Charles University

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Bachelor Thesis

Role of interactive computer word games in English vocabulary acquisition

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Abstract

This bachelor thesis examines the possibilities that computer assisted language learning (CALL) games might provide to learners of English as a second or foreign language in vocabulary learning.

Since the prominent focus is on the practical part, only a limited selection of relevant theories and concepts about vocabulary learning and CALL technologies in general is provided in the theoretical part. The practical part introduces an originally designed and programmed CALL vocabulary game and audits its functionality and helpfulness in vocabulary learning process of high school English as second language students through an experiment and a questionnaire survey. The results are analyzed in the last chapter and improvements and further extensions to the game are proposed.

Key words

Computer Assisted Language Learning (CALL), Vocabulary Learning, Word Games

Anotace

Tato bakalářská práce zkoumá možnosti, které nabízí počítačové výukové hry studentům angličtiny jako cizího jazyka v problematice učení slovní zásoby.

Vzhledem k tomu, že důraz práce je kladený na praktickou část, skládá se teoretická část z omezeného výběru relevantních teorií a konceptů v oblasti osvojování slovní zásoby a počítačových výukových technologií. Praktická část představuje původní autorsky navrženou a naprogramovanou počítačovou výukovou hru na rozšiřování slovní zásoby a následně prověřuje její funkčnost a nápomocnost prostřednictvím experimentu a dotazníkového šetření mezi středoškolskými studenty angličtiny. Poslední kapitola nabízí analýzu výsledků výzkumu a navrhuje možné vylepšení a rozšíření představené hry do budoucnosti.

Klíčová slova

učení jazyka za pomoci počítače, učení slovní zásoby, slovní hry

Table of Contents

1. Introduction

The main purpose of language is information transfer. Vocabulary is central to any language, because words carry most of the semantic value of a message. Students of second or foreign language might have perfectly mastered grammatical rules, but without the appropriate knowledge of vocabulary they will not be able to express the intended meaning.

Vocabulary learning is, however, very often the source of many troubles to second (and foreign) language students. Several levels of structure of a single lexical item, some of them frequently irregular, must be adopted by a learner. In addition to this, a considerable number of these items have to be mastered even for the basic communication.

Many of vocabulary learning strategies are based on repetition. Since vocabulary learning is a never ending task (due to the extremely large and open structure of the lexicon), it might become extremely boring and consequently unpopular among students.

This thesis investigates what the role of interactive computer assisted language learning (CALL) vocabulary games in the process of English vocabulary acquisition is, particularly how they can avoid the tedious repetitiveness in vocabulary learning, mostly through a case study experiment described in the practical part.

The scope of the thesis lies in intersection of several fields of interest; most obviously it is on the boundary of teaching English as FL and computer science. Although only a limited selection of relevant concepts from English linguistics is discussed in the theoretical part, orientation in both fields of interest was inevitable. The source code of the programmed application described in the practical part (that is fully the product of the author of this thesis) has nearly 3 000 lines, the database of the experiment comprises more than 15 000 lines of data and the current internal dictionary of the application consists of 2 041 entries that were compiled by the author. Brief technical specification of the application is attached as Appendix 1.

Unfortunately, during the research of sources for the theoretical part I encountered a problem with the lack of relevant literature dealing with the very specific problem of vocabulary acquisition in CALL and gaming environments that would not be outdated.

Therefore I decided to discuss more general sources and concepts. Consequently, the theoretical part provides only basic information about the English vocabulary (as the material that will be presented to students in the game), a brief introduction of two theories about vocabulary acquisition that are, either historically or functionally, related to CALL technologies and finally, the theoretical part is concluded with a brief discussion of characteristics and benefits that general CALL environments and games have.

Consequently, the main focus is on the practical part. Its primary aim is to design an efficient and engaging CALL vocabulary game using modern, stable and secure programming techniques. The game was then tested on a group of high school students who study English as FL. Concepts introduced in the theoretical part are further developed and applied to specific features of the game in some chapters of the practical part.

The hypothesis of the experiment is that students who will acquire new lexical items by playing this game will achieve better results in a vocabulary test than those who will use non-CALL based learning strategies. Moreover, it is expected that students who will play the game will become more engaged in the process of vocabulary learning than usually (when they use non-CALL based strategies).

2. Theoretical Part

2.1 English Vocabulary

Relevant Terms and Basic Concepts

In its broadest sense, **vocabulary** can be defined as the set of all words that exist in a language. Vocabulary of any language contains a huge number of lexical items and therefore *"there is no larger task than to look for order among the hundreds of thousands of words which comprise the lexicon"* (Crystal 117).

When discussing vocabulary learning processes, it is important to bear in mind several facts about the material to be learnt – lexemes and their word forms.

First of all, **lexeme** is *"a unit of lexical meaning, which exists regardless of any inflectional endings it may have or the number of words it may contain"* (Crystal 118). It has several levels of structure that need to be mastered by a learner and these are (at least) spelling (or the specific arrangement of graphemes), pronunciation (the specific sequence of phonemes) and the actual meaning (the semantic value).

Secondly, learners do not need to acquire all the different word forms of a lexeme separately, because the vast majority of them can be easily inferred by application of morphological rules onto the lexeme. Yet, it remains a demanding task for a student to learn sufficient number of lexemes to enable engaging in conversation.

2.2 How Vocabulary Learning Processes Work

Although there are many language acquisition theories, they have been traditionally focusing on syntax and morphology of the language rather than on vocabulary and as Rod Ellis states: *"Research has tended to ignore other levels of language."* (5). He further comments that *"A little is known about L2 phonology, but almost nothing about the acquisition of lexis."* (Ellis R. 5).

Different authors take different factors into account and there is no universal theory of language acquisition. A distinction is often made between the first language acquisition and second language acquisition and even between the second language acquisition and foreign language acquisition. The topic is also delicate, because it seems that there

cannot be any universal way in which all the individuals acquire language, but there are some general tendencies.

The theory about second language acquisition (SLA) that seems to be the most frequently cited in relevant literature for CALL applications is Krashen's *Monitor Model*.

The Monitor Model

Krashen's theory of SLA was introduced in the early 1980s and is often referred to by authors using different labels (for example *The Monitor Model* by Rod Ellis (261) or *The Input Model* by Underwood (12)). Central to the theory, there are five hypotheses which comprise different aspects and influences on language learners. The complexity of the theory might be the reason why it became so popular among SLA researchers. The five hypotheses (according to the terminology used by Rod Ellis) are *The acquisition learning hypothesis*, *The natural order hypothesis*, *The Monitor hypothesis*, *The input hypothesis* and finally *The affective filter hypothesis* (Ellis R. 261 – 263).

In the first hypothesis, clear distinction between the conscious process of learning and unconscious process of acquisition is made. Acquisition is *"a result of participating in natural communication where the focus is on meaning"* (Ellis R. 261), while learning is *"most of what goes on in foreign language classroom when we are focusing on form rather than on meaning"* (Underwood 13). The product of acquisition is *knowing* the language, whereas the output of learning is *knowing about* the language. The ability to describe the grammatical rules that results from learning is suitable only for the *Monitor* (which is discussed later).

The natural order hypothesis is based on SLA research and suggests that there is a tendency among language learners to master some grammatical aspects before others and therefore when learners are exposed to the language in natural settings, they pick up features of the language in a predictable order. However, Rod Ellis adds that when a student is *"engaged in tasks that require or permit the use of metalinguistic knowledge, a different order will emerge"* (262).

The Monitor hypothesis introduces *"a device that learners use to edit their language performance"* (Ellis R. 262). The Monitor operates on the learnt material (not acquired).

Underwood points out that the **Monitor** works only if the language user knows the rule and has enough time to think about its application (15). He further explains that this might be the cause of why some students seem to fail in application of certain rules in a conversation, although they have proved to master them in a grammar test.

The input hypothesis focuses on what should be presented to learners. *"Acquisition will take place if we provide our students with sufficient quantities of comprehensible input, language they can understand and which is at their level or just a bit beyond."* (Underwood 18). The stress is on the content rather than on grammatical aspects of the language.

The last of the five hypotheses considers environmental effects such as atmosphere in the classroom or the attitude of a learner towards the situation. Roughly, **The affective filter hypothesis** suggests that the **Monitor** is not the only filter in language production, but factors such as motivation, self-confidence or anxiety will have a strong influence on the performance of the learner.

To conclude, the most important implications of the theory are that students should not be taught grammatical rules, but rather exposed to the natural language so they can acquire the language in a natural order. **The Monitor Model** provided the theoretical background for Communicative approach to CALL technologies, which is discussed later.

Implicit versus Explicit Learning

Krashen's theory works with the unconscious processes of acquiring a language. These processes are also referred to as implicit learning processes (or incidental learning). **The implicit learning theory** suggests that simple exposure to the language is the only way how a language can be acquired and the conscious learning is ineffective.

Nick Ellis argues that if the implicit learning theory is sufficient to explain how vocabulary is acquired, then *"it carries a clear implication for the role of CALL instruction in vocabulary acquisition, that is that CALL has no other role than as a means of exposing learner to comprehensible input – it is no better, but currently more expensive, than books"* (Ellis 5). He provides an alternative to Krashen's theory and claims that besides implicit learning, also **explicit metacognitive learning** strategies (when appropriately used) are effective in vocabulary acquisition.

As has been already discussed, when learning a new word several aspects (or levels of structure of the word) must be learnt (or acquired). Although it might seem contradictory, Nick Ellis argues that both – implicit and also explicit learning takes place while acquiring a new lexical item, but *"they apply to different aspects of vocabulary acquisition"* (Ellis, 5). He states that implicit learning is of great significance in acquiring the formal features of the lexeme (which he refers to as I/O – the spelling and pronunciation of the word), and he further claims that *"the mapping of I/O to semantic and conceptual representations is a cognitive mediation dependent upon explicit learning processes"* (Ellis N.).

The effectiveness of explicit learning is *"heavily affected by depth of processing and elaborative integration with semantic and conceptual knowledge"* (Ellis N.). The paper covers several techniques Nick Ellis considers to be effective, such as inferring the meaning from context or consulting a dictionary, supported by evidence from research carried out by different authors.

2.3 Characteristics and Benefits of CALL Technologies and CALL Games

CALL technologies comprise all computer-based technologies that might be used in the process of language learning and teaching. These are especially different types of computer-based presentation materials, programs demonstrating and training specific features of language, programs used for instant or email communication as well as different tools for creating and editing text.

An important characteristic of CALL technologies is the attractiveness of computer technologies as a tool for language teaching and learning. Computers provide a modern interactive environment that can work with different types of media such as text, graphics or sounds and video. And although the initial cost might be high, this tool is also economical, because a computer can implement large numbers of different approaches and techniques of language teaching and training.

More importantly for language teachers, CALL technologies are programmable. The vast majority of languages show some degree of regularity and therefore can be described by rules.

To teach and even more so to practise these rules might be extremely tedious for a teacher because usually more than one explanation of a basic concept is needed. At the same time it might be stressful for a student who might feel embarrassed when even after several explanations, he still does not fully understand the application of the rule. CALL technologies are ideal to address this type of situations, because the aspects of language that are regular can be programmed as easily as the rule about the specific phenomenon can be stated. The program unloads the repetitive task of correcting the same mistakes over and over again off the teacher, while it provides a secure environment and an endlessly patient teacher for the student. Higgins and Johns support this argument and state that *"The computer is an obedient beast and will readily take on the role of drudge if required to"* (9).

The possibility to store data in the computer memory gives rise to another important feature of CALL programs – journaling history. If a good database model for recording the user activity is proposed, then valuable statistics about the most frequent errors made by students can be compiled easily by the program and then analyzed by the teacher. The possibility to track students' progress is of great informative value – the teacher can easily identify which aspects of the topic have been mastered by students and which need a more elaborate explanation.

Warschauer historically distinguishes three main phases of CALL approaches and these are **behaviouristic**, **communicative** and **integrative**.

In the first phase, language was treated as a set of habits that can be trained (Ellis R. 13). Therefore many of the early CALL behaviouristic applications were extremely simple drill and practice programs. The repetition was seen as an essential part of language learning (Warschauer).

The phase of communicative approach to CALL technologies was based on implicit language acquisition theory rather than on explicit learning strategies. Underwood presented 13 premises for **communicative CALL** (52 – 54) that were influenced by Krashen's Input Model. This approach denied the previous behaviouristic perspective and Underwood himself stressed that *"there will be no drill"* (Underwood 52). **Communicative CALL** can be characterised mostly by focus on content and using forms rather than the forms themselves (Underwood 52), natural and comprehensible input as described by Krashen (Underwood 52), use of the target language exclusively

(Warschauer) and interactivity – both learner-computer and learner-learner (Warschauer).

Warschauer lists multimedia and hypermedia among the steps towards ***integrative CALL***, because they create *"a more authentic learning environment"* by the natural way in which they *"combine reading, writing, speaking and listening in a single activity"* (Warschauer). Internet is seen as the most important and widespread medium of current integrative CALL environment that mostly serves as a platform for searching vast amounts of specialised material in English and enables instant communication among language learners.

Although the phases are distinct and they also seem to be contradictory (most strikingly the communicative versus behaviouristic phase), Warschauer claims that *"the introduction of a new phase does not necessarily entail rejecting the programs and methods of a previous phase; rather the old is subsumed within the new. In addition, the phases do not gain prominence one fell swoop, but, like all innovations, gain acceptance slowly and unevenly."*. This important fact enabled the programmers and teachers to combine the most beneficial features of every approach in design of new CALL applications.

Another division of CALL programs is introduced by Hope et al. They presented four main categories and these are tutorials, drill and practice programs, problem solving programs, simulations and games (Hope et al. 17). Tutorials are simple presentation materials that feature tables, charts, definitions and often hyperlinks that make them interactive. Drill and practice assumes that students were previously explained a rule and serve as *"a fast-paced check on discrete points in the students' knowledge"* (Hope et al. 17). Problem solving programs are used for larger tasks than simple drills. Students are offered more alternatives how to continue and the history of their choices is usually recorded. Simulations are used to replicate a real-life environment or situation and they are therefore suitable for practising skills. Finally, games are *"well-disguised simulations"* (Hope et al. 18) in which there is always some kind of obstacle to overcome.

Drill and practice programs are suitable for vocabulary learning, especially the formal and often irregular levels of structure of a lexeme (Ellis N.). They provide a patient

teacher who gives immediate feedback to the student. *"The essence of drill and practice is controlled repetition with monitoring and feedback"* (Higgins and Johns 46).

The repetitiveness of drill and practice programs eventually becomes tedious. Higgins and Johns provide a solution and state that *"Although it can provide the student with security, it can also be very boring in the long run. Students have their own way of avoiding this boredom, which is to turn the computer drill into a game"* (46).

A typical feature of a ***game*** is competition, which is realized via a scoring system. The scoring system might be either binary (victory versus loss, correct versus incorrect) or accumulative (points are assigned based on the task and player's performance, the player who gains the most points is the winner) (Higgins and Johns 46). A special type of scoring is a gambling principle in which *"the student is given a stock of points and has to stake a certain number on the chance of getting the right answer"* (Higgins and Johns 47). According to the number of players, games might be divided into single-player (the opponent is usually a computer or another player) and multi-player type (players work in a team to beat other teams or fulfil a given task). Higgins and Johns (47 – 50) introduce different types of games based on the task and also sketch their possible realization as CALL vocabulary games. For example, fruit machine games applied to vocabulary teaching work as normal fruit machines, but instead of pictures, syllables forming a word are in the slots.

In general, CALL vocabulary games have all the advantages of any other CALL program. *"The only real difference between a game program and a non-game program appears to be that the user perceives it as a game"* (Underwood 55) and besides providing a secure, anonymous environment for practising, these programs are also engaging and fun.

3. Practical Part

3.1 Aim of Experiment

The primary aim of the practical part of this thesis is to design and develop an interactive CALL game for students that would help them expand their vocabulary and learn all the structural levels of new lexical items correctly. Moreover, this application should be as flexible as possible, so that teachers would be able to adjust it for the specific needs that every group of students has. An important factor was to use reliable and foolproof programming techniques to ensure that the resulting application will be stable, secure ("hacker proof"), easily accessible and user-friendly at the same time.

The secondary aim (which was also the aim of the experiment) was to test the designed application in a real-life environment to find out whether the program is fully functional and satisfies all the requirements stated above.

The stated hypothesis is that students who will play the game, will score better in a vocabulary test than other students. Moreover, they will enjoy the learning process more than usually.

3.2 Game Design

User Environment Specification

The game is accessible from every computer with an Internet connection and an Internet browser, so students can practise not only during regular school lessons, but also at home. It can be found on the server vocabulary.hlavsa.net.

The graphical design of the game is based on the contrast of dark colours (such as black and dark brown), saturated red and white. This is not very typical of CALL environments. They are usually not graphically, but text-oriented and the choice of colours is rather moderate. Motivation for this divergence is to attract students' attention. Since the graphical interface does not interfere with the purpose of the application (it is given by the actual choice of words in the game rather than by its appearance), it is adjusted to the taste of teenagers. However, the preservation of

lucidity and easy orientation in the application was of the highest priority during the graphical design.

Every student who wants to play the game must use his own and unique username and password to log in. Usernames and passwords will be distributed by the teacher who will therefore have the opportunity to track students' progress.
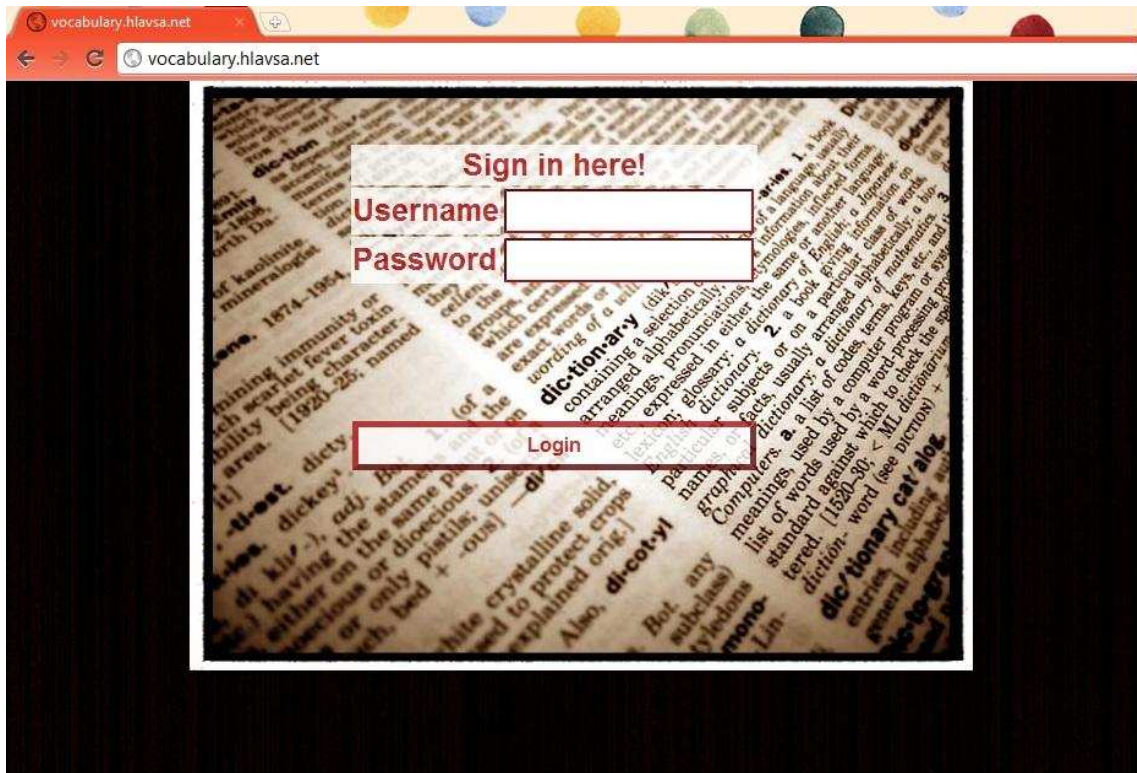

Picture 1: Login page.

After logging into the application, the player is welcomed by a customized message *"Hello player's real name"* and the default page displays is the *Instructions*. The welcome message is displayed in the upper right corner throughout the whole session and it should provide a personal touch.

The username (used to log in) and the name in the welcome message may differ. This fully depends on the teacher's decision. Usernames in anonymous forms will provide a comfortable feeling to the student, because if he scores badly, none of the other players will spot his "failure". However, the welcome message in which the student is addressed by his real name will be a warning that he might be, eventually, monitored by the teacher. This should prevent the player from trial – error guessing of words and

remind students that the game is not only amusing, but also a learning activity and serious effort to recall the words is expected.
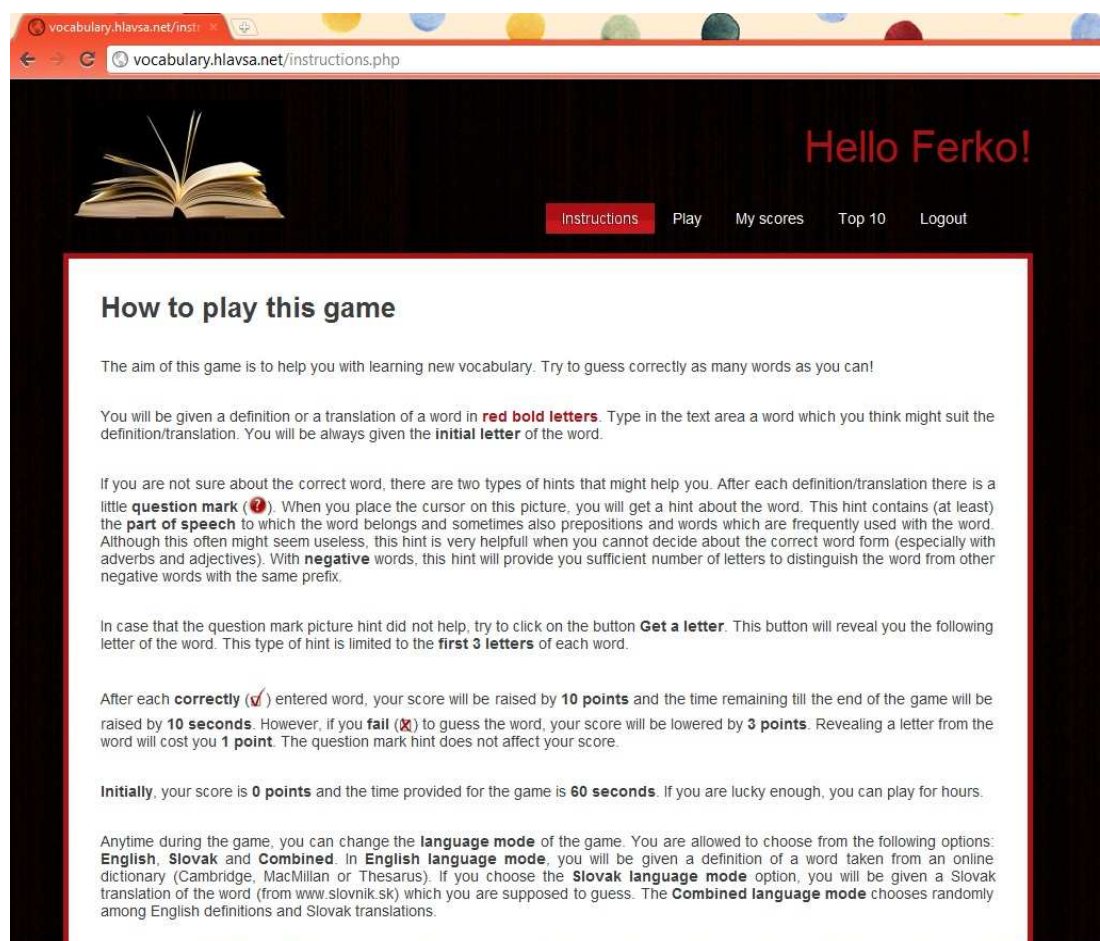
Picture 2: Instructions page.

Other modules of the game are listed in the menu in the upper right corner under the welcome message and these are: *Play*, *My scores*, *TOP 10* and *Logout*. The content that will be displayed after clicking on each of these menu labels should be self-evident from its name.

Section *My scores* provides every player the opportunity to browse his own history of played games and earned scores. Also, the player will be shown how many times he has entered the current table of *TOP 10* scores.

Picture 3: My scores page. *The player is addressed by his real name in the welcome message, while only the anonymous login is shown in the score tables.*

The *TOP 10* section is a table, which lists ten best scores in descending order. Only the anonymous username is displayed. If a player has entered this table, his own username will be highlighted in bold font. In this table, every student has a relative comparison with their classmates, but since the usernames are anonymous, the comparisons are not personal. The only extractable information is how many other distinct students scored better or worse than the player did.
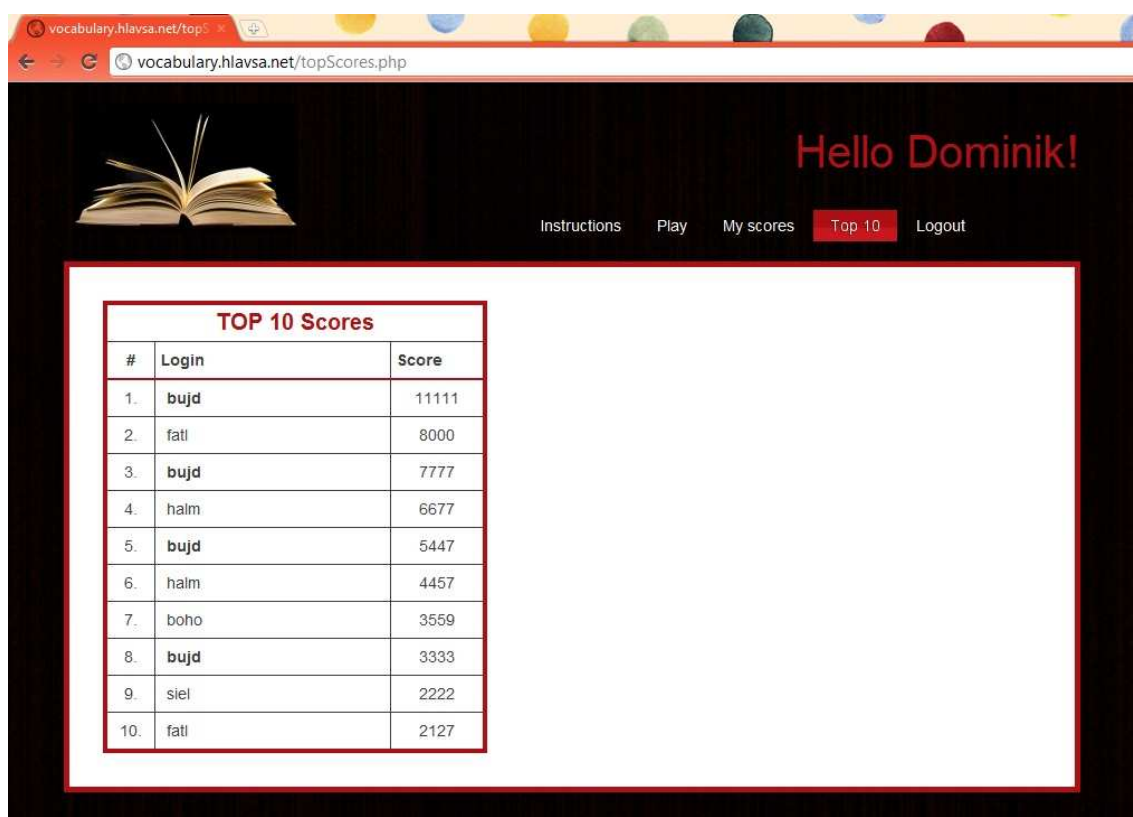
Picture 4: Top 10 page.

The actual principle of the game is very simple. Based on the current mode (*English to English*, *Slovak to English* or *Combined*) the application fetches a word from its internal dictionary (the full description of the algorithm is given in <u>Appendix 1</u>) along with its definition (in English) or translation (in Slovak). The first letter of the word is shown in the main text box and the definition (or the translation) of the word is provided above this text box. The player enters his best guess about the expected word into the text box. The application then processes and evaluates the player's input. The game ends when the player runs out of time provided for the game.

The score is adjusted after each submitted word. The scoring system used is accumulative. Although it might be motivating for some students to achieve the highest score from the group, the most engaging feature is the time limit, which is flexibly changed during the game. After each correctly guessed word, the player is awarded points as well as additional seconds to the time limit. After a wrong guess only the score is adjusted (usually lowered). This is similar to the gambling principle, but instead of points, students get a stock of "seconds" when the game starts and they do not bet

anything (they just lose the time spent on recalling the word). Students are not punished for wrong answers (this feature is listed among premises for communicative CALL (Underwood 52)), the countdown continues naturally. On the other hand, the time limit is raised every time a student shows adequate knowledge. I assume that this type of scoring system might be a strong incentive to remember unfamiliar words, because students realize that only their knowledge will grant them more time and thus score more.

The number of points to be added or subtracted from the score and the time gain are up to the teacher's decision. These attributes can be set up in the application's database by the administrator.
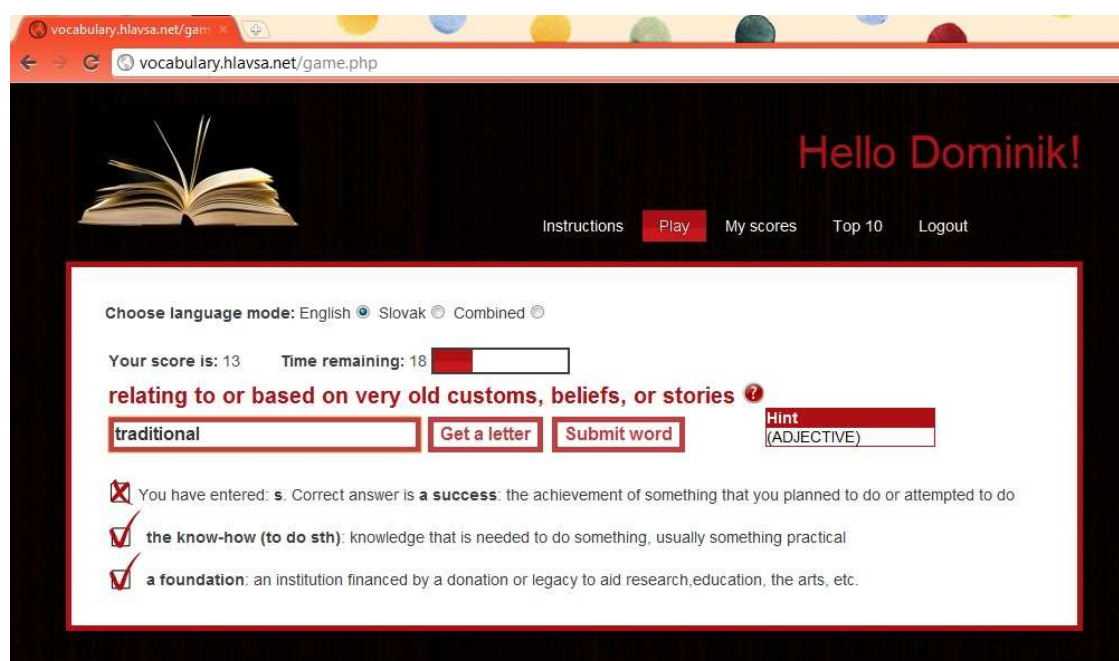
Picture 5: Play page. *The process of game in English to English mode with displayed hint. The history of already played items is displayed below the main text box.*

Words in the application's dictionary can be divided into certain groups (called topics). It is again the responsibility of the teacher to choose a suitable key for sorting the words into groups. These groups have an important attribute – frequency of retrieval. It can be set up by the administrator and causes words from a group with higher value of frequency attribute will be selected more frequently than words from groups with lower value attributes.

Currently, there are two types of hints implemented. The first hint is shown when a player hovers with the mouse cursor over the question mark picture. Using this type of hint does not cost the player any points. It might contain information about a word such as the part of speech or any other additional information (for example British versus American spelling) which will be provided by the teacher. The second type of hint is implemented as a button next to the main text box. The "*Get letter*" button reveals the following letter after a player clicks on it. This hint might be seen as more helpful, but only first three letters can be revealed to the player and every letter will cost the player a certain number of points (the actual amount of points will be set by the administrator after discussion with the teacher).

Although the game resembles drill and practice applications typical of behaviouristic CALL (Warschauer), it also shows traces of communicative and integrative CALL programs. Though it is important to note that true features of communicative and integrative CALL will be implemented in my intended future research (for more details see chapter [Suggestions for Further Extensions and Research](#)).

The drill and practice character is preserved in repetition of selected words and accepting only one right answer. This is, however, needed to train the formal features of words such as correct spelling.

On the other hand, the application cannot be treated as a traditional behaviouristic drill and practice program. Behaviourists looked at language as a set of trained habits and so *"there was little room for any active processing by the learner"* (Ellis R. 13). Behaviouristic CALL programs were trying to provide a training environment for these habits.

When a student is playing the *English to English* mode, he has to read the English definition, process it and fully realize or mentally visualize what is described in the definition. This is not as simple and straightforward as it was in traditional behaviouristic drill and practice programs.

Nick Ellis argues that *"Metacognitevely sophisticated language learners excel because they have cognitive strategies for inferring the meanings of words, for enmeshing them in the meaning networks of other words and concepts and imagery representations, and mapping the surface forms to these rich meaning representations"*. The process of the game is reversed to many of those listed by Nick Ellis in his paper.

If we, for example, examine the process of meaning inferring from context, the first input is the form of the word and the aim is to extract its meaning from context using different strategies. In this game, the first input is the definition and consequently the semantic value of the expected word. A student has to search the already existing appropriate semantic field and find whether there is a word beginning with the letter provided in the text box. The word form recalling is the final step.

Moreover, all of this happens very quickly (due to the time limit countdown) and therefore I assume that even more cognitive processing is involved in the game and therefore it reinforces the link between the formeme and sememe of a lexeme more effectively than the method of meaning inference.

The communicativeness of the game consists in its interactivity with the player and among players. Except simple feedback (correct versus wrong guess), the program addresses the player by his real name and provides hints on player's request. Due to the time limit countdown and frequently changing definitions, the game is very dynamic. One of the premises for communicative CALL applications, as stated by Underwood, was that they will not attempt to simulate what could be done on a piece of paper (53). It would be extremely hard to preserve such a dynamic character outside a CALL environment. The possibility to receive a relative comparison with other students enables interactivity among players.

The integrative character is granted by placement of the game on the Internet and its accessibility.

3.3 Design of Experiment

Respondents and procedure

Respondents tested in the experiment were 28 students aged 14 to 15 from Gymnazium Jura Hronca high school in Bratislava (Slovak Republic).

All of these students have five English lessons a week (each lasts 45 minutes). Out of these five, three lessons focus on vocabulary teaching and practice, one is a grammar lesson and the last one is a conversation class with a native speaker. Every type of lesson is taught by a different teacher. During the experiment, I was mainly in contact

with the vocabulary lesson teacher (who will be addressed as the teacher of respondents).

Students are split into two groups of 14 students for English lessons based on their scores in a test at the beginning of the school year (September 2010). Teacher of both groups explained, that they needed to separate complete beginners from those who knew at least something, but currently (April 2011) the difference became fuzzy. As was further reported by the teacher, the most striking difference is their English grammar knowledge and the ability to participate in a conversation. As to the vocabulary knowledge, the groups can be treated more or less equivalently, because the was trying to compensate the differences. Their level of English, as judged by the teacher, is somewhere in between A2 and B1 on average.

Both of the groups received the same list of words that students are expected to master at the end of the school year (see Appendix 2). This list is a compilation of words that frequently occur in FCE textbooks and the words are divided into 77 rows and several columns. Each column represents a category of a word (for example person, verb, negative, Slovak translation, etc.). The translation column is intentionally left empty.

Once a week or two, all students (in both groups) are instructed to learn a number of rows from the provided word list (the usual number is 10 rows). The following week they have a short test in which they complete a table of the same structure as the word list itself, but all the words except the Slovak translation are omitted. Usually, the test consists of five rows from the original list and the Slovak translations are often tricky and stylistically rather on the periphery of the lexicon (for example *zmäteč* for *confusion*). As the teacher of both groups said, how and whether the students will learn these words is their own responsibility. He expects his students to actively work with dictionaries and no other exercises are provided to train these lexemes before the test. After the test, students are supposed to use the acquired lexemes.

During the experiment, one group of students was a test group and the other one was a control group. Students from the control group were instructed to learn vocabulary items from the word list from row number 56 to row number 65 on Tuesday's lesson (April 2011). Students from the test group were not instructed to learn anything, but during their regular lesson in a computer laboratory on Thursday (the same week) each student was given a unique login and password for the game and instructed to play this

game for the whole lesson (45 minutes). These students were also given optional homework – to play the game at home for another 30 minutes and preferably in *English to English* mode.

On Tuesday (the following week), both groups were given a surprise test focusing on the newly learnt vocabulary.

While designing the experiment, two options of what material should be presented to students were considered. The first option was to teach students words that are semantically related. However, the second option of unrelated words from the word list was chosen. There were two main reasons for this. Most importantly, using this material ensured very natural testing situation and none of the students noticed that they were a part of an experiment. Secondly, as was pointed out by Erten and Takin, there are arguments against presenting new vocabulary items in semantically related sets. Furthermore, their research showed that young L2 learners recalled newly acquired vocabulary better when it was presented in semantically unrelated sets (Erten and Tekin).

Thus the structure of the words was not completely desirable for this particular application. The most obvious problem, that was also very frequently the cause of wrong guesses during the game, was incorrect identification of different word forms of a lexeme (most frequently the identification of adjective versus adverb). Secondly, a considerable number of the words (and not only from this particular word list) have their negative form derived using a negative derivational prefix, such as *non-*, *un-*, *im-*, etc. Since there is only a limited set of negative prefixes, the probability that two words from the category *Negative* will start with the same letter (and also with the same prefix) is considerably high. Also definitions of adjectives and adverbs derived from the same lexeme may be confusingly similar to each other.

This problem was solved using the hint that is displayed with the hover of the mouse cursor on the question mark picture. In the *Instructions*, students were explicitly warned not to underestimate the identification of the part of speech and when not sure they should check the hint. With the negative words, the hint showed not only the part of speech of the word, but also the first three or four letters of the word (depending on the length of the negative prefix), so that the student got the initial letter of the root morpheme.

For this experimental procedure a total of 2 044 entries was loaded into the application's dictionary. The topics covered were: *Rows number 1 to 55*, *Rows number 56 to 65* and *Basic words* (for a representative sample of dictionary entries from these topics see Appendix 3 – Internal Dictionary of Game).

The first topic included all the words from the word list that students were supposed to already know, while the second topic covered new and unfamiliar 10 rows from the word list. Topic *Basic words* was compiled to enlarge the application's dictionary and avoid frequent repetition of words that were familiar to students. It is a collection of 500 most commonly used nouns in English language, out of which only those longer than four letters were loaded into the database.

The English definitions were downloaded from *http://dictionary.cambridge.org* or *http://www.macmillandictionary.com*, the Slovak translations were downloaded from *http://www.slovnik.sk*.

The frequency of words from the topic *Rows number 56 to 65* is higher than the frequency of other words – in 20 fetched words from the application's dictionary at least 6 are from this topic. The frequency had to be delicately chosen – not very often (otherwise the game will become very repetitive and consequently boring), but also not scarcely (in order to preserve the drill and practice character of the application).

After discussion with the teacher, the scoring system for this experiment was set to +10 points and +10 seconds for each correct guess and -3 points for a wrong guess. Revealing the next letter cost the player -1 point.

Testing Procedure

As many models (such as **Vocabulary Knowledge Scale** (Segler et al.)) have suggested, there is a significant difference and a long way to go between the stage of passive recognition of a word (*"I have seen this word before and I guess it means..."*) and the full understanding of its morphological and semantic features and active and correct usage in communication. Considering this fact, to determine and measure the depth to which the students of the experiment have acquired new lexemes, testing method different from the usual test had to be chosen, because there is almost no space to determine the students' ability to use the words for communicative purposes in the usual test.

The surprise test consisted of four exercises, each testing different dimension of lexical knowledge. The first exercise was a matching exercise where students had to match five lexemes with their definitions (testing the passive recognition of a lexeme). The second exercise was a gap filling, in which students were provided a set of lexemes in their root forms and were asked to fill them into provided sentences using the correct word. This exercise tested the understanding of morphological features and correct spelling. The third exercise was a translational exercise that was inserted to test whether the students understand stylistically rather marginal meanings and again, to test the correct spelling when the root morpheme is not provided. The translation exercise was also inserted upon the request of the students' teacher. In the last and supposedly the most difficult exercise, subjects were asked to give their own definition of the listed words and use them in a meaningful sentence. It was orally stressed during the test that simple sentences from which the meaning of the lexical item in question would not be self-evident, will not be accepted (for example for a key word *hater* sentences such as *Jane/She/My sister is a hater.* were not accepted).

3.4 Results

The total score that could be achieved in the surprise test was 25 points (1 point for each correct answer). The full assessment of the test as well as an example of the test is attached as Appendix 4. Not only new lexical items (from *Rows number 56 to 65*) were tested. To record possible differences between the two groups and also among the individuals within a group, 7 (out of total 25 points) could be scored thanks to the knowledge of older items (from rows numbered 40 to 55) that the subjects should already know and the teaching method was the same for both groups. In every exercise, at least one item was a control.

In the tables below, results of the surprise test for both groups are summarized.

Although the full score of 25 points was achieved only by two students (both from the test group), the average total score and also the median total score for the test group is slightly below (1.04 and 2.00 points correspondingly) the corresponding values for the control group. This applies also for values of new vocabulary items (difference of 1.00 point and 2.50 points correspondingly). However, it is interesting that the median of the

control score is higher in the test group than the corresponding value of the control group (1.00 point difference).

Subject number	Total Score (out of 25)	New vocabulary score (out of 18)	Control score (out of 7)	The number of words played	The time spent playing (in seconds)	Correctly guessed words/The total number of played words
1	13	11	2	899	6 290	0.58
2	13	10	3	1 106	11 010	0.57
3	16	13	3	239	1 660	0.49
4	16	11	5	438	3 950	0.90
5	18.5	12	6.5	161	2 030	0.59
6	18.5	12.5	6	824	7 010	0.84
7	21	14	7	850	6 660	0.69
8	23	18	5	348	3 710	0.67
9	23.5	17.5	6	885	6 790	0.75
10	25	18	7	2 185	18 610	0.84
11	25	18	7	3 322	26 290	0.78
Average	19.32	14.09	5.23			
Median	18.50	13.00	6.00			

Table 1: Results of the surprise test for the test group.

Subject number	Total Score (out of 25)	New vocabulary score (out of 18)	Control score (out of 7)	The number of words played	The time spent playing (in seconds)	Correctly guessed words/The total number of played words
15	16	12	4	n.a.	n.a.	n.a.
16	18.5	13.5	5	n.a.	n.a.	n.a.
17	19	14	5	n.a.	n.a.	n.a.
18	20	13	7	n.a.	n.a.	n.a.
19	20	15	5	n.a.	n.a.	n.a.
20	20.5	15.5	5	n.a.	n.a.	n.a.
21	21	16	5	n.a.	n.a.	n.a.
22	21	16	5	n.a.	n.a.	n.a.
23	22	17	5	n.a.	n.a.	n.a.
24	22	17	5	n.a.	n.a.	n.a.
25	24	17	7	n.a.	n.a.	n.a.
Average	20.36	15.09	5.27			
Median	20.50	15.50	5.00			

Table 2: Results of the surprise test for the control group.

3.5 Assessment of Game by Students

Approximately one week after the surprise test, all students were asked to fill in an online questionnaire by their teacher. The questionnaire consisted of two main parts – the first focused on finding out about the strategies students normally use for vocabulary learning. Additionally, students from the test group were asked to fill in the second part, in which they were asked to assess the game from several perspectives.

The learning strategy that is used by the majority of students is extremely simple – they fill in the missing Slovak translation and then just read the words from the list (not aloud; 64 % of respondents). The second most frequently used strategy was reading the words aloud and then writing them down on a piece of paper (21 % of respondents). Some of the students described more elaborate strategies. Three respondents (11 %) answered that they write down words on small pieces of paper (on one side they write the English word, on the other side the Slovak translation). Then they mix them up, randomly pick up one and try to say aloud the word from the flipped side of the paper. Only two students (7 %) answered that they are trying to figure out a logical connection to words they already know or come up with helpful mnemonics.

On average, it usually takes approximately one hour to learn 10 rows from the vocabulary list (68 % respondents), 5 students (18 %) answered that it takes them less than 45 minutes and one student (4 %) needs two hours for preparation. Eleven students (39 %) consider their strategy to be efficient, eight (29 %) rather efficient and six (21 %) rather inefficient (these answers did not differ when asked about the short-term and long-term efficiency of the strategy). Almost all students (93 %) stated that do not enjoy new vocabulary learning at all.

The overall impression and satisfaction of students from the test group with the game was either *Extremely good* (19 %) or *Very good* (72 %). One student (9 %) chose *Neutral* option. The summary of assessments of other aspects is in the table below. It is obvious that most of the students were satisfied with features listed.

	Very good	Rather good	Neutral	Rather bad	Very bad
Graphical interface	55 %	36 %	0 %	0 %	9 %
User-friendliness (easy orientation)	25 %	36 %	0 %	0 %	0 %
Helpfulness of the Instructions section	72 %	27 %	0 %	0 %	0 %
Stability of the game (time lags, etc.)	82 %	9 %	0 %	0 %	0 %
Game speed	18 %	45 %	0 %	27 %	0 %

Table 3: Assessment of the game by students.

Students were also asked an open-ended question to assess the overall efficiency and helpfulness of the game compared to the strategy they normally use and to comment on possible improvements to the game. Only positive feedback was received from the students and the selection of representative of most frequent comments are:

- *"Yes, it was significantly more effective than the methods I normally use."*
- *"The game is very good, it helped me to understand several words I haven't seen before, it was very engaging."*
- *"I spent more than two hours playing the game, I would not have survived two hours learning new words from the list. The possibility to see TOP 10 scores was very motivating."*
- *"I have definitely spent more time on learning new vocabulary by playing this game and I even remembered them better."*

There were only two limitations to the game mentioned by students. The first one was a technical one – when a student scores extremely high, he also gains a lot of additional

seconds to the initial time limit. When he wants to end the game before he runs out of the time, he has to close the entire web browser session and his progress and score are lost (the final score is recorded into the database only after the game has finished). Therefore many students suggested adding an option to end the game immediately.

The second complaint was that English definitions were significantly longer than Slovak translations and therefore it was much more time-consuming to decode the long definitions in *English to English* mode than simple one-word translations in *Slovak to English* mode. As a consequence, students preferred to play *Slovak to English* mode, because it was more profitable for them.

3.6 Conclusions

Before any conclusions will be drawn from the experiment, it is important to note that the sample of 28 students is statistically small and not very significant. However, the findings from the experiment may provide ground for my future intended research of the game and its effect on a larger sample of respondents.

The game received unexpectedly positive feedback not only from the students, but also from the teacher of both groups. As he reported, students from the test group were completely absorbed in the game during the lesson. Another indicator of students' satisfaction might be the average time they spent playing the game – 8 546 second per one student (142 minutes). Even if we subtract the time students were instructed to play the game (either on the lesson or optionally at home), it is approximately an hour and a half of a teenager's free time spent voluntarily on vocabulary learning.

Although the subjective feedback from students was very good, there is not so much support for the game in objective indices of average and median values of total score from the test. Only rough trends (if any) about the dependency of score on the time spent playing the game can be stated.

From first glance, it can be seen that the results of the control group are more coherent than results of the test group (the dispersion of values of total score for control is 8 points compared to 13 points for the test group and the difference between the average and median total score is only 0.14 points for the control group compared to 0.82 for the test group).

One of the possible explanations is that students from the control group used self-chosen learning strategies, so there is high probability that every student chose a strategy that fit him. As can be seen from the score table for the test group, respondents number 1 and 2 scored only 13 points. If we suppose that this application was not a suitable learning strategy for these two students and leave their scores out, the recalculated values of average and median of the total score and the control score will become slightly higher than the corresponding values for the control group (difference of 0.36 and 0.50 point correspondingly). But even after this omission, the values of median and average of the new vocabulary score will remain lower than those for the control group.

Considering the fact that the median value of the control score calculated for the test group was higher than the corresponding value for the control group even when all students were included, it seems that if there was no other contribution to the students, at least the game is a very good tool for rehearsing the already learnt vocabulary items.

Another factor that might have influenced the overall results was students' expectations. Since students from the control group were instructed to learn 10 new rows from the vocabulary list, they expected that a test will follow (however, it was not explicitly mentioned by the teacher, students were just accustomed to this procedure), while the students from the test group might have considered the game a kind of complementary activity.

To sum up, the experiment failed to prove the stated hypothesis that students from the test group will score better on the test than others. Paradoxically, students from the test group made considerably less mistakes in the last exercise (the total of 10 mistakes in definitions compared to 13 mistakes in the control group and the total of 10 mistakes in meaningful sentence production compared to 17 mistakes in the control group) and therefore showed deeper understanding of the lexemes (for full results of this exercise see Appendix 5).

On the other hand, considering their feedback from the questionnaire (see Appendix 6) and time voluntarily dedicated to the game, they obviously enjoyed the vocabulary learning process more than usually.

3.7 Suggestions for Further Extensions and Research

As was already stated, students mentioned two limitations; no possibility to abort the game and very long English definitions compared to Slovak translations.

Even though, a good impression of the game was made upon the player, it is extremely disturbing that there is no alternative to end a successful match than to close the webpage and lose an excellent score. Therefore the *"End the game"* button will definitely be added to the design of the game.

The solution to the second limitation is, however, more disputable. The definitions and translations that are loaded in the application's dictionary can be easily changed by the administrator. Therefore it is up to the teacher's decision whether it is desirable to load Slovak translations (that will always be shorter than English definitions), Slovak definitions for the *Slovak to English* mode of the game (to compensate the length of definitions shown in different language modes) or to completely hide the *Slovak to English* mode (and the *Combined* mode as well). The option to hide *Slovak to English* mode will be added in the administrator's interface.

In the current stage, the game and its technical background is fully prepared for several further extensions. Definitely, a user-friendly administrating interface will be programmed, so that every teacher will be able to load his own sets of words to be learnt by students, set up the scoring system and the frequency of words. The application is also prepared to work with languages other than English and Slovak. However, it is important to note that the compilation of a reasonable number of words for the internal dictionary is a demanding and time-consuming process.

The E-R diagram (see Appendix 1) can be easily extended to enhance the integrative character of the application (for example implementation of chatting possibility for players and multimedia materials such as recorded sounds of correct pronunciation or pictures for better imagination of the described lexeme and higher flexibility in the graphical user interface, so that users will be able to change the background picture or font colour).

To extend the communicativeness of the game, a situational context might be added to the game by disguising it as a *"Guess what"* format. It will provide more comprehensible and natural input as it was described in the **Input Model theory** (Ellis

R. 262). However, this extension calls for an extremely elaborate artificial intelligence algorithm for evaluating the student's answer and currently, such algorithms are still in development.

To conclude, the application will be slightly upgraded (according to proposed changes) and the experiment will be replicated on a larger sample of students. The material that will be presented to students may remain of the same or similar structure, but to avoid the expectations' factor, the game must be used repeatedly (so that *all* the students will expect a test afterwards) and only the control group will be distributed the word list (to restrain the students from the test group to use different learning strategy that the game itself).

Appendix 1 – Technical Specification

The application consists of two main parts and these are MySQL database and the application itself.

The game environment is placed on the server http://vocabulary.hlavsa.net/ and was written in HyperText Markup Language (HTML), PHP 5, JavaScript and styled using Cascade Style Sheet (CSS) language.

The game starts on load of the *Play* page when the time limit is set and the words-from-dictionary retrieval algorithm is called. This algorithm together with the word evaluation algorithm is the core of the game.

On call of the words-from-dictionary retrieval algorithm function, the connection to the database server is established and twenty randomly chosen distinct words from a pre-defined group are retrieved from the database and passed to an array of currently loaded dictionary entries. The algorithm is mostly written using PHP 5 code.

The word evaluation algorithm is the second essential part of the game. It processes the array of currently loaded words and their definitions (or translations). On start of this algorithm, the first item from the array is loaded into local scope variables, i.e. the word itself and its definition (or translation) and subsequently, the first letter of the word is shown in the text box. At this point, the player is expected to enter his guess about the full word (or he might use the *"Get letter"* hint and the next letter will be revealed). The algorithm waits for the player's input and then evaluates whether the entered word corresponds with the word loaded from the dictionary and adjusts score and time limit. The recently played word is then deleted from the array of currently loaded words from the database and the algorithm starts from the beginning. This part of the program is written in JavaScript language.

When there are only five words (with their definitions/translations) remaining in the array of currently loaded words, the retrieval algorithm is called again to fetch new twenty words from the database. Thanks to the usage of Asynchronous JavaScript and Extensible Markup Language (commonly known as AJAX technology), the algorithm is executed as a background process of the whole application, so there is no need to wait for the new matrix of words and if no other serious connection problem occurs, there is a high probability that the player will not experience any time lags during the game.

The database supporting the game runs on a remote MySQL server. Its Entity-Relationship (ER) diagram consists of eight entities and its scheme is prepared for further extension of the game – for example a graphical administrator's environment, where the teacher will be able to load new set of words or adjust the scoring system easily without mastering any special IT skills.

When a player is trying to log into the application, his password is ciphered before it is sent to the database, so unless the player himself provides his user name and password to a different user, the password should be safe and not easily crackable.

Other security issue that was being dealt with during the development of the application was how to prevent SQL injection. Although there are not many inputs that are dependant on the player, all of the arguments that are to be sent to the database are checked beforehand. Only if they do not contain special characters such as \ or ", they are passed to the database. The *mysqli* class and *real_escape_string* function are used for this purpose.

Although the game is correctly displayed in almost every of the currently most popular web browsers, there are slight difficulties with Internet Explorer 6 (IE6) browser. Taking into account the fact that this particular version of otherwise popular web browser has currently only 3.0% market share (http://www.w3schools.com/browsers/browsers_explorer.asp) and also that IE6 is even no longer supported by its producer, this rather graphical than technical problem will be ignored.
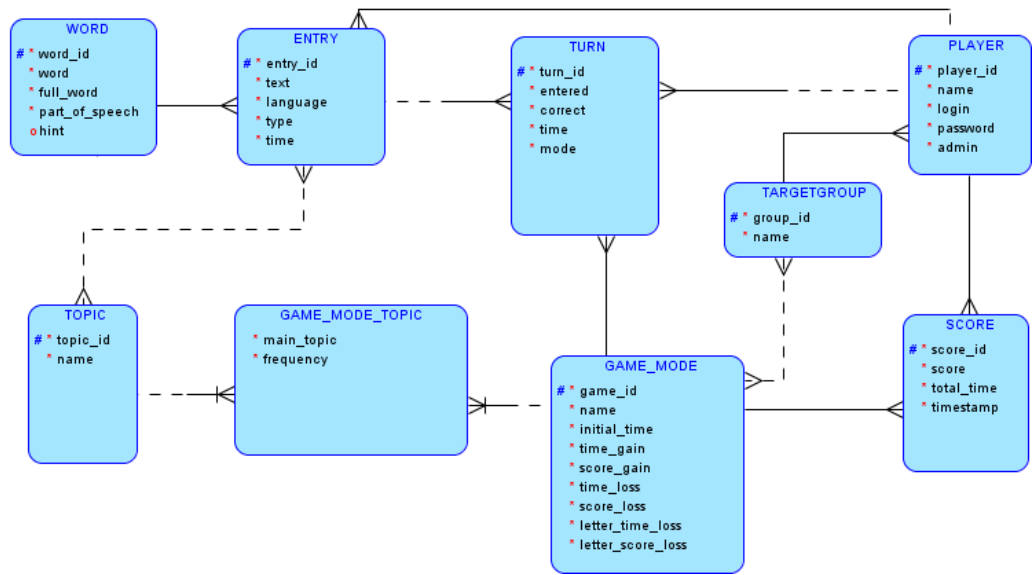
Picture 6: Entity-Relationship Diagram

Appendix 2 – Structure of Distributed Word List

	PERSON	NOUN	Translation	VERB	ADJECTIVE	ADVERB	NEGATIVE
1	a believer	a belief (in)		to believe (in)	believable	Believably	Unbelievable
2	A comforter	a comfort		to comfort	comfortable	comfortably	Uncomfortable
3	a dramatist	a drama		to dramatise	dramatic	dramatically	X
	a dramaturge						

Table 1: Example rows from the word list. *Since I was explicitly warned that the word list that was distributed to students is an internal document, only first three representative rows are listed. The whole word list has 77 rows.*

Appendix 3 – Internal Dictionary of Game

Topic	Word	Definition / Translation	Part of Speech	Hint	Full Word
56 - 65	shop	to give the police information about a criminal	VERB		shop
	significant	important or noticeable	ADJECTIVE		significant
	surroundings	all the things that are present in a place and that form the experience of being there	NOUN		surroundings
	teacher	someone who provides schooling for pupils and students	PERSON		a teacher
	understand	to know what someone or something means	VERB		to understand
	clarify	to explain something so that it is easier to understand	VERB		to clarify
	foreign	not belonging to the place or body where found	ADJECTIVE		foreign
	unfilled	the property of an empty container	NEGATIVE	unf...	unfilled
	important	necessary or of great value	ADJECTIVE		important
	instant	immediate	ADJECTIVE		immediate
56 - 65	shop	nakupovať	VERB		to shop
	insignificant	nepatrný	NEGATIVE	ins...	insignificant
	surround	obklúčiť	VERB		to surround
	teachings	náuka	NOUN		teachings
	understandably	zrozumiteľne	ADVERB		understandably
	unclear	nejasný	NEGATIVE	unc...	unclear
	foreigner	cudzinec	PERSON		a foreigner
	fill	vyplniť (4.p.)	VERB	to ... (sth/sb with sth)	to fill (sth/sb with sth)
	importantly	dôležito	ADVERB		importantly
	instance	konkrétny príklad alebo ilustrácia situácie	NOUN	an … (of)	an instance (of)

Topic	Word	Definition / Translation	Part of Speech	Hint	Full Word
1 – 55	believe	to think that something is true, correct or real	VERB	to ... (in)	to believe (in)
	make a tradition	to establish and legalize a specific type of behaviour that you repeat in a certain frequency over a longer period of time	VERB		to make a tradition
	accuse	to say that someone has done something morally wrong, illegal or unkind	VERB	to ... (sb of)	to accuse (sb of)
	developing	about a country that is poor and does not have many industries	ADJECTIVE	... (world)	developing (world)
	govern	to control and manage an area, city, or country and its people	VERB		to govern
1 - 55	believer	veriaci	PERSON		a believer
	ability	schopnosť	NOUN	... (to)	an ability (to)
	arguer	debatér	PERSON		an arguer
	deliver	dodať	VERB	to ... (from/to)	to deliver (from/to)
	founder	zakladateľ	PERSON		a founder
basic words	beetle	an insect with a hard shell-like back	NOUN		beetle
	chin	the part of a person's face below their mouth	NOUN		chin
	gate	a part of a fence or outside wall that is fixed at one side and opens and closes like a door, usually made of metal or wooden strips	NOUN		gate
	home	the house, apartment, etc. where you live, especially with your family	NOUN		home
	meat	the flesh of an animal when it is used for food	NOUN		meat
basic words	banana	banán	NOUN		banana
	feather	pierko	NOUN		feather
	ghost	strašidlo	NOUN		ghost
	giraffe	žirafa	NOUN		giraffe
	girl	dievča	NOUN		girl

Appendix 4 – Surprise Test

Exercise number	Task	Points (total)	Points (new vocabulary)	Points (control score)
1	Slovak to English translation	5	3	2
2	Gap-filling exercise (fill in the correct word form)	9	7	2
3	Matching exercise (Match the word and its definition)	5	4	1
4	Give a definition of the words and use them in meaningful sentences	6	4	2

Table 2: Structure and assessment of the surprise test.

In order to grant anonymity for respondents, their names are censored in the sample scans below.

Name censored

1. Translate these words into English:

a) splatný - payable

b) plomba - a filler

c) rozsudok a judgement

d) pochopiteľne – (starting with U) understandably

e) nákupca - a shopper

2. Look at the sentences below and try to fill in the gaps with the words from the box. Always use the correct form. One word is used twice.
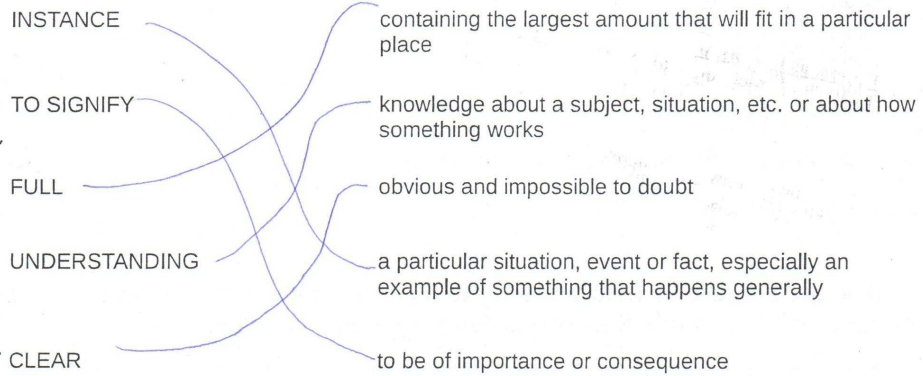
CLEAR	FOREIGN	HATE	IMPORTANT
PLEASE	RELY	TEACH	UNDERSTAND

a) The music was very pleasant to the ear.

b) An Introduction to Buddhism by Mike Butler is an excellent article for a beginner who is looking for the basic features of the Buddha's teachings.

c) There must be some misunderstanding I never asked for these chairs to be delivered.

d) Could you clearify the first point please? I don't understand it completely.

e) Rolls-Royce cars are famous for their quality and reliability.

f) The health report stresses the importance of fresh food in a diet.

g) Foreighness are not allowed to enter the country without having a valid visa in their passports.

h) Sam is dyslexic, he did not learn to read or write until he was fourteen and had been thrown out of several schools. He was even called unteachable, and sent to a school for maladjusted children.

i) The motive for this shocking attack seems to be racial hate.

1

3. Match the words with their definitions:

INSTANCE — containing the largest amount that will fit in a particular place

TO SIGNIFY — knowledge about a subject, situation, etc. or about how something works

FULL — obvious and impossible to doubt

UNDERSTANDING — a particular situation, event or fact, especially an example of something that happens generally

CLEAR — to be of importance or consequence

4. Give your own definitions of the following words. Create meaningful sentences using these words.

a) the surroundings - *things that are around you*

  ○ Example: *The surroundings of Australian continent is pretty welly because Australia is girt by Pacific & Indian ocean.*

b) instant - *straight away,*

  ○ Example: *There was instant death when the bullet went through his heart.*

c) possessed - *owned by somebody*

  ○ Example: *This land had been possessed by my uncle and when he died, I inherited it.*

2

Appendix 5 – Results of Last Excercise

The last exercise in the test was supposedly the toughest one. Students were asked to define given words using their own definitions and then use these words in meaningful sentences. When evaluating this exercise, vague definitions and simple sentences were not accepted and the emphasis was given in correct usage of the word in context. The results of this exercise are summarized in the tables below. Respondents numbers are the same as in the tables of overall results in Results.

Respondent number	Total score (out of 6 points)	Number of incorrect definitions (out of 3 possible)	Number of incorrect usage of the word in a sentece (out of 3 possible)
1	2	2	2
2	2	2	2
3	3	2	1
4	3	2	1
5	5.5	0	1
6	4	1	1
7	5	0	1
8	5	1	0
9	5	0	1
10	6	0	0
11	6	0	0
Average	4.23	0.91	0.91
Median	5.00	1.00	1.00
Total Sum		10	10

Table 3: Results of the last exercise for the test group.

Subject number	Total score (out of 6 points)	Number of wrong definitions given (out of 3 possible)	Number of incorrect usage of the word in a sentece (out of 3 possible)
15	1	3	3
16	2.5	3	2
17	3	2	1
18	5	1	0
19	3	2	1
20	4	1	1
21	3	2	1
22	4	1	1
23	4	1	1
24	4	1	1
25	5	0	1
Average	**3.5**	1.55	1.18
Median	**4.00**	1.00	1.00
Total Sum		17	13

Table 4: Results of the last exercise for the control group.

Appendix 6 – Online Questionnaire

Sample screenshot of the online survey

Dotazník k výukovej pomôcke - interaktívna slovná hra

* Required

Hodnotenie interaktívnej slovnej hry

V tejto časti dotazníku by som vás chcela poprosiť o zhodnotenie samotnej hry, či už po stránke technickej (Zobrazovala sa vám hra vo Vašom prehliadači správne? Nepadala? atď.), ako aj podľa iných kritérií (Bavilo vás hrať sa hru? Pomohla vám ľahšie si zapamätať niektoré definície? atď.).

Aký bol Váš login do hry?
Táto otázka je nepovinná.

Ako je Váš celkový dojem z výukovej hry? *
Uveďte prosím celkové hodnotenie Vášho dojmu z hry, ako po technickej stránke, tak aj či Vás hra bavila, zdala sa Vám prehľadná, atď.

	1	2	3	4	5	6	
Veľmi dobrý	○	○	○	○	○	○	Veľmi zlý

Ako hodnotíte hru podľa nasledujúcich kritérii?

	Veľmi dobre	Skôr dobre	Skôr zle	Veľmi zle
Grafické rozhranie - voľba farieb a obrázkov	○	○	○	○
Užívateľské rozhranie - jednoduchosť navigácie v prostredí hry	○	○	○	○
Nápomocnosť sekcie "Instructions" - pomohla Vám pri pochopení pravidiel hry?	○	○	○	○
Stabilita hry - stalo sa Vám, že hra spadla?	○	○	○	○
Rýchlosť hry - museli ste dlho čakať na novú definíciu alebo stalo sa Vám, že hra sa zasekla?	○	○	○	○

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