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RESEARCH ARTICLE

Designing educational material to teach Braille to adult educators through the method of distance learning

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Abstract: The primary purpose of this research is to design and implement educational material through the method of distance learning to teach Braille to adult educators. Another main aim of this study is to probe into the possibilities distance learning offers learners and to what extent it can be conducive to a proper and effective teaching of Braille to adult educators. More specifically, the educational material was examined by three experts in distance learning education who contributed to its evaluation and further development. Subsequently, the educational material was examined by five educators who evaluated it.

Keywords: Braille language, distance learning education, educational material

1 Introduction

Digital media has entered people's daily lives in western societies (Barianos, Papadakis, & Vidakis, 2022). At the same time, new educational technologies have been developed to introduce children and adults to digital activities more actively (Skaraki & Kolokotronis, 2022). Lionarakis (2005) mentions that distance teaching activates learners and teaches them how to learn on their own and act more autonomously through an investigative process of self-learning and self-knowledge (Dahal et al., 2022). One can understand that educators' problems vary depending on the learners' age group, with the primary goal being to enhance the learning process using digital technologies and tools (Drolia et al., 2022). Educators assume a vital role in this as they need to design their educational material so that learners obtain new knowledge (Chaldi & Mantzanidou, 2021; Depoux et al., 2020; Qureshi & Qureshi, 2021). The main concern of this current study is designing and developing digital educational material that could allow adult educators to meet the Braille language to become familiar with the Greek alphabet as well as other valuable information concerning the Greek language of the visually impaired.

2 Literature review

2.1 Online learning

The term online learning stands for a family of machine learning methods in which a learner attempts to resolve an online prediction (or any decision-making) task by learning a model/hypothesis from a sequence of data instances one at a time (Hoi et al., 2021). Online learning aims to ensure that the online learner makes a sequence of exact predictions (or correct decisions) given the knowledge of correct answers to previous predictions or learning tasks and possibly additional information (Hoi et al., 2021; Lavidas et al., 2022). Online learning has become a promising method for learning through the continuous flow of data in many applications of the real world (Kalogiannakis & Papadakis, 2017). According to Rossi (2009), e-learning refers to a broad spectrum of applications, learning methods, and processes. According to Tzimogiannis (2017), the characteristics of such a program are the following: 1) Structured content based on specific learning goals, 2) Use of digital means and technologies for the provision of the educational material as well as for communication and interaction, 3) Educational methodology, 4) Activities and plans regarding learners' participation in the learning process through collaboration, 5) Evaluation of learning outcomes. Joksimović et al. (2015) define online learning as "a form of distance education where technology mediates the learning process, teaching is delivered completely using the internet, and students and instructors are not required to be available at the same time and place".

2.2 Teaching adult learners and distance learning

Individuals above 18 years old are treated as adults that can function effectively in distance education settings (Lazarinis et al., 2022). Adult learners have their own needs and feelings on how to help them learn more effectively (Karakose et al., 2022; Yazıcı Arıcı et al., 2022).

This means that the educational material should provide learners with the proper instructions, objectives, interaction, dynamic engagement and active participation in the learning process, direct communication between adults, proper use of the digital media, evaluation, and implicit critical thinking that serves to help adult learners to understand whether they have truly learned something (Anastasiadis, 2014; Lionarakis et al., 2020; Papadakis et al., 2021). A person above 18 years old is considered aware of what they do and wants to learn. For this reason, they select distance learning based on their own learning needs (Moore, 1986).

2.3 Teaching adults and Braille

According to the World Health Organization (2022), disability refers to impairments, functionality restrictions, and the restriction of such individuals from taking part in various activities. Such an anomaly presents a problem in the function or structure of the body (Maksum et al., 2022). The second is the percentage of disability a person has while executing a task. In contrast, the third has to do with the fact that specific individuals are disadvantaged in everyday functioning. Distance education has been foregrounded as the type of education that offers equal opportunities to all individuals, especially those with disabilities (Maharjan, Dahal, & Pant, 2022; Papadakis, 2021). While such a claim is indisputable, most distance education programs are delivered online (Kotera et al., 2019), therefore housing issues for people with disabilities do not hold any relevance as they do not severely hinder access and, the educational experience of students with disabilities (Bervell & Umar, 2020).

According to the United Nations Convention on the Rights of Persons with Disabilities (2006), as Cataudella mentions et al. (2021), "reasonable adjustments" are necessary to foster their learning development. However, specific questions arise concerning how such "reasonable adjustments" can be affected during online learning and other questions concerning the consequences of the particular use of online learning and distance education (Cataudella et al., 2021).

2.4 Greek writing Braille & teaching adults

More specifically, Gadiraju et al. (2020) notes that educators' training in Braille has declined, with fatal consequences for students with visual impairment. Regarding the issue of training in Braille writing in Greece, the efforts could be more adequate. According to Tsironas (2016), educators find their training in Braille writing easy and satisfying. They find the process of teaching students with visual impairment entertaining and satisfying. According to Ginja and Chen (2020), while educators understand the benefits of coeducation by supporting it, they consider their preparation in teaching Braille inadequate as there is a lack of relevant material, and the state does not give due weight to the educators' preparation for this purpose. A study conducted by Ávalos-Gómez & Ordaya-Díaz (2021) supports the same claim, suggesting that the absence of training in educators in Braille results in unsuccessful coeducation.

It should be noted that a study conducted by Gadiraju et al. (2020) designed and evaluated the online educational material BrailleBlocks. This system helps parents improve their visually impaired children's literacy in Braille smartly and entertainingly by broadening their horizons concerning online learning tools. At the same time, educators of Special Education acknowledge the positive contribution of ICT to the learning process for individuals with visual impairment. In contrast, according to Ginja and Chen (2020), educators trained in Braille can cover the needs of the visually impaired to a satisfying extent by applying the principles of inclusive education.

2.5 Designing educational material

The online platforms H5P and Chamilo were used to design and implementeducational material. Initially, the interactive educational material was designed in H5P, and so, it was uploaded to the platform Chamilo. The educational material is composed of three sections. More specifically, in the first section, learners are taught what Braille is as well as the vowels of the Greek alphabet. In the second section, they learn about the tactile bump dots and the consonants from B up to N. Finally, in the third section, they are taught the consonants from X up until (Ψ) and ten valuable things someone must know about the Braille language. More specifically, by clicking on the following web address (https://chamilo.datacenter.uoc.gr/metchamilo/courses/SXEDIASMOSYLOPOIHSHKAIAPOTIMHSHEKPAI/index.php) learners can access the educational material without any need for registration. The first thing one can see while entering the platform is this:

During this stage, learners have two options: a) click on the image lesson description and be transported to a page where they can access information regarding the lesson. More specifically, they will learn about the objectives of the lesson, the expected learning results concerning their level of knowledge, skills, and attitudes, as well as the structure of each section, the activities they are asked to complete, and the estimated study time that is required to study the educational material (Figure 1). The b) the second option the learner has is to click on the image knowledge

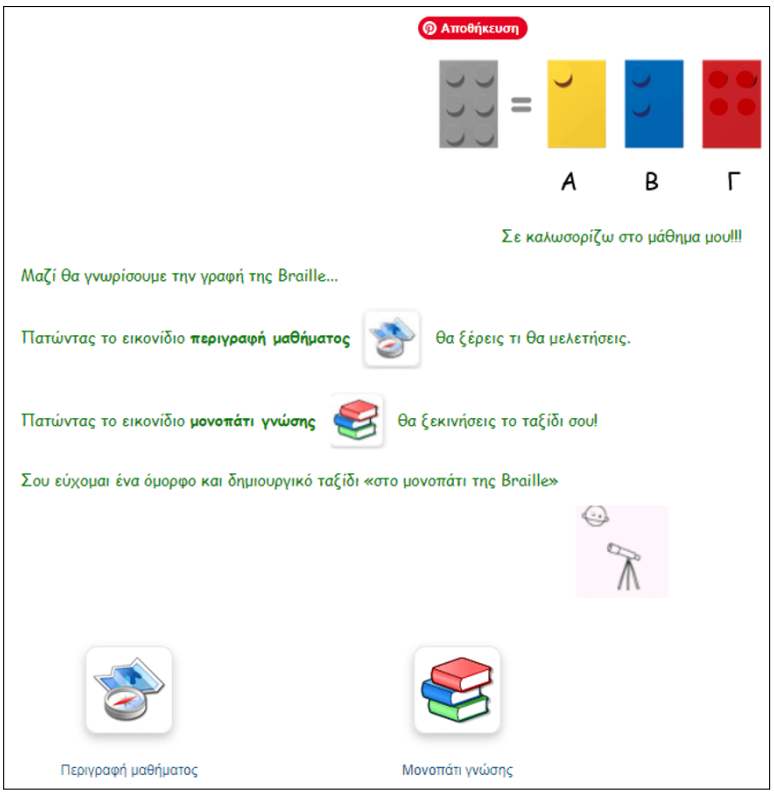

Figure 1 Initial page of Chamilo for the teaching of Braille

path where the three sections of Braille will appear. By selecting the first section, they will be transported to the homepage, the button instruction manual to understand the function of each button, as well as the essential elements referring to the goals, expected learning results, and lesson structure (Figure 2). The translation of the Greek words are presented in the textbox below.

BUTTON INSTRUCTION MANUAL

- It takes you to the homepage.
- It takes you to the contents.
- It takes you to the next page.
- It takes you to the previous page.
- Audio
- It takes you to the bibliography.

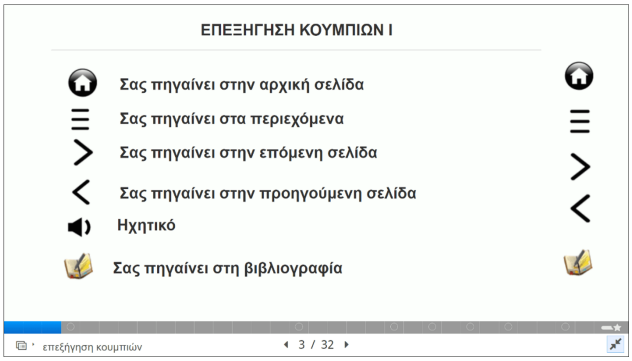

Figure 2 Button instruction manual

From this point onward, the lessons are presented with their respective activities. More specifically, learners will watch interactive videos and be asked to respond to comprehension questions, be transported to other websites by clicking on specific buttons and listen to recordings to understand better the vowels of Braille writing. At the same time, they can play games to see if they have truly learned all the information presented in the educational material. It should be noted that all the comprehension questions are accompanied by feedback on whether the

response given by the user is correct or incorrect.

For the vowel E, there is an image that shows how to write it. There is also an avatar through which the learner hears that to write the vowel E; he must press the numbers 1 and 5. Finally, a self-assessment exercise on writing E with feedback (Figure 3).

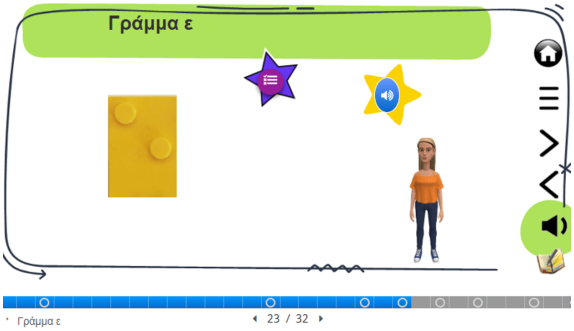

Figure 3 Vowel E with a comprehension question and a recording

At the end of each section, there is a summary and a game of comprehension questions with instant feedback to learn and memorize the vowels of Braille writing.

In the second educational module, the user learns what the embossed dots are through an interactive video with feedback (Figure 4). At the same time, he then goes ahead with learning the consonants from B to N with intermediate comprehension exercises, summarization and puzzle creation.

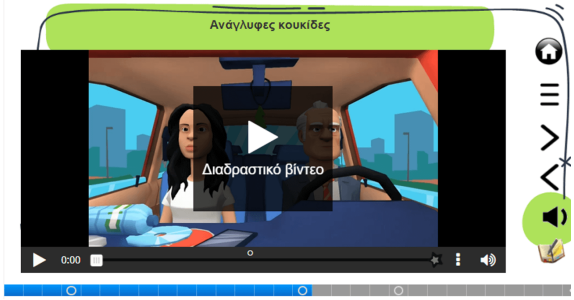

Figure 4 embossed dots

By reaching the third teaching unit, the user can learn about the rest of the consonants, answer comprehension questions, answer blank filling questions on all the teaching units (Figure 5), and finally learn ten valuable things about the Braille language he did not know before. The translation of the Greek words is presented in the textbox below.

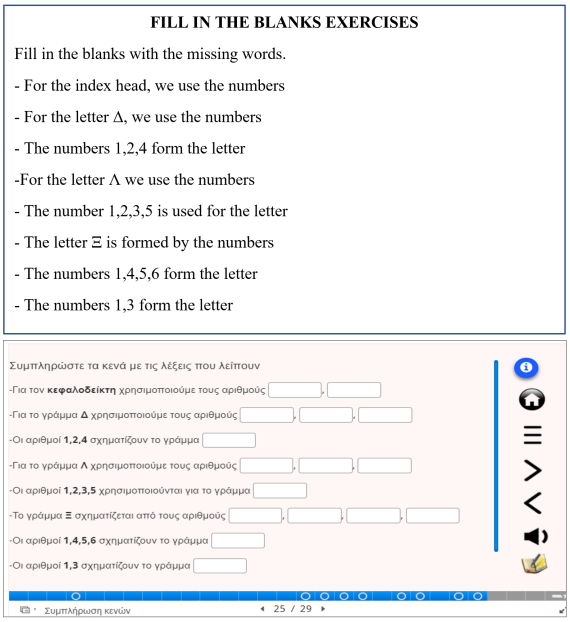

Figure 5 Fill in the blank's exercises

3 Research methodology

This research is qualitative, and this is because there is an evaluation of the quality of the educational material for the Braille e-learning environment. This research enables the researcher to divide the research into two phases to investigate and understand the topic in depth. Regarding the first phase, more specifically, the part of the research that has to do with the educational material, the "expert sampling". Regarding now, the second phase of the research concerns the learning and ease of use of the educational material by adult teachers who do not know the language of Braille.

Participants first answered seven demographic items and then fifty-six questions about the evaluation of the Educational Material, which the education experts answered. The questions related to the evaluation of the educational material are articulated in ten axes (see Table 1). The present study followed international research ethics (Petousi & Sifaki, 2020).

Table 1 Phase A – Research axes

Research Axes	Evaluation
1^{st} axis	Scientific coherence/documentation
2^{nd} axis	Simple and comprehensible presentation of a knowledge object
3^{rd} axis	Ease of use
4^{th} axis	Student support-guidance
5^{th} axis	Learner interaction
6^{th} axis	Reflection-self-evaluation
7^{th} axis	Purpose/ Expected results
8^{th} axis	Multimedia learning
9^{th} axis	Strong points
10^{th} axis	Suggestions for improvement

Regarding phase b, the trained (adult teachers) were given the electronic link to access the educational material on the Chamilo platform, together with a questionnaire of open questions created by the researcher of this work to collect the data. The participants initially answered four (4) demographic elements and nine (9) questions regarding evaluating the Educational Material. The questions that have to do with the evaluation of the educational material are articulated in six axes (see Table 2).

Table 2 Phase B – Research axes

Research Axes	Evaluation
1^{st} axis	ease of navigation of Educational Material
2^{nd} axis	learning outcomes of Educational Material
3^{rd} axis	Learning motivation
4^{th} axis	Suitability
5^{th} axis	Strong points
6^{th} axis	Suggestions for improvement and changes

4 Presentation and commentary on research results

The participants in phase A were 3. Two were women, and one was a man. Experts agree that information/opinions are cited with relevant literature and various sources of information. The writing style is friendly. The language is simple and understandable, and the writing and information density of the educational material is acceptable. Also, the educational material contains text, images and videos without tiring, while the colour compositions contribute to comfortable interaction with the learner. Moreover, experts have no problem with the buttons, while the hyperlinks lead to the expected content. The training material supports the learner in emphasizing specific points, while the explanatory comments are constructive. Finally, all three experts agree that the material includes activities encouraging the learner to integrate/enrich his views. Self-evaluation of the trainee is also encouraged, as well as critical thinking. At the same time, they consider that the activities include the learner's feedback. Experts agree that the expected results motivate the learner at the level of knowledge, skills, and attitudes. At the same time, they agree that the learner can control his progress based on the expected results. There are elements of narration; friendly language is used, and an audio presentation of the knowledge object is made. Experts agree that a friendly character (avatar) enhances the learning process. Also, there are introductory activities which help in studying the material. Experts cited various strengths of the training material. More specifically, reference is made to the simple and understandable way of presenting the educational material, the auxiliary video protagonist,

which makes the educational process more interesting, and the images help to understand the material.

The participants in phase b were five. Three were women, and 2 were men.Regarding the participants' prior knowledge of Braille, none knew anything about Braille before studying the educational material. The teachers agreed among themselves that the instructions were straightforward to understand, and the navigation of the educational material was straightforward. Also, the teachers learned new things about the Braille language as they needed to gain earlier knowledge. According to the participants, the images, videos, and sounds helped to understand Braille better as it made the lesson more interactive. In addition, the games helped them learn more about Braille as there was feedback. The educational material is suitable for adults. Finally, they mention strengths: coherence, multimedia tools such as images, games, and videos, simple language, and the subject itself.They like the educational material to have more games because they like it.

5 Contribution of the current study

This current study aimed to design and developed distance learning educational material to teach Braille to adult educators. Someone needs to know the Braille language, the language of people with visual impairment either from birth or after an accident at an older age. Nevertheless, there needs to be a more relevant bibliography in this field, and the researcher hopes this study can provide an impetus so that more people can get to know Braille and learn about it.

6 Suggestions for future research

A suggestion would be to provide educational material to educators and associations that teach the language of the visually impaired with the purpose of distance teaching, as such a venture exists neither in Greece nor in any other countries of the world. Furthermore, another researcher could further develop educational material by creating words, paragraphs, and texts and provide instant feedback to learners as we live in an age where new technologies have become part and parcel of people's lives.

Conflicts of interest

The author declares that they have no conflict of interest.

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