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THE LEXICOGRAPHIC PROTOCOL OF Mikaela_Lex: A FREE ONLINE SCHOOL DICTIONARY OF GREEK ACCESSIBLE FOR VISUALLY-IMPAIRED SENIOR ELEMENTARY CHILDREN

Abstract The purpose of this paper is to present the lexicographic protocol and to report on the progress of compilation of Mikaela_Lex, which is a Greek, free online monolingual school dictionary for upper elementary students with visual impairments including 4,000 lemmata. The dictionary is equipped with new digital tools, such as the "Braille-system-keyboard, a "speech-to-text" tool, a "text-to-speech" tool and also a qwerty accessibility for visually non-impaired students.

Keywords Inclusive lexicography; blindness; visually impaired children; pedagogical lexicography Greek

1. Introduction

Print school dictionaries, like the print dictionary *Το πρώτο μου Λεξικό με εικόνες* (My first picture dictionary) (2005) including 4,000 lemmata, for children aged 6–9 or *Το Λεξικό μας* (Our Dictionary), including 800 lemmata (2005) for children aged 9–12, were compiled by the Greek Ministry of Education in the frame of the reform of school curricula. They are dictionaries designed to be used by school children and are adapted to their mental, linguistic, cultural, and encyclopaedic development (Antypa/Efthymiou/Mitsiaki 2006; Tarp/Gouws 2012).Their use in classroom may facilitate language learning, vocabulary acquisition, reading comprehension or writing skills in a way that increases language growth. However, their use in schools is not always successful, either because they do not address the exact needs of specific target groups of school-age children, or because pupils are not strategic dictionary users (Gavriilidou 2013; Gavriilidou/Konstantinidou 2021) and lack important reference skills that would allow them to make quick and successful searches in the dictionary (Tarp 2011; Chadjipapa et al. 2020).

Furthermore, in the case of specific target-groups, like for instance visually impaired children which are, in an inclusive perspective, educated in mainstream primary schools in Greece, such print school dictionaries are not accessible, while no other adapted lexicographic materials exist. Even though advances in technology have offered new opportunities (e. g. optical scanners, optical magnifiers, note-taking devices, etc.) to help visually impaired children to be independent at school or home, and compete with sighted people (Mulloy et al. 2014), ICT supported tools or e-learning resources are lacking in Greek schools to assist learning of this specific population or, when present, teachers lack training and support in order to implement them in classroom to empower their visually impaired students.

This leads to an urgent need for the creation of tools and resources tailored for the needs of children with visual impairments that would, however, be cost-effective, given that the costs

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of creating such materials is often economically not justifiable due to a small number of visually impaired children speaking a lesser spoken language such as Greek.

To address the above-mentioned needs, offer equal access to printed information, and help remove barriers to learning of visually impaired children attending mainstream Greek schools, we are in process of compilation of Mikaela_Lex.

However, dictionaries are often the product of an unplanned or arbitrary way of compilation which results in an inconsistent presentation of data. Gouws/Prinsloo (2005, p. 9) maintain that the compilation and publication of any dictionary should follow a rigorous lexicographic process and that "such a process compels lexicographers to adhere to certain planning and organizational criteria". According to the authors the lexicographic process or protocol is a workflow of well-defined tasks, required for compiling a dictionary. Part of this workflow is the dictionary plan which, according to Gouws/Prinsloo (2005) includes two basic modules: The organization plan and the dictionary conceptualization plan.

The purpose of this paper is to present the lexicographic protocol designed and implemented for Mikaela_Lex compilation and also offer a detailed description of the dictionary. In section 2, we describe our dictionary's organization plan. Section 3 focuses on the dictionary's conceptualization plan phases. Finally, section 4 offers a detailed presentation of the dictionary's macro-structural characteristics and its general features.

2. Dictionary's organization plan

The organization plan of a dictionary includes its genuine purpose and its lexicographic functions. It should be noted that, its genuine purpose should address the needs of the target users (Tarp/Gouws 2012). Mikaela_Lex is a free, online, monolingual Greek school dictionary which is compiled to be used by upper elementary visually impaired children attending Greek schools. Its genuine purpose is to transfer, accessible information regarding the vocabulary included in Greek school textbooks, in order to ensure the linguistic empowerment of the specific target group. In other words, Mikaela_Lex is produced so that visually impaired children will have an accessible and easy to use instrument to assist them in achieving autonomous learning in classroom and a successful dictionary consultation procedure by reaching the goals that motivate searches within specific linguistic tasks (e. g. the need to search the meaning of a word that obscures reading comprehension, a synonym or antonym exercise in the textbook, new vocabulary acquisition, etc.). Therefore, the basic knowledge and communication orientated lexicographic functions (Tarp 2000) it fulfils are a) providing data about Greek language, and b) assist the users solve problems during text production and reception in L1.

In order to ensure successful dictionary consultation procedures by the targeted population in a user-perspective (Prinsloo/Gouws 1996), it was deemed necessary, prior to Mikaela_Lex's compilation, to launch a survey to gather information from visually impaired students and their parents, in order to trace their needs and expectations. The results partially determined the structure, content and presentation of the entries (see preparation phase below).

3. Dictionary's conceptualization plan

The dictionary conceptualization plan, on the other hand, consists of five separate, consecutive phases (Gouws/Prinsloo 2005) which are presented below:

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I. The preparation phase

This phase was completed in December 2020, during which the dictionary's size and technical aspects were decided. In this phase, it was also decided that the dictionary basis would include all school textbooks available in Greek schools for lower and upper elementary children (see material acquisition phase below).

Size: Taking into account that due to its small size (only 800 entries) the already existing print school dictionary *Το Λεξικό μας* (Our Dictionary) (2005) left out of the scope of the dictionary a lot of frequent words included in Greek school textbooks compiled for the specific age group, and thus it was not responding adequately to the needs of the specific target group, it was decided, considering the results of a corpus-based study (see below), that the Mikaela_Lex would comprise around 4,000 lemmas when finished.

Lemmatization process: We opted for word lemmatization based on the frequency of occurrence in the lexicographic corpus specially compiled for this dictionary (see material acquisition phase below). No sublexical lemmata were included. Multilexical lemmata, on the other hand, were included in the lexicographic article of the semantic head of the multilexical item.

Technical decisions: Furthermore, it was decided that Mikaela_Lex would be accompanied by a novel application that would allow the visually impaired dictionary user to easily enter the online dictionary and search for any entry using only six buttons on the keyboard, as if using a Braille typewriter, with the help of a keyboard shortcut that converts it into a Braille basic keypad. Thus, the user is not obliged to use or learn the QWERTY keyboard.

There is an audio recording of the looked-up entry with the use of text-to-speech technology. More precisely, the application offers the option to read the word both letter by letter, so that the user is aware of what (s)he is typing and by the whole word.

It was also decided to include in the dictionary one more tool, the "speech-to-text tool" for children who do not know how to use either the QWERTY keyboard or the six buttons of Braille. The dictionary is also accessible for the general population of the school-aged children with the use of keyboard typing.

II. The material acquisition phase

Mikaela_Lex is a corpus-based user-oriented interface whose compilation was proceeded by a corpus building containing the content of 40 school textbooks of 1st to 6th Grades of Greek elementary schools. The software used for building and querying the corpus was AntConc. The corpus query program also provided vital statistical information on the corpus, e. g. the size (number of tokens), types (different words), average word length, sentence, length, etc. The headword selection was based on word frequency in a corpus of 1,119,424 tokens, given that "on the macrostructural level word-frequency counts is an extremely useful tool in the compilation of a lemma list for a new dictionary" (Gouws/Prinsloo 2005, p. 30). This phase was completed in August 2020.

III. The material preparation phase

In this phase, the material was sorted in order to omit tokens of the corpus that cannot be used in Mikaela_Lex and set the corpus in order, so that to proceed with macrostructural selection and present the lexical items to be included as entries in the dictionary. The macrostructural selection was performed in accordance with the typological crite-

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ria of Mikaela_Lex, in order to ensure the age appropriateness of data and definitions and resulted in 3,992 entries which were further compared manually with the entries of the two paper school dictionaries available for Greek pupils, "My first picture dictionary" (for ages 6–8) and "Our Dictionary" (for ages 9–11), in order to check whether important entries found in these dictionaries were also included in our dictionary.

Furthermore, the microstructural characteristics of the entries were determined in this phase: to ensure user friendliness and age-appropriate cognitive load, it was decided that the microstructure of the dictionary includes information about the Part of Speech, synonyms and antonyms, phraseology and word families. This phase was completed in October 2021.

IV. The material processing phase

This phase began in November 2021 and entails the creation of dictionary texts. Mikaela_Lex is the first school dictionary that is based on a rigorous lexicographic protocol. As a part of the dictionary conceptualisation plan of this protocol, we formulated a microstructural programme, which determined the nature and extent of the microstructure, the article structure and the way in which the different slots in the article were filled with data types.

There was also a systematic effort to provide age-appropriate noncircular definitions and supporting examples to best suit the needs of upper elementary children comparing to previously published school dictionaries which, due to the fact that they were not corpus based, they included a lot of age-inappropriate lemmas and non-pedagogical definitions.

This phase is foreseen to be completed in October 2023.

V. The publishing preparation phase

It was planned that the Mikaela_Lex will be made available as a free online lexicon at the +MorPhoSe lab of Democritus University of Thrace's webpage http://synmorphose.gr/index.php/en/ once completed. Once compiled, Mikaela_Lex will be submitted to usability testing, in order to check its effectiveness, efficacy and user satisfaction (Heid/Zimmermann 2012).

4. Microstructural characteristics and general features of Mikaela_Lex

Mikaela_Lex offers information about the morphological, phonetic and orthographic form of the lemmata (e.g. grammatical gender, part of speech) and their *semantics* (meaning, examples, synonyms, antonyms, word families). Lexicographic labels are frequently offered orally in the comment on semantics to give explicit contextual guidance to the target group users. Pragmatic labels are also used to help users relate an item in Mikaela_Lex to the world outside the dictionary.

Table 2 summarizes the basic features of Mikaela_Lex.

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1.	**Original form of publication**	Online dictionary
2.	**Completeness**	Under construction
3.	**Hypertextualization**	No hypertextualization
4.	**Multimedia**	Dictionary with text and audio
5.	**Dictionary access**	(1) **Braille system keyboard:** Entry "look up" with the "Braille-system-keyboard" tool, in order to assist the visually impaired students in case that they do not know how to use the QWERTY system. (2) **Speech-to-text tool:** Automatic look up with the "speech-to-text" tool, in order to help visually impaired students navigate better without using any of the keyboard-systems at all. (3) **Text-to-speech tool with VoiceRss:** Automatic pronunciation of all information included in the lexicographic article. (4) **QWERTY accessibility:** Accessibility for visually non-impaired students by QWERTY keyboard, in case that they do not desire to use the "speech-to-text" tool or they are not acquainted with the "Braille-system-keyboard" tool.
6.	**Gamification extension**	In order to combine learning with entertainment, a Gamification module is included for supporting and boosting vocabulary learning ("Fill-in-the-blank" game).
7.	**Automatic refresh tool**	Automatic refresh of the search box is activated after every look-up, in order to search for other words without moving hands from the keyboard.
8.	**Braille transcription tool**	Automatic transcription in Braille of each result for teaching or learning purposes.

Table 2: Overview of Mikaela_Lex's main features following Klosa (2013)

5. Conclusion

The major contribution of the paper lies in the rigorous presentation of the lexicographic protocol of Mikaela_Lex. We have also demonstrated the characteristics that the e-dictionary Mikaela_Lex offers to visually impaired students. It was shown that, in contrast to other Greek e-dictionaries or voice assistants, Mikaela_Lex contains not only much more digital characteristics and tools, but it also covers a wider range of new educational methods, such as the Gamification in word-teaching. Furthermore, the e-dictionary is equipped with new digital tools, such as the "Braille-system-keyboard" that promotes Braille's knowledge which becomes important to the world of the blind community. Finally, the dictionary provides a better linguistic processing of vocabulary in comparison with pre-existing dictionaries of primary education and, therefore, the dictionary could serve as a resource for diverse linguistic research for the creation or improvement of other e-dictionaries. All the above guarantee the accessibility and unambiguous retrieval of the information presented on both the macro- and microstructural level so the Mikaela_Lex, which will empower visually impaired students and will allow them to access autonomously to language knowledge.

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