

“LEARNING WITH SIGN AND LIPREADING...”: ONLINE MULTIMEDIA EDUCATIONAL SOFTWARE

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Many teachers and designers of educational materials regard multimedia tools a vehicle for effective practices in learning, taking into account the combination of different informational formats (fixed or moving images, text, videos, sound). Especially in deaf education such materials are useful due to the enrichment of visual communication and the opportunity they give to deaf students to deal with them in order to enhance their learning. The purpose was a) to create and enrich an online interactive educational software combining sign, oral and written language, sound and images and b) to examine its effectiveness in oral language and in written vocabulary. A careful research of relative educational software preceded the design of the present software, which followed the basic principles of designing multimedia software and the principles of universal design for learning. Taking into account the reading difficulties of deaf students we are going to examine its effect using two tests in order to examine whether deaf students will learn and recall the unknown words in written and oral language. The creation of the software was completed with the active involvement of deaf students (available on <http://gym-ekv-thess.thess.sch.gr>). Results regarding vocabulary and speech therapy showed its effectiveness in vocabulary acquisition and oral language. With the present software there was a pilot trial to design an online dictionary that can be used in many ways and from different groups of students, deaf and hearing.

Deaf students have difficulties in reading comprehension, mainly in words (Paul, 2003). According to researchers (Lane et al, 1996, Wilson & Hyde, 1997) deaf students lose the meaning of the whole text due to their trial to recognize words. This difficulty has to do with their limited vocabulary, which seems to be predictive factor for comprehension (Paul, 2003, Luetke- Stahlman & Nielsen, 2003). Paul (2003) claimed that there is a causal relation between vocabulary knowledge and comprehension. The more words someone knows it's easier to comprehend text.

Deaf students are able to gain world knowledge and enrich their vocabulary, to develop and imply effective strategies for meaning that improve reading comprehension, when they use sign language (Musselman, 2000). Researches in preschool deaf children showed that sign language together with writing text has important impact on word recognition (Rottenberg, 2001, Schirmer & McGough, 2005).

Additionally, Kyle and Harris (2011) claimed that ability in lipreading seemed to be predictive factor for the reading comprehension, especially of the first words. Lipreading in conjunction with the speech training give cues to deaf children about the relation between sounds and spelling (Luetke- Stahlman & Nielsen, 2003, Dillon et al, 2012).

One of the most effective strategies for increasing vocabulary and, consequently, reading comprehension is to read widely with vocabulary support which can be achieved using a dictionary. The use of a dictionary is considered as a vocabulary learning strategy that gives students the chance to become independent readers. For students learning a second language, like deaf, dictionaries may be either monolingual in which words are defined in the language of the words, or bilingual in which words are defined in a second language (Hamilton, 2012) (in the case of deaf students, monolingual dictionaries will define words in spoken language and bilingual in sign language).

Within this framework an online Greek Sign Language (GSL) dictionary was designed in order to enrich deaf students' vocabulary and motivate them to be more active in learning process. Many teachers and designers of educational materials regard multimedia tools a vehicle for effective practices in learning, taking into account the combination of different informational formats (fixed or moving images, text, videos, sound) (Dubois & Vial, 2000). Especially in deaf education such materials are useful due to the enrichment of visual communication and the opportunity they give to deaf students to deal with them in order to enhance their learning (Nikolarazi & Vekiri, 2012).

The design of the present multimedia tool is based on some basic principles related with Cognitive Theory about learning with multimedia (Demetriadis et al, 2004, Karoulis & Demetriadis, 2004, Clark & Mayer, 2008). These principles are the following: a) *multimedia principle* which includes the combination of words and pictures, b) *contiguity principle* according to which it's better pictures to be presented simultaneously with words and close to them, c) *modality principle* which has to do with the way words are presented, d) *redundancy principle* which emphasizes the presentation of voiceover with graphics rather graphics, voiceover and text, e) *coherence principle* that underlines the presentation of the essential information only, without any unnecessary texts, pictures or sounds and f) *personalization principle* that relates with personal and friendly expression.

The purpose of the present study was a) to create and enrich an online interactive educational software combining sign, oral and written language, sound and images and b) to examine its effectiveness in written vocabulary and oral language.

Process

a) Design of the online GSL dictionary

The creation of the present educational software was made with the active involvement of the deaf students. Before the design of the online GSL dictionary, 10 multimedia software of sign language were examined. From those four related with GSL. The most important software of other sign languages are Spreadthesign, Signstation, ASLPRO.com, RIT Science Sign Lexicon, HandSpeak.com, SIGN ON. From the examination of the existing software, we found that there was no dictionary in GSL that combines writing, sign language, speech, sound and picture and that can be used in terms of teaching vocabulary in classroom. We also added phonological spelling using a pedagogical agent, in order to give deaf students the opportunity to gain phonological awareness and to be trained in a program of speech therapy.

The educational software is divided in two parts:

In the first part it consists of a digital dictionary, where each word is presented with the following ways:

- a) in writing language,
- b) in sign language,
- c) in oral language with sound,
- d) in oral language with video focusing on the articulation,
- e) with picture,
- f) with phonological spelling.

The main characteristics of this educational tool are the online support, the word's search, the alphabetical categorization of the words, the words' classification according to the subject, the matching of words with pictures, the sign language, the articulation of every word, the opportunity to choose combination of ways to see words and the phonological spelling.

In the following picture there is the representation of these characteristics and the interface of the software:

Picture 1: Representation of the interactive educational interface

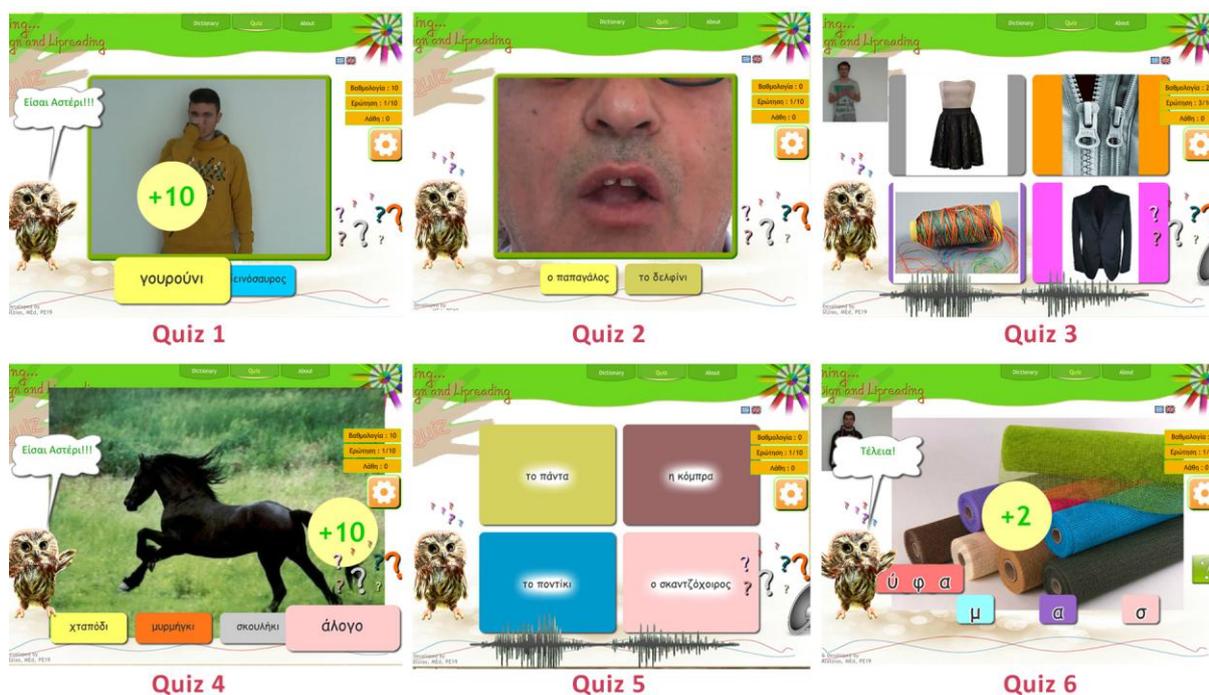


The second part of the software gives to the user the opportunity to practice with six different kinds of questions in a Quiz. The existing choices are questions that combine:

- 1) sign language with words,
- 2) lipreading with words,
- 3) sign language with sound and pictures,
- 4) pictures with words,
- 5) sound with pictures,
- 6) words with their letters in different order (anagram).

The questions are presented randomly and the user can choose the number of questions, words' category and the level of difficulty of the questions. In each quiz the user can also check the score according to the correct and the wrong answers one gives. Below there are pictures with examples of each kind of quiz.

Picture 2: The six different kinds of the quiz



b) Its effectiveness regarding vocabulary and oral language

Participants

12 deaf and hard of hearing students, with hearing aids or cochlear implants, participated in the second part of the present study regarding vocabulary and oral language. All students attended special school for the deaf. 3 were female and 9 male. Their age range was 14-22 years.

Vocabulary

The effectiveness of the online GSL dictionary regarding vocabulary is examined based on the process followed by Hamilton (2012). At the beginning we examined what words were unknown to the students. After two weeks, each student was given separately, at different times, one paragraph for the online GSL dictionary and one paragraph for online dictionary of Greek language without GSL or pictures. Both paragraphs had similar syntactic structure but different vocabulary. The students were instructed to read the paragraph using the online dictionaries in order to find the meaning of unknown words and were given as much time as they needed. After reading each paragraph, they answered simple multiple-choice questions about the target vocabulary. The pictures used were different from the ones used in the online GSL dictionary. After a week students were given a second test with multiple-choice questions for the target words. The pictures in this test were also different from the pictures used in the first test.

Oral language

The effectiveness of the present interactive educational software regarding oral language was examined according to the following aims:

- Sound discrimination.
- Lipreading.
- Phonological awareness.
- Enrichment of vocabulary in terms of articulation.

Results

Vocabulary: the results of the first multiple-choice test showed that when using the online GSL dictionary, 9 students answered all questions correct and 3 made one mistake. When using the online dictionary of Greek language only 1 student answered all questions correct, 3 made one mistake, and 8 students made two or more mistakes. At the second test when using the online GSL dictionary, 8 students answered all questions correct, 1 made one mistake and 3 made two or more mistakes, while when using the online dictionary of Greek language one answered all questions correct, 4 made one mistake and 7 made two or more mistakes (Table 1). In general, the results showed that deaf students learned and recalled more words when using the online GSL dictionary rather than when using the online dictionary of Greek language.

Table 1: Answers of the two tests using online GSL and Greek language's dictionary

Answers of the students	Online GSL Dictionary		Online Dictionary of Greek language	
	1 st test	2 nd test	1 st test	2 nd test
Correct answers	9	8	1	1
One mistake	3	1	3	4
Two or more mistakes	0	3	8	7

Oral language: the present educational software was found to be friendly and to be used easily from a speech therapist, because there is plenty material and the professional can check the progress of each student. In the present study children with cochlear implant or good hearing remains can exercise in the decoding of electronic sound for using telephone. Additionally, each student has the opportunity to exercise alone at home.

Discussion

Multimedia software increases access to new vocabulary and students' motivation for reading (Nikolarazi & Vekiri, 2012). Especially, e-dictionaries provide students who learn a second language with a quick searching tool for improving comprehension (Hamilton, 2012). Observing students' behavior during the use of the two dictionaries, we should mention that deaf students felt more confident, while using the online GSL dictionary, made efforts to remember relevant signs for the new words and, generally, were willing to interact with it. On contrary, while using the online dictionary of Greek language, they became frustrated when they saw the definitions of the words, made negative comments for the absence of pictures and faced great difficulty in understanding the definitions. The results of the two tests for each dictionary confirmed the belief that dictionaries are powerful tool for enhancing vocabulary and comprehension, when words' definitions are given in the readers' first language (Hamilton, 2012), that means for the deaf students in sign language.

Additionally, the results showed that the present interactive educational software can be a useful tool for enhancing lipreading in case of students with cochlear implant or adequate hearing remains.

The present study is limited in some areas which have to do with the small sample, the fact that sign interpretation was made by deaf students with maternal GSL but not by a Deaf teacher of GSL. The online GSL dictionary is educational software in which we continue to add new vocabulary and quiz. It is available in the following address <http://gym-ekv-thess.thess.sch.gr>. With the present software there was a pilot trial to design an online dictionary that can be used in many ways and from different groups of students, deaf and hearing.

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