

SanjigenJiten : Game System for Acquiring New Languages Visually

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Imagine being able to approach any object in the real world and instantly learn how to read and pronounce the name of the object in any other language. This paper introduces a system that simulates this idea by utilizing the video game medium in a way that makes learning a new language simple and fun. The system was designed specifically for the new technologically-inclined generation that stands to benefit greatly from learning within a game environment. The process of learning a new language with this system strays from previous and conventional methods in that it employs a more visual-spatial approach to learning. Additionally, this system engages the player through the use of industry-standard video game elements such as a 3D environment, controllable main character, item collection system, scoring system, rewards system, and a solid storyline with character development and interactive dialogue. By keeping in line with what people expect from standard video games, this game is capable of holding the player's attention for longer periods of time than when compared classes, textbooks, or tutors.

三次元辞典：第二言語学習のための ゲームシステム

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私たちの普段の生活環境で、テーブルやキッチンにあるモノに近寄るだけで、そのモノの読み方や発音の仕方を、英語、日本語、中国語などの様々な言語で教えてくれると、語学の習得が簡単になると思われます。本稿では、高品質な3Dグラフィックスを利用したビデオゲーム技術を利用して、生活空間の中で歩き回ったり様々なゲームのタスクを遂行する過程で、楽しみながら語学を習得することができる新しいゲームシステムを提案します。このゲームでは、従来の英語学習法よりも、視覚的・空間的なコンテキストに基づく学習を重視しています。また、ゲーム分野で蓄積されてきた、3D空間内の自由な移動やキャラクターの操作、アイテムを集める収集要素、得点要素、報酬要素、キャラクタとの会話、ストーリー性などのエンタテインメント性を融合化することで、従来の教室での教科書を利用した学習と比べて、体験者の意欲を高め、継続性を向上させることが可能になると考えられます。

1. Introduction

Learning a new language is quite possibly one of the most difficult and time consuming endeavors that a person can embark on. When one even considers the task, they are met with numerous challenges and fears that can potentially deter them from believing that gaining fluency is within their grasp. Even with all the tools that technology offers us today in regard to Language Learning, the task is ever daunting. Generally speaking, gaining fluency in a foreign language is something that is reserved only for those with a true passion for both the language and the culture, as the effort and time involved in the process is nothing short of life consuming. However, our world is growing more and more diverse as people now have the means to spread out and explore it, thanks in part to advancements in transportation, but mostly to peace between nations. Languages themselves are the all-important keys to the world and we must always try to find new ways to help spread this knowledge in an effort to bring people closer together.

We propose a game system that provides language learners and students alike with the means to increase their vocabulary in their desired language simply through exploration of 3D environments modeled after a variety of everyday environments from real life. Since the process of learning a language is such a long-term endeavor, a game system was selected for this project based on how effective video games are at capturing the attention of players for extended periods of time. This effectiveness can be seen by examining the amount of time people spend playing video games, which has been studied quite thoroughly in recent years.

A study conducted in 2009 by The Nielsen Company on both men and women between the ages of 13-24 concluded that on average, gamers play between 14-19 hours per week, with females playing between 10-17 hours per week, and males playing between 17-24 hours per week [1]. In regard to this game system, great care was taken to ensure that it would capture and hold the attention of the player in very much the same way that mainstream video games can. Furthermore, in regard to using a game system as a means to teach, video games inherently promote active learning by shifting players into the participant role, which is particularly ideal when learning a new language [2].

This system has been designed specifically with the language student in mind in that it allows players easy access to all the information they need. It is our hope that by using this system, language learners will be capable of gaining fluency in their target language faster than with traditional methods such as textbooks or classes [3]. The game was originally designed with a primary focus on entertainment value, and a secondary focus on language

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learning. This serves to motivate players to continue playing the game, thus keeping them on track with their goal. This is also to ensure that players are able to enjoy the gameplay experience in a way that differs from the normal educational gameplay experience. This “Entertainment First” philosophy is seen in both the learning environment and the gameplay.

In recent years, the title of “Serious Game” has been used to describe games designed for a primary purpose other than entertainment [4]. Many such games have been gaining a great deal of attention in that they have a more noble cause. While this system may have objectives apart from just entertainment, the core focus of the game is still entertainment itself. The underlying intention of helping to facilitate the learning of a new language, while noble, is still only secondary. It is therefore difficult to classify such a game, since more effort has been spent on giving the player more of what they want in terms of fun gameplay elements, object interaction, good graphics, and an enticing storyline. The amount of effort that went into making the game fun and interesting for the player can be seen in the development process. A good amount of time was spent on conceptualizing the game through the creation of various designs for the learning environment and the main character (Fig. 1).



Figure 1 – Concept artwork depicting the main character and learning environment

2. Related Work

There has been a great deal of research into the development of new software and other methods utilizing technology as a means to facilitate better language learning. Many of these projects are similar to SanjigenJiten in that they also employ a more visual approach to

learning the language. Popular language learning software programs such as Rosetta Stone provide the user with images rather than text, which are representative of the words they are learning. However, a study conducted in 2008 regarding the software’s “Dynamic Immersion Method” concluded that the research principles regarding the shortcomings of traditional language instruction were not successfully implemented in the software [5]. Nevertheless, Rosetta Stone’s visual learning style still allows users to anchor newly acquired vocab words directly to the images on the screen, which has been proven to be more effective than simply learning the word based on its direct textual translation [6]. SanjigenJiten achieves this same result by using 3D objects in the very same way that Rosetta Stone uses 2D images.

There have been a few notable language learning projects also situated in 3D environments. One of these projects, Zengo Sayu, was developed in 1996 by Howard Rose at the University of Washington’s Human Interface Technology Laboratory [7]. Rose’s system attaches a Virtual Reality device to the user that allows them to explore a room while selecting and moving objects. The user learns by listening to audio cues from the system based on the objects they interact with and their location in reference to other objects in the environment. SanjigenJiten gives users the same freedom to explore, and learn at their own pace.

Another system, known as SGLL ProjectX, was developed in 2008 by students at the Dublin Institute of Technology’s School of Computing. The ProjectX system places users in a 3D environment with a static camera and gives users the ability to move around by selecting objects in the scene, which the camera changes to focus on. The system is essentially a collection of mini-games linked by a common theme [8]. The user carries out certain tasks such as gathering ingredients to make a recipe in a 3D kitchen environment or completing a grocery list in a 3D marketplace environment.

An online system entitled Middworld Online was developed in 2010 by software company Muzzy Lane in conjunction with Middlebury College’s Interactive Languages division. This system connects users to an online interactive world and guides them through coursework, activities, and mini-games designed to keep them immersed in the language [9]. One such mini-game places users in charge of waiting tables at a restaurant. The users must interact with customers and keep them all happy by determining what they ordered and how to respond to them correctly in the target language. Making mistakes will result in unhappy customers and a lower overall score. This software is not available publicly and is a part of Middlebury College’s Interactive Languages program, making it difficult to assess the online aspects of the system. However, the system does appear to give users a lot of freedom by allowing them to explore their environment and learn at their own pace. Additionally, Middworld Online’s graphics are on par with what most gamers would expect from an online game world, which can help keep players immersed in the game world while learning.



Figure 2 – Gameplay screenshot depicting the learning environment

3. Game Design

3.1 System Overview

3.1.1 System Concept

This system was conceptualized with the intent to increase the rate of overall language acquisition by players by providing them with quick and easy access to the information they need. One of the major goals of the project, which has become the main function of the system itself, was to allow players the freedom to select absolutely anything in their environment and see the object's name and pronunciation in their target language instantly. The idea originated from the author's method of studying Japanese by taping flash cards to various appliances in his own home. The author describes himself as a visual-spatial learner and attributes the effectiveness of this method to the way his brain stores information in an image format as opposed to auditory-sequential learners, who tend to store information based

more on what they hear [10]. This system's use of a visual-spatial learning style provides the new technologically-inclined generation with a new way to study a second language and could be considered by many people as significantly more appealing than traditional methods, such as textbooks, classes, or tutors [11]. While the end user would most certainly only use this game with the intent to learn a new language, it is still of the utmost importance to keep the game as entertaining as possible. By playing this game, the user has proven to be at least somewhat interested in learning a new language, but whether or not the user continues to use this game in their studies relies on two main factors.

- (1) The overall effectiveness of the game.
- (2) The overall entertainment value of the game.

3.1.2 Short-Term Interest

Assuming that the game is indeed an effective means of learning a new language, the dependence shifts to the question of entertainment: is this game enjoyable? There is no questioning whether or not the user would like to learn a new language, but how motivated and focused the user is could range anywhere from mildly interested to extremely passionate. Keeping the user's attention, regardless of how interested they are in actually learning the language was a major goal of this project. In regard to any subject, even if the subject material is incredibly dull and uninteresting, providing the user with enough stimulation could essentially trick them into learning the information anyway, simply because they enjoy the process more than the material itself, in this case, simply playing the game [12].

3.1.3 Long-Term Interest

In regard to the user's attention span, even passionate users will have a limit. There is always going to be a point where any human being decides they have played enough for the day. But whether they will pick up the game where they left off is another issue. Once the player has stopped playing the game, they need to have enjoyed the experience enough to decide to come back for more. Whether or not the user found it to be both effective and enjoyable is the real test in overall appreciation of the game itself. If it is both of these things, then it has proven the game to be worth the user's time [13].

3.1.4 Unlocking Motivation

Through the use of various industry-standard game elements, players can be motivated to continue playing in a number of ways. Item and object collection with an on-screen tracking system showing their progress gives the player goals to strive for. The addition of a good rewards system that triggers a new reward every 10 or so objects further motivates the player to keep collecting in order to earn more rewards. Moreover, dangling an "Ultimate Reward" in front of the player for finding all the objects or items in each level or even the entire game drives the player even further toward playing to completion [14].

3.1.5 Storytelling

Aside from actual gameplay elements, this is the one aspect of video games, and most media entertainment, that really takes hold of the player's interest. The success of most good video games can be attributed to a good storyline and the same is true for a good movie and even a good book for that matter. Malone suggests that if you have just read all but the last chapter of a murder mystery, you have a strong cognitive motivation to bring completeness to your knowledge structure by finding out who the murderer was [15]. Weaving a well-told story will most certainly keep people's attention until the very end. By providing the player with an enticing storyline, they will feel obligated to play through to completion, just to see how it all turns out for everyone in the end.

3.2 User Experience

3.2.1 First Impression

When the player begins the game, they are prompted to select their native language, which communicates to the system which language to display to the user. Then, in the player's own native language, the system asks what language the player wishes to learn. Once these options have been set, the system brings the player to the main menu. Players may change these language settings in the main menu at any time. From here, the player also has the ability to change a few other useful settings as well, such as the way the game's camera functions, as well as some audio options. Once the player selects play, the game will begin. A controls window is displayed, which allows the player to get a feel for how to control the character and interact with objects in their environment. The game then gives the player full control over the character and the freedom to wander around and thoroughly explore, as well as interact with their environment. The game's various environments are modeled after common, everyday places and filled with common, everyday objects, which the player can select and interact with freely. This free-roam exploration part of this system is called Explore Mode.

3.2.2 Explore Mode

While in Explore Mode, the player can select any object on the screen with the mouse, which causes the name of the selected object (noun) to be displayed on the lower portion of the screen (Fig. 2). Upon selecting the displayed word (or by double-clicking the object itself), a new window is displayed on the screen providing more details about the object, such as the word's part of speech, pronunciation description, translation into the player's native language, and one or two synonyms if applicable. A speaker button beside each word can also be selected to hear the pronunciation of the selected word (Fig. 3a). Additionally, a "+ Vocab" button is located in the bottom right of this window. Clicking this button stores the word in the player's Vocab List, which keeps track of all added words and whether the player has learned them or not (Fig. 3b).

3.2.3 Time Attack Mode

During Explore Mode, the player will eventually accumulate 10 words in their Vocab List. At this point, they will be given the option to enter Time Attack Mode in order to test themselves on the words they have added to their Vocab List. The game creates separate lists of 10 words based on the order in which the words have been added by the player. Upon entering Time Attack Mode, the player will be prompted to select the list they wish to play. This List Select Menu shows all the lists the player has created, along with the previous score, if applicable. Once a list has been selected, the player will be prompted to find each word in the environment as they appear on the screen in under the time limit. Players can also check the results for each word individually in their Vocab List (Fig. 3b).

3.2.4 Parts of Speech

Regarding adjectives and verbs within the game, some words will have additional tabs located at the top of the Vocab Word window, which provide a description of the selected object (adjective), or an action associated with that object (verb). Based on the structuring of the game, however, these tabs are initially locked and cannot be accessed until after the word itself (noun) has been learned. Once a tab has been unlocked, the player will then be able to view and add the containing adjective or verb to their Vocab List. The reason for this is that the adjectives and verbs used in the game are directly related to the nouns themselves and an understanding of the noun is required in order to know what the trait or action is describing. By allowing the player to learn the parts of speech in this order, they will have a better grasp of how to use the words they've learned in complete sentences.



(a) Vocab Word window

[English to Japanese]

(b) Vocab List window

[Japanese to Chinese]

Figure 3 – In-game windows shown in various language modes

3.3 Practical Applications

3.3.1 Intended Audience

SanjigenJiten is designed for personal use amongst people who wish to learn a new language on their own and for those who might have some difficulty staying on task and keeping focused when using conventional methods of language learning. The task of learning a new language can be discouraging for many people, which adversely affects even the best learners' motivation to keep at it. This game aims to assist these learners and visual-spatial learners alike by making the learning process a bit more interesting and fun [16].

3.3.2 Educational Institutions

Although the game is designed for use in the home by individuals, the game could easily be adapted for use in an educational curriculum. One way this could be accomplished would be to provide students with copies of the game and give homework assignments to find and study specific words each day. With the assistance of a few creative language instructors, this game system could easily find its way into educational institutions worldwide.



Figure 4 – Gameplay screenshot depicting the learning environment

4. Conclusion

4.1 Results

Based on data gathered from two trials with follow up surveys, the general consensus about the game has been overwhelmingly positive. These initial trials consisted of presenting the game to test subjects and allowing them to learn on their own. In both trials, half of the test subjects required some assistance in understanding the game, while the other half managed to learn how the game worked on their own. After getting comfortable with using the system, test subjects were asked to add 10 new words to their vocabulary list within the game. They were then instructed to enter Time Attack mode and test themselves on the new words. The game gave each test subject 120 seconds to locate the 10 words in their environment. Once the game was over, the test subjects were given a written test made from the words they had studied within the game. The test results reflected that the test subjects were indeed learning through the use of this system and surveys showed that all test subjects enjoyed the game.

◇	Test Group A	Test Group B
Time Attack Results	86%	74%
Written Test Results	90%	70%

Figure 5 – Test results from the initial trials for SanjigenJiten

4.2 Future Goals

The game's design allows for episodic releases in which new environments, vocab words, and story elements would be included in a whole new package. The episodic format allows for a gradual increase in the overall difficulty of the subject matter, allowing players to grow in skill with the games as they are released. This format also allows for a shorter development cycle and an overall better product as more time is spent on simply adding more content to the already existing game.

If distributed properly, SanjigenJiten could eventually gain recognition worldwide as an effective tool for learning a new language. In order to obtain such a goal, it is very important that the game finds its way on to the right platform. The ideal platform for SanjigenJiten would be a handheld, as it would provide users with the freedom to play and learn whenever and wherever they want. Therefore, we are hoping to find a way to release the game on either the Nintendo 3DS or Sony Playstation Vita. An eventual release on both of these systems is particularly ideal and we are currently seeking partnership with a small Kyoto-based game studio to help with this goal. A release on such systems would certainly allow the game to find its way into the hands of young learners all over the world.

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Acknowledgements

We would like to thank Kazuhito Shiratori for making all this possible through his efforts and assistance in communicating with the University of Tsukuba. Additionally, we would like to thank Takeru Umemura for his help and continued commitment. We would also like to extend our gratitude to Feng Chencheng for his assistance with the Chinese translations and proofreading of the Chinese text within the game system. Furthermore, we would like to thank Yu Peichao for his help and feedback on this paper. And lastly, we would like to thank all participants in the trial tests and surveys for their time and feedback.