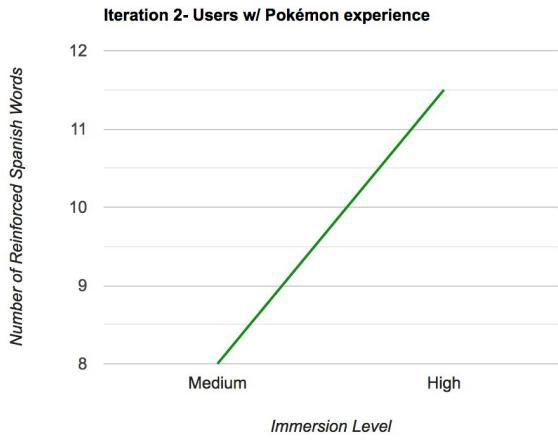


[3B] Immersion Level vs. PokéMon Experience

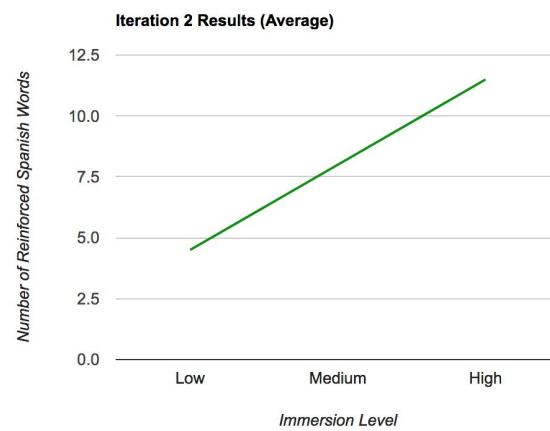


Iteration 2-

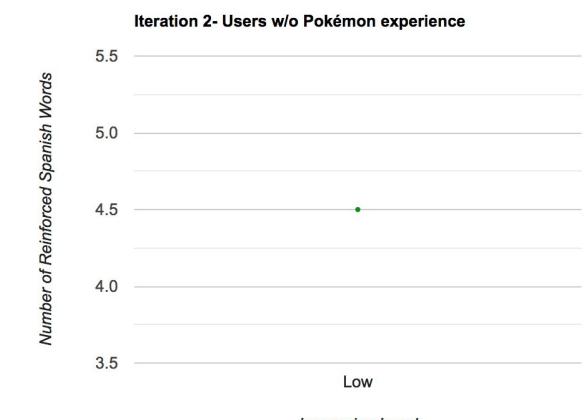
[1B] Immersion Level vs. Short-Term Memory Retention



[4B] Immersion Level vs. No PokéMon Experience
(Both of the players had no experience and were in the low group, so there was nothing to plot.)

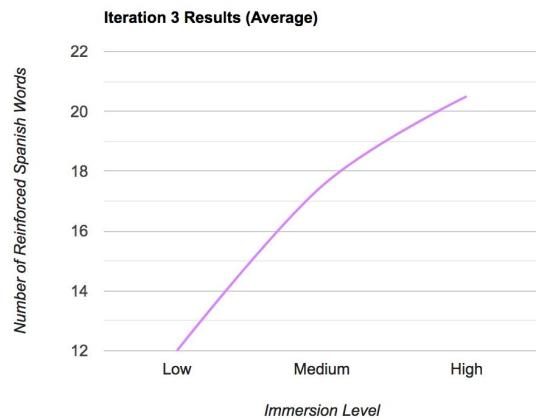


[2B] Retention by Age

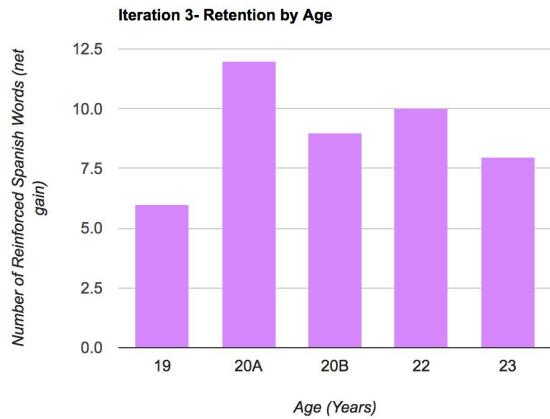


Iteration 3-

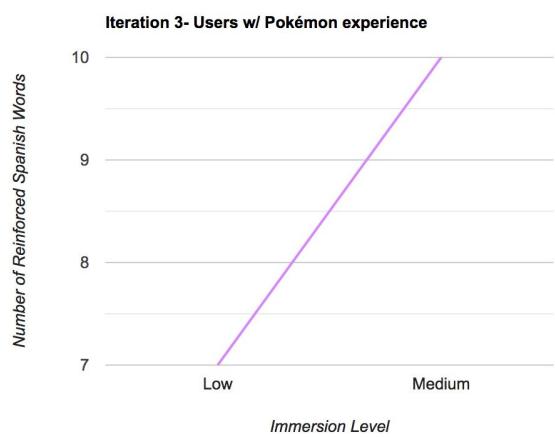
[1C] Immersion Level vs. Short-Term Memory Retention



[2C] Retention by Age

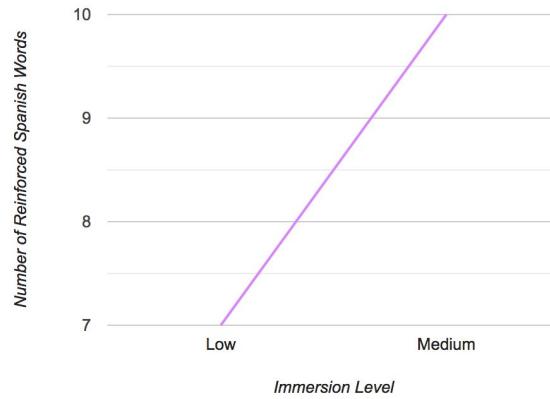


[3C] Immersion Level vs. Pokémon Experience



[4C] Immersion Level vs. No Pokémon Experience

Iteration 3- Users w/o Pokémon experience



[5C] Immersion Level vs. Pregame Test Results & Postgame Test Results

(Green is post-game results, and purple is pre-game results)

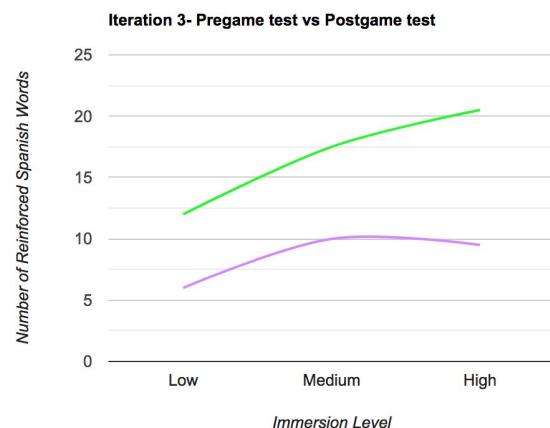


Table Appendix

[Table 1]- Paper Prototype User Testing

Participant #	Age	Played Pokemon Game before	Played an RPG before?	Spanish level?	Immersion group	Words enforced (end-game test)
1	20	Yes	Yes	Forgotten	Medium	8
2	19	No	No	Forgotten	Low	5
3	22	Yes	Yes	Forgotten	High	15

4	23	No	No	None	High	7
5	20	No	Yes	None	Low	6

[Table 2]- Wireframe User Testing

Participant #	Age	Played Pokemon Game before	Played an RPG before?	Spanish level?	Immersion group	Words enforced (end-game test)	
1	21	No	No	None	Low	4	
2	20	Yes	Yes	Forgotten	High	13	
3	24	No	Yes	Forgotten	Low	5	
4	19	Yes	Yes	Forgotten	Medium	8	
5	18	Yes	Yes	None	High	10	

[Table 3] Final Product User Testing

Participant #	Age	Played Pokemon Game before	Played an RPG before?	Spanish level?	Immersion group	Pre-existing vocabulary test results	Words enforced (end-game test)	Vocabulary Gain
1	20	Yes	Yes	Forgotten	High	10	22	+12 words
2	23	No	Yes	None	Medium	9	15	+8 words
3	19	Yes	No	None	Low	6	12	+6 words
4	20	Yes	Yes	None	Medium	11	20	+9 words
5	22	No	No	Forgotten	High	9	19	+10 words

Image Appendix

As discussed in class on December 3rd, we have moved every picture of our prototype throughout the 3 iterations into an Appendix at the end. References to all images are labelled.

[Figure 1] Iteration 1 Player 1 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. I was very uncomfortable with this game.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

[Figure 2] Iteration 1 Player 2 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: UIUTrend.com

[Figure 3] Iteration 1 Player 3 SUS

[Figure 5] Iteration 1 Player 5 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. I was very uncomfortable with this game.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: UIUTrend.com

[Figure 4] Iteration 1 Player 4 SUS

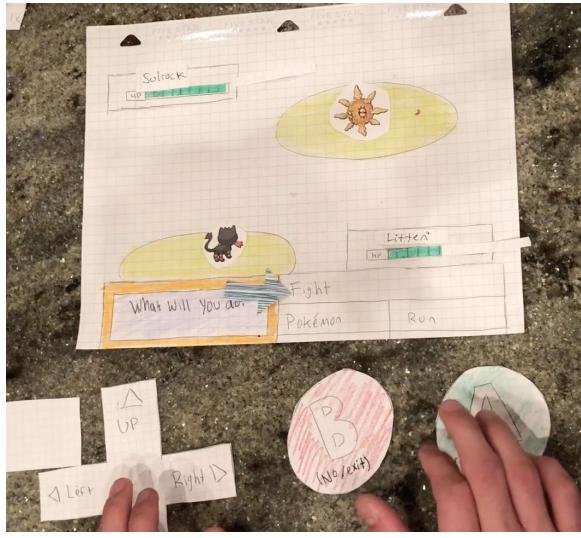
SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: UIUTrend.com

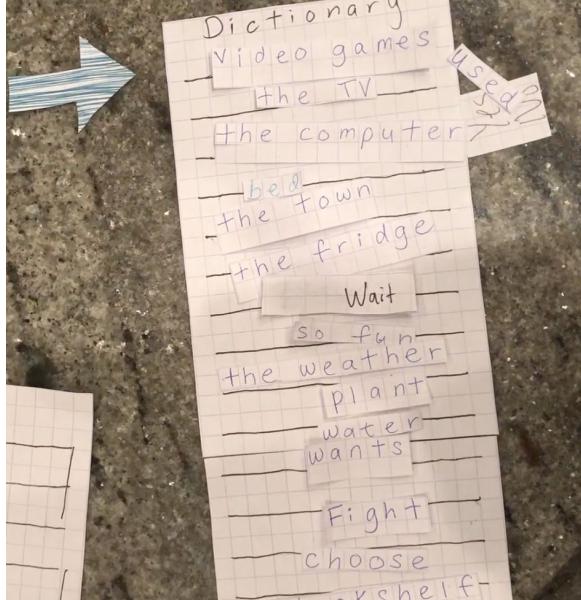
[Figure 6] Iteration 1 Overworld Starting town



[Figure 7] Iteration 1 Battle Scene



[Figure 8] Iteration 1 Mockup



[Figure 9] Iteration 2 Controller

[Figure 10] Iteration 2 Player 1 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

[Figure 11] Iteration 2 Player 2 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: UIUTrend.com

[Figure 12] Iteration 2 Player 3 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

[Figure 13] Iteration 2 Player 4 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

[Figure 15] Iteration 2 English flavor text



SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had clunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

[Figure 14] Iteration 2 Player 5 SUS



[Figure 17] Iteration 2 First event trigger



[Figure 18] Iteration 2 Starting Town



[Figure 19] Iteration 2 Second event trigger



[Figure 20] Iteration 2 First route



[Figure 21] Iteration 2 Route 1 NPC 1



[Figure 22] Iteration 2 First Route wildgrass



[Figure 23] Iteration 2 wild Pokémon encounter



[Figure 24] Iteration 2 Pokémon interaction



[Figure 25] Iteration 2 Route 1 Interaction Example



[Figure 26] Iteration 2 healing town



[Figure 27] Iteration 2 Route 2 blockage



[Figure 28] Iteration 2 damaged Pokémons



[Figure 29] Iteration 2 nurse interaction



[Figure 30] Iteration 2 healed Pokémons



[Figure 31] Iteration 2 Piplup Evolution Sequence



[Figure 32] Iteration 2 Piplup Evolution Success



[Figure 33]- Iteration 3 Player 1 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had chunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

[Figure 34]-Iteration 3 Player 2 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had chunky design.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: UIUTrend.com

[Figure 36]-Iteration 3 Player 4 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had chunky design.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: UIUTrend.com

[Figure 35]-Iteration 3 Player 3 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had chunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. I was very uncomfortable with this game.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source: UIUTrend.com

[Figure 37]-Iteration 3 Player 5 SUS

SUS	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would use this approach to language learning in the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The game design was unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. I think the game was designed well.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I think I would require extra experience in Pokémon games before playing this.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. I enjoyed the in-game functionality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. I thought this game had chunky design.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I think that other people would enjoy using this type of approach to language learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8. I was very uncomfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9. I was very comfortable with this game.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. This design requires a lot of previous knowledge to effectively work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: UIUTrend.com

[Figure 38] - Professor opening scene



[Figure 39] - Professor event trigger



[Figure 40] - Professor event inside



[Figure 41] - Sister battle



[Figure 42] - Post-event lab



[Figure 43] - School



[Figure 44] - English dictionary



[Figure 45] - Spanish dictionary

