ADULT LANGUAGE LEARNING
Using Minigames to teach Vocabulary in the ESL Classroom

Master Degree Project in Informatics
One year Level 22.5 ECTS
Spring term 2016

Kristoffer Kosunen

Supervisor: Mikael Johannesson
Examiner: Per Backlund
Abstract

Research within the field of serious games shows that games and simulations can supplement traditional learning methods in a positive way. Modern technology allows for simulations of real situations thus allowing for improved vocabulary training. This paper focusses on ESL (English as a second language training) for adult learners and looks at how a prototype set of minigames could be used to enhance learning outcomes in a specific set of vocabulary. The paper looks at a case study carried out by the researcher in Plymouth in the UK at an ESL training centre. Results from this sample showed that this method of using games is viable, however not that much of an improvement on traditional methods.

Keywords: L2 Language Learning, ESL, Serious Games, Educational MiniGames.
Table of Contents

1 Introduction.................................................................................................................. 1
2 Background.................................................................................................................. 2
   2.1 Serious Games....................................................................................................... 2
   2.2 ESL (English as a Second Language) Training..................................................... 2
   2.3 Serious Games in Language Learning................................................................. 2
   2.4 The Role of Teachers ......................................................................................... 3
3 Game Prototype ......................................................................................................... 5
   3.1 Structure .............................................................................................................. 5
   3.1.1 Drill Games.................................................................................................... 6
   3.2 Theoretical Justification ..................................................................................... 6
   3.3 Game Description ............................................................................................... 7
4 Problem Methodology ................................................................................................. 11
   4.1 Pilot .................................................................................................................... 11
   4.2 Revised Methodology ......................................................................................... 12
   4.3 Ethical Considerations ....................................................................................... 13
5 Analysis ...................................................................................................................... 14
6 Conclusions ................................................................................................................. 21
   6.1 Summary ............................................................................................................ 21
   6.2 Discussion ......................................................................................................... 21
   6.3 Future Work ....................................................................................................... 22
References ....................................................................................................................... 25
7 Appendicies ................................................................................................................ 1
1 Introduction

Games present new methods with which to supplement learning outcomes, and become a valid tool in the classroom (Gee 2006). With regard to ESL training, games and research within serious games shows that games can be a viable way to make students learn certain subject matter better than traditional methods, drill exercises for learning vocabulary being one area (Nakata 2008). It is also shown that images, or moving images can have a positive impact on learning (Tsou, Wang and Li 2002). Combining these ideas moves towards the idea of an interactive game with visuals and player interactivity. Designing a game in this way leads to learning about game design methods, and it has been shown that a good game is interactive in several different ways (Salen and Zimmerman 2004).

The importance of vocabulary in language learning is high, vocabulary conveys a lot in making oneself heard and to obtain a mutual understanding when conversing in a new language, grammar is also important but vocabulary is key (Wilkins 1972). This is reinforced by Rohani and Pougarib (2013) who state that vocabulary is the key factor that links together many other factors in language learning.

With regard to the current generation of young adults, and those that will make up the target group for this research, it shows that current teaching methods are, while perfectly adequate with regard to results in foreign language training, the addition of new technologies could make this kind of education even more successful. Young adults in 2016 have been exposed to digital media for most of their lives, and are what could be termed as “digital natives” (Prensky 2001) although this is debated and Prensky’s findings may not be accurate. Due to this, the idea of “digital natives” is used as a guide and something to be tested as opposed to a major principle of this study.

How can games be used by educators? What are the stresses and strains it creates on teachers wanting to implement them? How can these be minimised? Arnab et al. (2012) states that using games in a formal educational setting requires skills that go above what is normally considered the skillset of a formal educator.

With these points in mind it is the aim of the researcher to create a prototype game that will be used as a supplement within the classroom and show one way or the other, its usefulness to an ESL training organisation. This is achieved by carrying out a Paired T test, testing a game prototype against a traditional learning form. This study is furthered by another test, testing a smaller group of students using games and word lists and seeing any differences as well as a qualitative approach receiving feedback from the test participants.

The results of this study showed that the method of using minigames for vocabulary acquisition in ESL classrooms could be viable, especially with students aged under 35. However, the results showed little to no improvement over traditional methods, in this case a pen and paper word list drill exercise. This could have been down to several factors, such as the games being poorly designed or the demographics of those tested.
2 Background

Videogames are ubiquitous, a report by the BBC found that 59% of people aged 6-65 play video games in some kind of way (Juul 2010). Creating games for all audiences is now a possibility, and the field of serious games itself is becoming more and more desirable. As children grow with videogames and gaming technology, it appears a need for different methods in teaching are becoming more desirable with the use of serious games in the classroom becoming something legitimate and useful (Peterson 2010, 2012, Gee 2003).

2.1 Serious Games

Serious games are defined as “Games that do not have entertainment, enjoyment or fun as their primary purpose” Michael & Chen in Serious Games: Games that Educate, Train and Inform (2005) or “digital games and equipment with an agenda of educational design and beyond entertainment” Sorenson & Meyer, in the article Serious games in Language Learning and Teaching – A theoretical perspective (2007). Both of these definitions explain that the primary purpose of such games is not to entertain or give the player an enjoyable experience, but to assist in the training or learning capabilities through the use of the technology available.

Serious games, whilst offering a lot also have a number of downsides.

Why use these technologies in education? One factor could be that many of the problem solving aspects of games, or the puzzle solving within video games are also present within a formal teaching setting (Zaman et al. 2012).

2.2 ESL (English as a Second Language) Training

ESL also known as EFL (English as a Foreign Language) is a study programme for non native speakers. A hallmark of ESL classrooms is that of small classes so that each individual student will receive enough attention and feedback from the teachers. The goal of ESL training is to improve the students level of communication within the English language through the learning of conversational English, reading, grammar, listening, comprehension, writing and vocabulary. (applyesl.com 2016).

ESL is a big business, there are ESL training centres in many areas of the English speaking world. ESL courses offer various levels of English training, from beginner levels to advanced. In the United Kingdom between 2012-2013 some 585,000 students studied in both the public and private sector. Of this number 501,000 studied at private sector centres for ESL training. Of this 501,000, 291,000 were adults and accounted for some 80% of the total teaching time over this period (English UK Marketing Statistics 2013, 2014). With the use of gaming technology in other areas of teaching regarding serious games, could gaming technology be useful in this area for the purpose of vocabulary training?

2.3 Serious Games in Language Learning

So then, where could the use of serious games in language learning could be particularly useful? Many studies have been carried out since the 1990’s with regard to this idea and both
games developed specifically for the task at hand as well as off the shelf games have been used (Peterson 2010).

Peterson (2010) finds that SLA (second language acquisition) comes from “goal based communicative activities” which is to say that creating activities within the games with a clear structure and goal, that can facilitate the learning experience through communicating positive and negative feedback could be beneficial to the design of a game prototype. In such a game prototype the interaction between the user and the game is task focussed and feedback is instantaneous as well as the interaction being exclusively in the target language. Feedback is visible through cues on the screen as well as through a numerical “score” system (Peterson 2010).

There exists a differentiation between types of game based activities that can be used in the classroom to supplement traditional teaching methods: Game Enhanced, Game Based and Game Informed.

*Game Enhanced* research looks at how learning is categorised by using off the shelf titles to supplement learning methods and can be useful in using primarily entertainment focussed titles to supplement learning methods. An example of game enhanced learning is the use of the *Nancy Drew* games (Her Interactive 1998-Present) as used by an ESL teacher in the UAE to encourage women to read during her classes, a clear increase in interest was shown following the introduction of off the shelf point and click adventure games in the classroom (Whittaker 2013). This shows that if nothing else, engagement increases for some students with the introduction of interactive adventure games.

*Game Based* research looks at games specifically developed for the purpose of teaching certain curricula and what factors are useful in such games developed for such purposes.

*Game Informed* research looks at how features of video games can be used outside of gaming itself and focusses on the motivational aspects of games and how such aspects can be transferred to a traditional classroom setting (Reinhardt & Sykes, 2014).

This study looks at a *Game Based* approach to learning in an ESL classroom in the fact that it looks at specific curricula, in this case, 15 words to be learned as vocabulary and how it compares against a more traditional form of vocabulary acquisition in the form of a word list. The tests are based on pre and post quizzes on the same vocabulary as this will give a basis for any data collected and allow it to be used comparatively.

### 2.4 The Role of Teachers

Using games in the classroom requires the instructors and teachers to be involved. This means that the instructors and teachers must know, themselves, how to operate any systems involved in the process. Berg Marklund (2015) found that teachers themselves need to have some form of gaming literacy as well as an understanding of the game systems involved as well as the subject matter and their own pedagogical foundation to be able to use such devices in the classroom setting. Berg Marklund (2015) also found that teachers need to be able to set up the games to be used in the classroom in a timely fashion, in order to not waste classroom time with small administrative tasks involved with setting up and using computer systems. Whilst this could pose a large problem to the use of videogames in a classroom setting, it also indicates that any game made for the purposes of this study be very simple to set up and use.
These assertions are backed up by Arnab et al. (2012) who point to the additional requirements placed on to the educator using games in the classroom. Arnab notes that the educator needs multi faceted new skillsets to be able to successfully integrate games within a formal learning environment, that the educator would need skills which aren’t always associated with being a teacher such as the need to understand both the pedagogical and game elements of using such software and this strain can cause problems with teachers wanting to implement such practices within their teaching methods.

With this in mind, it is necessary to design as simple a suite of minigames as possible in order for the teachers, and students involved not to waste classroom time on administrative tasks. A guiding principle for the design phase adopted through and for this research. This is due to the time constraints that come with the eventual testing of the game prototypes as well as if the school involved would like to use the games again for future students.
3 Game Prototype

It would appear that at this stage, a game of high fidelity and sophistication would not be possible to complete within the time frame, and as such, a low fidelity, basic prototype to be made over the course of several weeks by one developer. Following feedback from peers and doing personal research, it has been made clear that a minigame, or series of minigames, would be the best to use as a test bed for both piloting and the subsequent experimentation. The game will be informed by research and take the Game Based approach as defined by Reinhardt & Sykes (2014) meaning that the game will be developed with the express purpose of being an educational artefact.

The game prototype itself is not intended to replace or indeed cut into any teaching time that the students have but be an extra voluntary activity that can be utilised if the student’s wish to do so. It is intended to be used outside of the classroom, when the students have free time.

3.1 Problem Statement

At this stage a formal problem statement should be devised to guide further research and study. The statement then is: are games useful in an ESL classroom? How can such technology be used to increase the vocabulary of the students using it? When and where can such strategies be implemented? This study takes the form of a scientific experiment that tests the efficacy of using such minigames in an ESL classroom. The study looks at how the games compare against more traditional means and tries to look for a way that games can be implemented in the rigid ESL curricula of a specific school in the South West of England. How will students and teachers respond to using the technologies?

Other factors to take into account are, will the students as paying customers be more responsive and more motivated to learn than say if the study was made differently and used people who weren’t specifically looking to learn vocabulary? How will age and nationality grouping differ in terms of results? Will those whose native tongue is a relative of English perform better? How can these minigames be used to create an environment in which learning vocabulary becomes a factor?

In terms of the design of the game itself, are the games simple and quick enough to play through that they don’t take too much time from the normal activities of both the students and teachers involved? The design philosophy behind the games is that they must be very simple and easy to understand as explanations and tutorials could take important time out of actually learning. Time that could be better spent elsewhere that would allow the students to learn more using traditional methods.

3.2 Structure

The use of minigames within the sphere of language training is useful. Minigames offer several enticing factors to the educator as they are cost effective, reuseable, can assist in motivation and focus on specific topics within the classroom. Minigames also only require basic technical knowledge and skills to develop and can be easily embedded onto websites (Strik et al. 2015).

There are several aspects of minigames found described by Cornillie and Desmet (2016). Some of these elements are utilised in the design of the prototype for this research. These aspects are to act as a guide to the design of the aforementioned prototype:
Excessive positive feedback and rewarding: These features are important, because they let the user know they have done the right thing and show them that they are correctly spelling the word (in the context of language learning). Rewarding also gives the player a sense of accomplishment, and using such systems as “achievements” or “scores” (Extrinsic rewards).

Competition: Leading from the previous score systems as extrinsic rewards, they can also give a numerical value that can be discussed with peers, adding a sense of competition between the users of the game prototype.

Time Pressure: This adds a stress level and needs to be balanced accordingly through thorough testing and feedback, as it could too easily hinder the learning outcomes by making the product too stressful.

Game core and non-linguistic outcomes: This is to say the gameplay itself, and the interactions the player can make within.

Positive Failure feedback: Making the feedback for failure positive and encouraging will increase the motivation to succeed, the handbook recommends doing this through humorous animations.

Using these guidelines, a minigame suite of two or three different minigames are aimed to be created for use in the experimentation.

Berns et al. (2012) created a minigames suite for teaching German to beginner level Spanish university students. The suite they created focussed on vocabulary related to the activity of shopping in a supermarket. They used several types of quiz style minigame, and found that the use of these, combined with the three dimensional virtual environment they had used was beneficial to the students and that they had increased their comprehension of the vocabulary by using the software. It felt that the study lacked a control group, and it was uncertain whether or not the students had improved due to the software or through other factors.

3.2.1 Drill Games
The games themselves are following a “drill” exercise style. Drill games in education have been around since at least the 1970’s and although some recent studies have found them to be less useful (Egenfeldt-Nielsen 2007), new technological developments pave the way for them to become useful once more (Fadde 2010). Drill games can be categorised as using some of the systems stated above, such as immediate and excessive feedback, competition and time pressure to create a progressively more challenging game as the game itself progresses (Fadde 2010).

Nakata (2008) found that drill exercises that were digital were more beneficial than traditional drill exercise methods using pen and paper. Drill exercises are shown to be beneficial to a certain degree and the advancement of easy game making technologies such as game maker lead to a relatively easy implementation of digital drill exercise games.

3.3 Theoretical Justification
The main attraction for the user is not the language learning focus but the minigames themselves, the challenge therein such as beating a personal high score, or collecting more points. It has been demonstrated that the motivational aspects of games can assist in rapid gains in an language learning setting. (Cobb & Horst 2011). It is also demonstrated that L2
(Foreign language learners) can achieve a high level of vocabulary learning through the use of word games (Cobb & Horst 2011).

The use of images, moving image or animation in these kinds of games is also beneficial as it is demonstrated that this kind of content is both beneficial to the learning process (Tsou, et al. 2002) as well as being something that is preferential to a younger demographic (Prensky 2001). Making these images interactive and giving a basis for the learning of the vocabulary associated with them, in theory, should show positive results.

The use of extrinsic rewards such as “achievements”, “scores” and “leaderboards” could go some way to adding an extra level of motivation to the relatively dull task of vocabulary drilling. The main problem area seems to be adding a level of excitement or “fun” to the task of learning a set of new words. The use of this kind of extrinsic rewards system, to add another layer of interest to the task, could be beneficial for some students. Chasing a high score, personal best, or trying to unlock all of the achievements is expected to increase the motivation of the user, and maybe even help them to learn the selected vocabulary. That is to say that the extrinsic rewards, such as those stated above could be the extrinsic rewards that end in intrinsically gained knowledge and motivation (Kong et al. 2012, Sänger & Wascher 2011).

The minigames design is aimed at providing the user with a flow space as described by Csikszentmihalyi (1998). A space in which the player is engaged within the game experience, this will hopefully be achieved and the positive result of it is that the player will be learning the vocabulary by merely playing the game, not necessarily studying, but learning through the enjoyment of the game. The design principles that go into this are those such as getting the player into a state of concentration. Hopefully, this will be true of the games designed for this project.

### 3.4 Game Description

The game is built using the game maker engine. This was chosen as it is a free use software providing no profit is derived from its use as well as being relatively easy to learn and use for and amateur level designer. The Game Maker suite from YOYO software can be used to make a multitude of different types of games, and seems suitable for such an endeavour to be produced from it, the three-tiered structure of the game, as described below, fits the use of the Game Maker suite well.

The game prototype itself is made up of 3 sections, one for study, one for improving recognition and one finally for improving the spelling of the user:
The first section is a cartoon style drawing of a kitchen from a straight on two-dimensional perspective (see Fig 1), the interaction in this case takes the form of clicking on objects and having the word for them appear and a sound file to play to assist with pronunciation. This room is designed to be a place where the user can freely explore and study the words of the objects that will be used in the minigames henceforth. A kitchen was chosen as it contains basic vocabulary that can be learned and kept relatively simple.

The second part of the game is a “memory” style game in which the players turn over cards which are initially face down (see Fig 2). On half of the cards a word is displayed and the other half is a picture of the object. The premise is for the user to match the word to the image of the object, it is hoped that this will assist in learning the vocabulary and also learning the spelling of the words which will be used in the second minigame.
The third section of the game is a slightly different type of game. Here the pictures of the objects from the vocabulary list will be displayed and the user will have a time limit to choose the correct corresponding word (see Fig 3).

[Fig 2: Memory Match game]

[Fig 3: Timed word match game.]
Each of the two minigames have scores to give the user motivation to improve on the next time they play via the use of extrinsic rewards structures. The score system will also serve as a competitive aspect to the game, allowing the users to compare their scores against each other. The games are very simple and are intended to only be played once by each user in the study. Additional features could have been added that increased the motivational and gameplay aspects but as the subject’s interaction time with the games would be brief, this design choice was decided against.

To deal with failure feedback, sound effects and visual cues will be shown. The aim is to help the user learn using a very basic game system and to compare how effective it could be versus a traditional methods of vocabulary learning.
4 Problem Methodology

A Paired T test is aimed at initially with regards to the study. It feels as though this will be the most suitable for testing the impact of any prototype games that are made using the same sample group. The research includes a comparison between students using a game, and comparing it to a set of students that are using a more traditional method of vocabulary learning, in this case a word list.

4.1 Pilot

The pilot involves a very basic pen and paper version of the two proposed minigames. This pilot is just to see how the test could work on a larger scale and what changes need to be made when it comes to testing the actual finalised prototype.

As I am using native English speakers in the pilot, the vocabulary list will be taken from made up words from science fiction and fantasy novels, movies and TV series. Using a small sample of friends and relatives (initially 8 3 Female, 5 Male) I began by asking their familiarity with the terminology, with a basic quiz, then this group was narrowed down as I took out people who knew most if not all of the vocabulary, the group now stood at 6 (3 Female 3 Male, aged between 24 and 65). This quiz also allowed me to take the initial readings for the baseline score and have something to compare against with the final outcome. I then ran through the primer instructions, which would give them a basic grounding in the terminology and to simulate the “study” room in the actual game whereupon users can interact with a room and learn the terminology by clicking.

Then the games began, first up was memory, as this would allow them to match the picture of the object to the word, and wouldn’t rely on their spelling accuracy as it was hoped that it could be developed through the use of this. Some observations were that this was maybe too easy, and that perhaps too much time was allowed to look at the primer initially. Hopefully this could be revealed in the spelling section.

The second minigame, was the “whack a mole” type, which was difficult to simulate with pen and paper, but a system was developed where I would show a picture card and the contestant would then have a set time limit of 20 seconds (this appeared to be too long) to spell the word correctly. Observations from this showed that the time limit was too lenient, and it was basically a bad simulation of what was in mind for the final prototype to be tested later on.

Following this, I set the users the quiz once more to see how they had improved, and the results showed that the games had had an impact on their vocabulary knowledge of the word list. I think this could just as easily be down to just the primer instructions and unfortunately didn’t have a control group to sit out of the games. This is something that needs to be considered for my final experimentation. The results on the face, where overwhelmingly positive. Initially, the scores were very low, 4/10 on average for the whole group. Following the test, they had increased to 6.5/10 but it cannot be said that the games themselves were solely responsible. A control group is very much needed for tests such as this, as the games may only be as impactful as a simple word list alone.

A paired T test with two tails was carried out on the minimal amount of data collected from the pilot and the results were interesting as the p value turned out to have a significance to it showing that the way the test is set up (see Fig 4).
The test went well, showing that this is the right set up to take forward to the testing of the prototype itself albeit with a few modifications.

4.2 Revised Methodology

Following the pilot test, a protocol had to be devised so as to make the finalised test as accurate and without differentiation as possible. The pilot showed it was clear that a paired T test would be the most useful to measure the success of the games versus the traditional word list. This is because the paired T test compares the same subjects with two different test results. This would also be used by the control group, but some revisions to how the test was carried out had to be made.

As the subjects and facilities would be supplied for the testing by the Meridian school of English in the UK the results, and motivation would vary to the pilot. The pilot used made up words that wouldn’t have so much motivation to be learned, however the students in the final testing would be paying customers of a language school, and thus their motivation to learn the language would be higher.

The first day of testing was conducted on the 10th of May 2016, in a classroom in the school. The participants were asked by their teachers if they would like to take part in the study in the days prior to my arrival at the premises. They were all volunteers and were given consent forms to sign stating that only the data on their quiz performances would be used and they would remain anonymous throughout the publication. The teachers involved were interested in the research and wanted to participate too. This day was chosen by the teachers who were assisting me as they had found that this particular time would be most suitable in terms of

![Pilot T-Test Table](image-url)

The value of t is 4.330797, The value of p is 0.00617. The result is significant at p ≤ 0.05.

Fig 4: Pilot T-Test Table
how many students could be involved and how much time could be given over to the experiment.

Using the idea of testing a few people at once in small groups of four as opposed to individuals, as the students provided to test the game on had to get back to class, time was somewhat limited. As there was a total of 16 participants, they were split into groups of four with each group containing two users using the game, and two control group users using the paper word list.

The protocol was as follows: four students enter the classroom in which the test was being conducted. A brief explanation of what they would be doing would be given, then they would take the initial quiz to see how knowledgeable they were prior to using any of the study software/papers. Following this, two students would be given a word list to look at and study, while the other two would be put in front of the games, the games were labelled 01, 02, 03 on the desktop and the students using the computers were told to load and play them sequentially. The students would play through the games and study the wordlist for 6 minutes, they would then take the quiz again to see if there was any improvement. Three days after this, the students once again met up and took the quiz again to see if there had been any longer term results.

Following initial testing, another test was devised to evaluate the qualitative impact of the game. The initial testing had a good amount of qualitative data to be analysed which would show the results of how the game prototype performed against the traditional pen and paper word list, but a lack of feedback on the game from the users was noted as something that could provide a discrepancy as the factor of the player’s enjoyment or how they thought and felt about the software was lacking. Thus a second, albeit smaller test, was devised and conducted.

This second test used a different paper word list and a different quiz containing different item vocabulary, this second quiz and word list would provide the basis of a comparison, using the same test subjects against the game prototypes different word list. The test methodology differed as the users this time, played the game, and the initial quiz and then the new quiz and word list. It was hoped that this would allow the users to compare their experiences, a Likert scale questionnaire was devised to collect feedback from the users asking for their opinions of their experiences with both formats.

4.3 Ethical Considerations

As the research takes place with paying students at a private English school, several factors should be taken into account. Although this study will hopefully be beneficial in terms of the fact that the students participating are motivated to learn by virtue of the fact that they are paying customers in terms of their education, it could also be seen that the students feel as though they have to take part in the study as part of the course. As the study takes place during a normally scheduled break and the students are informed that they are participating voluntarily, there is an issue of understanding. The students are not fluent in English so extra care must be taken to ensure that they are fully aware that they are by no means obliged to volunteer for the study. This was taken into account by the teachers that assisted me throughout the research, and they explained the situation prior to taking part in the study. It was decided that the teachers would be better for explaining such ideas as the students already have familiarity with them and that as ESL teachers, they have ways of making more difficult concepts such as this better understood to those that took part in the study.
5 Analysis

The problem was tested and the data collected over a day, and a follow up a few days afterwards. The subjects were taken in different groupings. The first group contained 2 men and 2 women, of beginner level in English, from Italy and Slovakia, aged between 50–65.

<table>
<thead>
<tr>
<th>Game Testing Student</th>
<th>Pre Quiz</th>
<th>Post Quiz</th>
<th>After 3 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Control Group Student</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

*Fig 5: First test group*

This group perhaps due to age, were perhaps the most unfamiliar with videogames and performed much better with the wordlist. Looking at the data shows that the students using the game had a lesser grasp of the words to begin with, as they both scored 0 for the initial quiz. There is improvement however, in both sections, the game helped the students learn as did the word list, but the word list worked in a much better way, particularly for this group of students. It is interesting to note that there is less drop off from the game, and perhaps using the game helped motivate the students to learn the vocab, as subject 2 score went up from 1 to 4 after 3 days.

Mean scores for the pre quiz, for the game testers 0, post quiz, 3, after 3 days mean score being 4, showing improvement. Mean scores for the control group are much higher across the board, with 2 for the pre quiz, 11 for the post, and 9 for the after 3 days. With this age/ability grouping a traditional vocabulary learning method would be recommended (see Fig 5).

The second grouping was made up of female Italian students at intermediate level aged between 25–45.

<table>
<thead>
<tr>
<th>Game Testing Student</th>
<th>Pre Quiz</th>
<th>Post Quiz</th>
<th>After 3 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Control Group Student</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>13</td>
</tr>
</tbody>
</table>

*Fig 6: Second Test Group*

This group, of a younger average age, performed better using the game, averaging as good a results as the wordlist. There is a clear indication that the vocabulary was learned through playing the games, to as good a degree as using the word list. This is then carried through over to the after 3 days results where the knowledge is remembered, albeit slightly better by the control group, though 2 subjects, subject 3 in the game test, and subject 4 in the control, still see a drop off of four points after 3 days.

Mean scores for this grouping were as follows: game testers Pre 5, Post 11, After 3 Days 8.5. For the control group: Pre 3, Post 11, After 3 Days 8.5 (see Fig 6). This shows improvement, and a similarity for the after 3 days score, it shows a higher improvement in the control group.
and a similar amount of retained knowledge between both. However, at such a small sample size it is difficult to make any concrete observations.

The third and fourth groupings were made up of female Polish vocational students, aged between 18-23 as they fall within the same demographics they have been included into a larger table even though the results were taken in groups of four as had been the case with other groups.

<table>
<thead>
<tr>
<th>Game Testing Students</th>
<th>Pre Quiz</th>
<th>Post Quiz</th>
<th>After 3 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Control Group Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>6</td>
<td>15</td>
</tr>
</tbody>
</table>

*Fig 7 Fourth Test Group*

These students, being the youngest samples, seemed to get the most out of using the game software. There is a clear indication that the software and word list are as effective as each other, at this age/ability grouping. The game testing students saw a marked increase with two scoring 10 more following the use of the games, this is also seen with the control group however. The after 3 days scores were both very high with this group also, with the word list pipping the game users by one point. This grouping shows a clear indication that the game can be an effective learning tool, as effective as traditional methods in fact.

Mean scoring here is as follows: Game Testing, Pre 7, Post 14.75, After 3 Days 14.25. For the control group: Pre 7, Post 14.75, After 3 Days 14.5 (see Fig 7). This is a good grouping to show the effectiveness of the game versus the wordlist as the pre scores mean score is the same, as is the post score. This shows the usefulness is about the same for the game and wordlist, the after 3 days score is higher by 0.25 on the control group, showing only a slightly better score for this factor.

A table of collated and collected results from across the whole test paints a different picture (see Fig 8).

<table>
<thead>
<tr>
<th>Game Testing Students</th>
<th>Pre Quiz</th>
<th>Post Quiz</th>
<th>After 3 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Mean</td>
<td>4.75</td>
<td>10.875</td>
<td>10.25</td>
</tr>
</tbody>
</table>
Looking at the mean scores over the entire grouping has the data show that there isn’t a great deal of difference between the traditional method of the word list and the game. An equal score on the Pre Quiz mean shows that the results are coming from a similar starting position. The word list goes on to show a 2 point higher increase in the post quiz and just over 1 point higher in the After 3 Days retained knowledge section. As earlier grouping results showed, that outside of the older age groups, there is a lot less difference in the score and this could be down to a number of factors, poor design choices, demographical factors, students being used to using one type of vocabulary learning method.

Drawing a conclusion from this, it would show that the game system does increase learning objectives, albeit not as much as a traditional method.

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.75</td>
</tr>
<tr>
<td>Variance</td>
<td>11.92857</td>
</tr>
<tr>
<td>Observations</td>
<td>8</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.860366</td>
</tr>
<tr>
<td>Hypothesized Mean Difference</td>
<td>0</td>
</tr>
<tr>
<td>df</td>
<td>7</td>
</tr>
<tr>
<td>t Stat</td>
<td>-5.97358</td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.000278</td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.894579</td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.000557</td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.364624</td>
</tr>
</tbody>
</table>

The above table shows a paired t-test (see Fig 9). It shows the sample based on the mean data. There is a recognizable difference within the table that shows that the mean has increased between the initial value (variable 1), that of the test before playing the games, and the after value (variable 2). The test was based on a null hypothesis meaning that there was no
hypothesized difference in the values. The two-tailed P value of 0.000557 (see Fig 9) indicates that the result has significance and that it is very unlikely this is due to a random sampling factor meaning that there is truly a difference between the pre and post scores that indicates that the game has been successful in improving the vocabulary of the participants that have taken part in the study.

**t-Test: Paired Two Sample for Means**

<table>
<thead>
<tr>
<th></th>
<th>Variable 1</th>
<th>Variable 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.75</td>
<td>12.875</td>
</tr>
<tr>
<td>Variance</td>
<td>7.642857</td>
<td>5.553571</td>
</tr>
<tr>
<td>Observations</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>0.805833</td>
<td></td>
</tr>
<tr>
<td>Hypothesized Mean Difference</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>t Stat</td>
<td>-13.995</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>1.13E-06</td>
<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.894579</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>2.25E-06</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.364624</td>
<td></td>
</tr>
</tbody>
</table>

*Fig 10: Paired T Test for Control Group (Word List Users)*

The above table shows the results of the paired T test for the word list users. It shows very trustable results (see Fig 10). The P value being as it is, means that randomness only has an infinitesimal chance of affecting the results of this. This would show that the results are sound and can be interpreted to show that the results of the sampling are legitimate.

Another test day was arranged with seven more students from the ESL school and this would use alternative methodology described in the methodology section. A brief description follows, this time the same students were tested using the original game with 15 words and an alternative pen and paper word list containing different vocabulary. Following the standard tests to test the usefulness of either medium a questionnaire was handed out using the Likert scale, this allowed for an alternative take on the data, as it gave some qualitative feedback about the game and the experience of the test subjects.
<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>PRE SCORE</th>
<th>POST SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MEAN</th>
<th>3.714</th>
<th>9.143</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCREASE</td>
<td>5.429</td>
<td>5.714</td>
</tr>
</tbody>
</table>

**Fig 11: Second Test Day Full Table**

The students taking part in the second test were 3 female students 2 from Turkey and 1 from Italy, in the 18-30 age grouping, 4 males, all Italian, with three belonging to the 18-30 age grouping and one in the 30-50 grouping. Earlier analysis showed that the increase should have been higher for the younger subjects, however this wasn’t so much the case within this testing as the older participant improved to around the same degree as the younger participants. This could be down to a range of factors, such as the older participant in this study was more familiar with the concepts of video games, or that the systems were easier to understand, as this participant was between the ages that showed lesser results and the younger age group that responded well to the games as a whole. Another factor could be that the initial word list and game contained more well-known vocabulary as it was designed to be as simple as possible and the second word list had less known words.

Analysing this data (See Fig 11) shows that there is not a great deal of difference in how the subjects performed within either medium, with an increase in scores across the board both from using the game as well as using the word list. It is visible in the above table, that the difference favouring the pen and paper word list with these students is minimal, standing at a mere 0.285 increase over the game for the vocabulary used.
The second part of the testing involved analyzing the qualitative data taken from the questionnaire.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The game was more useful than the word list.</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The game was more fun than the word list.</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>This game helped me learn vocabulary.</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I enjoyed playing these games.</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>It would be nice to have these games in lessons.</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The word list method was less stressful.</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>It was too difficult to focus on learning the words with the game.</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>I would like to play these games again.</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>The game contained too many distractions.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>The game could have been more fun.</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Fig 12: Questionnaire results table*

The qualitative results point to a favourable attitude towards the game from the answers delivered by the respondents (see Fig 12). Whilst 3 found there to be no major preferences to using the game over the traditional method, 4 respondents believed that the game was more useful, with 57% of the total. All but one respondent found the game to be more fun than the word list, whilst fun is a very subjective term, the response from the subjects can be believed, 85% of, what is granted as a small sample size found the game to be more fun.

All respondents were unanimous with their belief that the game helped them improve vocabulary, with one in the strongly agree camp. The same can be said for the enjoyment the respondents received through playing the game, as all of them indicated that the games were enjoyable (see Fig 12).
The majority of subjects found that the games would be a nice addition to lessons, with 71% believing this would be advantageous. However, with this said, the remaining 29% were indifferent to including these types of games within lessons (see Fig 12).

I tried to ask the same question in two ways, with the “The game contained too many distractions.” and “It was too difficult to focus on learning the words with the game”. Both responses were very similar, with only one subject admitting that the games could be more distracting to the learning process or difficulty to focus. The majority disagreed with these statements with two respondents unable to agree nor disagree with the question each (see Fig 12).

Most respondents indicated that they would want to play these types of game again, with 2 strongly agrees and 3 agrees. One respondent indicated that this would not be interesting with the final one neither agreeing nor disagreeing with the statement (see Fig 12).

All respondents were unanimous in their opinions that the game could have been more fun, and this is one of the most important factors as any further project would need to take note of this and try to improve the prototype to perhaps increase the enjoyment, and hopefully learning outcomes. A problem noticed via this could be that as the games weren’t well designed enough, thus meaning the students were at a disadvantage in the testing due to the games being somewhat dull and uninteresting (see Fig 12).

One question group, relating to the distractions caused or the focus of the players during use of the games was used to see if the players found using the games this was to see if the games that had been designed for use in this study were too complex or distracting. It was a necessary in my eyes as this was one of the guiding factors of my initial design brief, relating to the problems that could be faced by using such games in a classroom as described in 2.4. It was vindicating to the design ideas of simplicity that this came out to be a non-factor as the games were found to be simple enough for the task they were to perform with only one respondent indicating any difficulty with using the games with regard to focus or distractions (see Fig 12).
6 Conclusions

6.1 Summary
The data shows that games can be useful to increase vocabulary learning outcomes, particularly amongst younger language learners. Older learners may be more comfortable with traditional means, and thus not find a game system as useful. A quantitative approach showed this and showed particularly that the games do increase the vocabulary knowledge.

Finding that there is a significant difference over this research shows that further development and refinement of this study would yield more accurate results that could point to something more worthwhile. It is pleasing to note that amongst some certain age groupings the results vary. This was not something that had been foreseen or hypothesised prior to carrying out the study and was not a factor that was intended to be looked at, but showed itself in a way that was unexpected. Carrying out this study on a group entirely consisting of 18-35 year olds would have shown similarities with the groupings that showed that the game was at least as useful as the traditional methods.

The data points to the game being a potentially great learning tool, amongst younger adult language learners, and discussions with the teacher assisting me told me that it would be a good way to break up the sometimes monotonous process of vocabulary learning in the ESL classroom.

With the addition of the qualitative feedback in the form of questionnaires, indications from the students show that the majority did enjoy learning through the games and that the games could be a good addition in the classroom. This adds to the idea that the games could be used to supplement any classroom learning, enhancing the learning experience in combination with traditional learning methods.

The experiment was good, however there were some issues with the initial test. The lack of a significant P value in the control group is disturbing and could have resulted in issues with the experiment design itself. The noticeable difference of the means were useful however and it was clearly obvious that both the game and the word list method of vocabulary acquisition was working. The second test day gave good results as to both the qualitative and quantitative results of using the game versus the traditional learning methods. The mix of ability levels and age and nationalities of the participants could also have been a factor in this.

6.2 Discussion
The process of carrying out this study leads to several conclusions relating to similar topics of research within the field. Cornillie and Desmet (2016) talk about the guidelines that should be used when designing educational games, and to an extent I followed some of these rules. The score and positive and negative feedback were valuable to me during the time I was designing the games, I think that as I was designing such a basic game, which would be used only once, that a lot of this was irrelevant and time could have been focused elsewhere.

I think that in a lot of these cases, and studies such as this one and that of Berns et al. (2011) that the study tries to show the positives of using such an approach and neglects to show that traditional methods can in some cases at least be as good at this kind of vocabulary learning objectives. Including the control group of an equal number to that of those using the game was
invaluable and gave me results that can be useful in the future. The lack of this control group in similar studies such as the aforementioned “Supermarket Game” by Berns et al. (2011).

The study used guidelines from other researchers, such as Cornillie and Desmet, and also Nakata (2008) which served as a good baseline for this research. Nakata looked at how to make drill exercises in vocabulary learning more interesting to students by computerising and gamifying them. This was similar to what I tried to do in this study. I looked at how vocabulary is taught both through research and personal experience and tried to think of simple ways in which to make it more interesting to the learner.

I tried to use the points stated by Tsou, Wang and Li (2002) with regard to using images and animations, but my abilities within this discipline aren’t good enough so static images are the only thing that appear in the game. It is not very visually appealing and maybe this could have had some kind of impact on the results. The games are, at their core, a slightly more interactive version of a word list, with two different types of game mechanics to try out.

The results showed what could be expected to be seen after having looked into Prensky’s (2001) work on digital natives. Although Prensky’s quite dated assumption that those that grow up with digital technology take to it better is not backed up by research, this research shows that it could have some weight. The younger age groupings responded better to the software than the older participants. This is in spite of me trying to make the games as simple and easy to understand and use as possible, making them only barely more interactive than the paper word list that the control group was using. The younger the tester the better the results as the youngest subjects scored better than their slightly older counterparts from the middle group.

The results and discussion with the teacher that was helping me at Meridian, showed that games can be a useful supplement in the classroom. That the breaking of the monotony of normal vocabulary learning practices can be eased by using games such as these. The teacher working with me said how it would be useful for her to use these games again in future classes as a different type of activity. This all points to what Gee (2003) stated about how games will never replace, but more supplement traditional learning methods and add a new tool to the arsenal of teachers to assist them.

The simplicity of the games seemed to be suitable for the students and teachers involved in the testing. This was positive and allowed more data to be collected as opposed to another form whereby the games were complicated and took time to explain controls, systems etc. This simplicity seems to be suited well for the modern ESL classroom where students are only spending a few weeks at a time in these environments and not really having a long term education in the language, due to the cost of such private courses. This went in line with the research into the role of teachers by Arnab et al. (2012) and Berg Marklund (2015).

### 6.3 Future Work

This study was very interesting and showed that there could be a place for games in the ESL classroom. Future work could help define the exact role that games could play within the ESL classroom and how frequently they should be used. As a vocabulary teaching tool, games are a valid way to improve certain types of vocabulary learning and are particularly useful to younger students.
Future work could take the form of a more in depth study, where the games are better designed to be more visually appealing, with the help of digital artists and other such professionals. The games could also have a more personal feel with the addition of rewards that stay in the games system after initial use. My lack of technical skills I feel, may have let down the design of the games, as they couldn’t be exactly what I had envisioned.

A longer study, where there is more vocabulary to be learned could also be considered, 15 words is not a huge amount to test against, and a larger scale version of what has been carried out in this research could be useful to future work. However, this would probably require a method whereby the students use the software over a more prolonged period of time, meaning certain game features such as saving and loading progress would be needed.

Future work could also take the form of just having more data and testing. Whilst this study contained 23 participants, more would allow the data to take a better and more valid shape. A larger participant base, would allow for more interesting reading in terms of results and give the data more validity if the same trends were noticed over a longer and more in depth study.

Something that wasn’t considered before conducting the testing and analyzing the data was that of demographics. The data evolved the study and allowed me to consider factors that I had not initially thought about, such as differences between age groupings and nationalities. Testing using speakers of exclusively non-western European languages might point to different results as there are similarities in words in English and it’s closer relatives that aren’t there in Chinese native speakers for example. These kind of differences could make for interesting reading and allow a better designed experience for people of different nationalities, maybe even going as far as tailoring experiences with people of various backgrounds.

Age demographics too could make for an interesting test. How could this game be designed in a way that allowed older participants to get as much out of the experience as younger ones. The games had a much more noticeable impact on the vocabulary acquisition of the younger participants. How could this be manipulated to allow for the older users to achieve the same results, of course a lot more research and background would need to be carried out.

Further to this, how could the games themselves be designed to be more appealing to users. Every person is different and finds different things appealing, how could this idea be used to tailor the game systems in such a way that they could be used to make a better experience for everyone.

Teachers involved in the study found it to be a useful tool, and something that made their lessons a bit different and broke up the monotony. Working more with Meridian School of English could allow me to receive more feedback from teachers and how they viewed the experiment, and take more advice from them as they are experts in their own fields. The time constraints on the testing made this difficult with the scope of this study but future work could take the form of designing games, with the direct input of teachers. Although this could factor in the additional workload teachers must have in order for this to be achieved.

I found that the qualitative approach I took to this study was kind of rushed and the questionnaire that I designed could have been a lot better. I feel that the feedback I received was good, but there were more questions unanswered. More time taken on this could be useful.

In conclusion, the study was beneficial, it showed that games can be used in the classroom and that games can be useful for such activities as acquiring vocabulary. That the games are only
marginally less useful than traditional means, and that this isn’t necessarily a bad thing, as the games can still be used to break monotony of normal classroom activities.
References

Arnab, S., Berta, R., Earp, J, de Freitas, S, Popescu, M, Romero, M, Stanescu, I, Usart, M, (2012): Framing the Adoption of Serious Games in Formal Education, Electronic Journal of E-Learning, v10 n2, pp 159-171


Michael, D, & Chen, S, (2005): Serious Games: Games That Educate, Train, and Inform (1er ed.). Course Technology PTR.


Reinhardt J, Sykes J, Digital Game and Play Activity in L2 Teaching and Learning, Language Learning and Technology, Vol 18, No. 2, pp 2-8

Reinhardt and Thorne, (2016): The Routledge Handbook of Language Learning and Technology


7 Appendicies

Word Lists, quizzes and consent form.

Consent Form for Participation in MSc Study
University of Skövde

You are invited to participate in a research study that will make up the basis of research for a thesis in Informatics: Serious Games. The study is being carried out by student Kristoffer Kosunen (b15kriko@student.his.se) in Serious Games masters program at the University of Skövde, Sweden.

Voluntary participation
Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be asked for any explanations if you decide not to participate or to withdraw from this study.

Method to be used
Your participation will involve completing a quiz, playing three mini games for 5-10 minutes or studying a word list, then taking the same quiz again to see if there has been any improvement, you are also invited to take the same quiz a few days later to see if the knowledge remained over a longer period.

Data to be collected
Your scores in the quiz will be collected, collated and compared using the “paired T-test” method of data analysis.

Protection of confidentiality
All data is anonymously collected. Your identity will not be revealed in any publication resulting from this study.

Consent

I have read and understood this consent form and have been given the opportunity to ask questions.

☐ I give my consent to participate in the study.

_____________________           ____________________           ___________________
Participant’s name                    Participant’s signature                 Kristoffer Kosunen
Usefulness of software questionnaire

Thank you for your patience with the testing, now I would like to ask you a few questions with regard to the exercises we carried out earlier today.

This questionnaire will use a “Likert” scale, numbering 1-5, 1 indicating the least agreement and 5 indicating the most.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This game was more useful than pen and paper.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. This game was more fun than pen and paper.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. This game helped me learn vocabulary.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I enjoyed playing these games.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. It would be nice to have these games in lessons.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The pen and paper method was less stressful.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. It was too difficult to focus on learning the words with the game as opposed to the word list.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. The game contained too many distractions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I would like to play these games again.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. The game could have been more fun.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quiz

Please write the word of the pictured object to the right of the picture, if you do not know the word, please leave blank.

............................................

..............................................

..............................................

..............................................

..............................................

..............................................