Universal Design and Cultural Heritage
Univerzalno oblikovanje in kulturna dediščina

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Abstract
New technologies are vehicles for dissemination of cultural values. They also enlarge the number of persons that have access to heritage. This paper presents a web-based platform, developed within the Erasmus+ AD HOC (Accessible and Digitized Cultural Heritage for Persons with Disabilities) project that enables perceptual accessibility of such content for persons with disabilities. The main principle followed during the entire project duration was the principle of Universal Design – including accessibility for persons with disabilities from the very beginning and thus creating a generic model of an accessible platform for some important aspects of the cultural heritage of Macedonia, Slovenia, Greece and Italy.
Key words: cultural heritage, accessibility, platform, persons with disabilities

Izvleček
Nove tehnologije so sredstva za širjenje kulturnih vrednot. Prav tako povečujejo število ljudi, ki imajo dostop do dediščine. Prispevek predstavlja spletno platformo, razvito v okviru projekta Erasmus+ AD HOC (Accessible and Digitalized Cultural Heritage), ki osebam s posebnimi potrebami omogoča zaznavno dostopnost tovrstnih vsebin. Glavno načelo, ki smo ga upoštevali ves čas trajanja projekta, je bilo načelo univerzalnega oblikovanja – vključno z dostopnostjo za osebe s posebnimi potrebami že od samega začetka in s tem ustvarjanje generičnega modela dostopne platforme za nekatere pomembne vidike kulturne dediščine Makedonije, Slovenije, Grčije in Italije.
Ključne besede: kulturna dediščina, dostopnost, platforma, osebe s posebnimi potrebami

Introduction

Before we discuss Universal Design in Learning (UDL) in museums and archaeological areas and connect this design to interoperable digital platforms we need to answer the question, what do we mean by "Universal Design/Design for all"? Universal Design is the designing of different products, information technology and/or environments with the goal to make them easy and convenient to use by all people-particularly persons with disabilities, to the greatest extent possible (Ginnerup 2009). This precludes the need to make additional adaptations, accommodations or other specialized designs.

The principles of UD need to be implemented from the early generic stages of planning. Although UD was initially envisioned to tackle issues in accessibility of buildings (architecture), it now converges to cover different societal issues and it is becoming an integral part of policy planning. When it comes to persons with disabilities, UD is used to make accessible solu-

tions with the purpose to include them in different aspects of society life.

In many countries in Europe and the world, there has been a strong shift from the medical model where persons with disabilities are seen as persons with diagnoses (biomedical perception of disability) to the social model and model of human rights. The social model recognizes that disability is created by society and persons with disabilities face many barriers that prevent them from inclusion in society life. Universal design is the bridge and connector between these two models.

It should be noted that the difficulties associated with different types of disabilities are individual (each case is a case of its own), and the deficiencies are not static (they are evolutionary and may have positive or negative evolution). In general, the solutions that are placed are always tailor-made, and the system should be sufficiently intelligent or flexible enough to adapt to the user, not the other way around. The idea of the tools dynamically adapting to the user profile is something that has been pursued for many years. The goal is to have a solution that reads the user profile and return an entire adapted interface. However, given the difficulty of finding Universal solutions, relying on tools where the learning curve for its full utilization (including its personalization) is low, seems more realistic. So, the alternative is to create a solution that allows to respond in a global way, but it must also be adaptable to the specific needs of different target groups, not something typified, static and immutable in time. Solutions need to be developed that could simplify the use of the tools, through the design option that allows simplified customization according to needs (including colours, font, menus and their order of presentation), and / or contextual needs.

Discussion

In the past years, many researchers call for inclusive museums, not only in regard to physical access but also to intellectual access (Giusti 2008; Rappolt-Schlichtmann and Daley 2013;

Salmen 1998). Although there has been a movement towards making museums more accessible, persons with disabilities lag behind in the experience of museum exhibitions (Rappolt-Schlichtmann and Daley 2013). Universal Design in Learning (UDL) gives an alternative for museums and exhibitions, in line with the progressive view of disability, not only focusing on the physical aspects and physical accessibility but also access to learning options. Universal Design for Learning (UDL) is a framework for developing and delivering content that is accessible to all learners (Hall, Meyer and Rose 2012). The UDL framework incorporates the following principles: 1. Provision of multiple means of representation (to activate the what, or the recognition networks of the brain); 2. Provision of multiple means of expression (to activate the how, or the strategic networks of the brain); and 3. Provision of multiple means of engagement (to activate the why, or the affective networks of the brain) (CAST 2008; Hall et al. 2012; King-Sears 2014).

UDL is a good fit for museums. It focuses on multiplying the modalities in which we present exhibits and the types of interaction they elicit from visitors. Virtual reality and augmented reality technology offer close-up experiences of heritage assets. Universal Design is not mutually excluded with assistive technology. Assistive technology is and will remain a very important aspect of everyday life of persons with disabilities. Universal Design solutions should be integrated with modern assistive technologies. One example of the interaction between UD and assistive technology is the development of a platform, which complies with accessibility requirements.

Having all of this in mind, researchers from four European countries worked jointly on the Erasmus+ AD HOC project: Accessible and digitized cultural heritage. The aim of the project was to create a strategic partnership in the field of higher education with the purpose to create and share innovative practices in the digitization of the cultural heritage and its accessibility
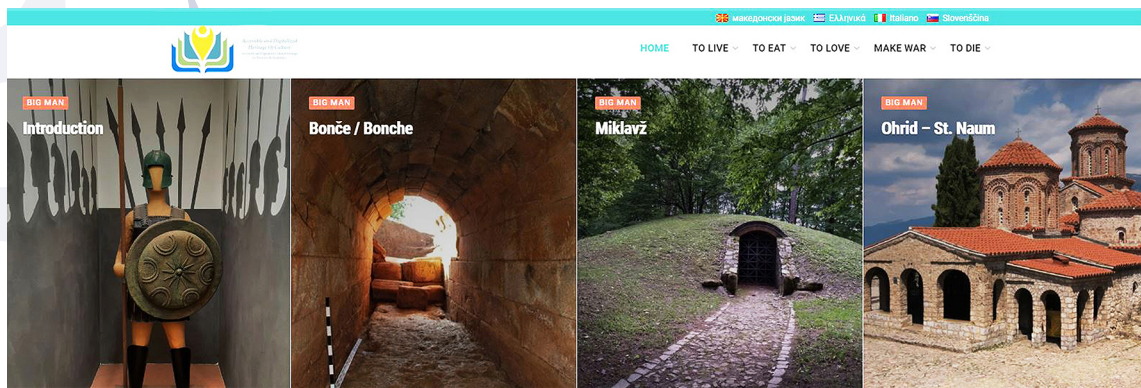
Figure 1: AD HOC home page (https://adhoc.ireason.mk/).

for persons with disabilities. The general goal of this project was to bring archaeological cultural heritage closer to the public, including different categories of the population, preferably through on-line courses. The project objectives were related to: Digitization of the cultural heritage in formats accessible to all and hence enabling on-line and distance learning as well as long life learning: Fostering quality improvements and excellence in innovation at the high education institution level through enhanced transnational cooperation between education and training providers and other stakeholders; Promoting the cultural heritage and its values among persons with disabilities and improve their level of key competences and skills, in particular with relevance to the labour market and their contribution to a cohesive society; Creating innovative ways for sharing effective methods in learning and recognizing culture and history for people with fewer opportunities (visual problems, hearing problems and intellectual problems), addressing the opportunities and implications of digitalization; Fostering the inclusion of people with fewer opportunities; Fostering equality in learning culture and history and foster the inclusion of people with fewer opportunities; Fostering social and educational value of European cultural heritage, its contribution to job creation, economic growth and social cohesion; Promote and strengthen knowledge and acceptance of diversity in society.

Within this project, a platform was created. This platform is a web-based platform that allows quick access to information related to archaeological sites and cultural heritage in Macedonia, Greece, Slovenia and Italy. It increases the level of knowledge in terms of flexibility, perception and simplicity for the visitors that are deaf, blind or intellectually disabled (Karovska Ristovska et al. 2021). This software is an open source system for building and presenting information collections. It builds collections of effective full-text search objects and metadata-based, attractive and easy-to-use search objects. In addition, they are easily maintained and can be enlarged and restored completely automatically. The system is extensible: software plugins contain different types of documents and metadata. The software includes an interface that makes it easy for people to create their own library collections. Collections can be built and serviced locally from the user's own web server, or (subject to appropriate permissions) remotely shared by a digital library host. This software allows incorporation of additional plug-ins. Hence, two plug-ins were added for: Persons with impaired vision (by using text-to-speech which is different for different languages); Persons with impaired hearing (by adding videos on sign language for each narrative or story). A simplified web-page was created for persons with intellectual disability (Stanojkovska-Trajkovska et al. 2017).

Over the past ten years, rapid innovations in text-to-speech (TTS) technologies have creat-

ed new and affordable ways to help students read print-based or digital texts that have no audio equivalents. TTS technologies provide students with the ability to hear virtually any text read aloud with a synthesized voice. TTS software is one example of assistive technology that has become a more common tool for struggling readers in schools and colleges, and has been widely accepted as a form of accommodation for students with disabilities (Mishev et al. 2020).

TTS has also been effective in improving reading skills of struggling readers. A study conducted by Robert Stodden and colleagues (Stodden et al. 2012) showed that readers that use TTS had improved reading rates, vocabulary and comprehension. This was also shown in another study conducted by Sarah Wood and colleagues (Wood et al. 2018). The authors confirmed that Text-to-speech/read aloud presentation positively impacts reading comprehension for individuals with reading disabilities.

Sign languages of deaf communities all around the globe are complete human languages with full expressive power. Sign was once viewed as nothing more than a system of pictorial gestures without linguistic structure (Каровска Ристовска 2014). In the past, sign languages have been disputed in linguistic research and haven't been defined as real languages. This was due to the differences in sentence production in sign and spoken languages. Like spoken languages, sign languages have their own grammatical rules and linguistic structures. Sign languages do not follow the same grammatical patterns as spoken languages and there is a need for a substantially different conception of grammar (Mishev et al. 2022). This makes the task of translating between spoken and signed languages a complex problem, as it is not simply an exercise of mapping text to gestures word-by-word.

Sign language apps used for museum exhibitions and accessible web-platforms have been thriving as well (such as Signly and ARCHES), and many museums in different countries, such as the Van Gogh Museum and the Metropolitan Museum of Modern Art, have made exhibitions for visitors with hearing loss.

This platform was completely designed following the Web Content Accessibility Guidelines (WCAG) 2.1, which promotes accessible web content. The UNESCO basic and advanced guidelines for the preparation for an accessible Digital Documentary Heritage (UNESCO, 2020) were also followed. Accessibility was considered at every step of the document digitization, sufficient funds for disability were allocated, persons with disabilities and experts in disability were included in every step of the process, and the content was described using simple, understandable language. The entire platform was created having accessibility in minds and accessibility awareness training was organized for different stakeholders. Digital images are accompanied by a text descriptor for the key features and in the highest resolution possible, PDF documents are screen-readable, videos are accompanied by captions in sign language and an audio description by using TTS. The content is provided in five languages: Macedonian, English, Greek, Slovenian and Italian.

Conclusion

Heritage is always associated with living, cultural, museum, national, local, and ritual practices. Accessibility of cultural heritage would mean that every individual, regardless of his/hers limitations can experience cultural heritage sites.

How can we improve the experience and learning of persons with disabilities in terms of archaeological sites and cultural heritage? 3D scanning, 3D printing and carving technology has made it possible to recreate objects and architecture with a high degree of precision and in a form that allows visitors to have a tactile experience of these materials. Some suggestions for accessible museums and accessible cultural heritage include: 3D modelling; Promoting tactile exhibits, complete with braille, large print, and audio exhibition guides; Use of digital technologies to guide visitors with different access needs; Creation of iOS and Android apps that chart

routes through the museum galleries, or game that invites users to create their own collages from collection highlights; Personalized experiences and many more. The combined application of the principles of Universal Design and the use of an interoperable digital platform leads to the improvement of accessibility.

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Summary

Universal design is an approach to design that incorporates products as well as building features that, to the greatest extent possible, can be used by everyone. Universal design in learning (UDL) incorporates multiple means of representation (to allow various ways of acquiring information and knowledge), multiple means of expression (to allow alternatives for demonstrating knowledge), and multiple means of engagement (to challenge appropriately, to motivate, and to allow learners to express and participate in their interests). UDL is a good fit for museums because it suggests a focus on broadening the ways we present exhibit components and the kinds of interaction they elicit from visitors. The combined application of the principles of Universal Design and the use of an interoperable digital platform leads to the improvement of accessibility.

A group of international researchers from four European countries worked jointly on the Erasmus+ AD HOC project (Accessible and digitized cultural heritage). The aim of the project was to create a strategic partnership in the field of higher education with the purpose to create and share innovative practices in the digitization of the cultural heritage and its accessibility for persons with disabilities. The platform developed within this project is a web-based platform that allows quick access to information related to archaeological sites and cultural heritage in Macedonia, Slovenia, Greece and Italy. It increases the level of knowledge in terms of flexibility, perception and simplicity for the visitors that are deaf, blind or intellectually disabled. This software is an open source system for building and presenting information collections. Two plug-ins were added for: Persons with impaired vision (by using text-to-speech

which is different for different languages); Persons with impaired hearing (by adding videos on sign language for each narrative or story). A simplified web-page was created for persons with intellectual disability. This platform was completely designed following the Web Content Accessibility Guidelines (WCAG) 2.1, which promotes accessible web content. The UNESCO basic and advanced guidelines for the preparation for an accessible Digital Documentary Heritage (UNESCO 2020) were also followed. Accessibility was considered at every step of the document digitization, sufficient funds for disability were allocated, persons with disabilities and experts in disability were included in every step of the process, the content was described using simple, understandable language. The entire platform was created having accessibility in minds and accessibility awareness training was organized for different stakeholders.

Povzetek

Univerzalno oblikovanje je pristop k oblikovanju, ki vključuje izdelke in gradbene lastnosti, ki jih lahko v največji možni meri uporablja vsakdo. Univerzalno oblikovanje v učenju (UDL) vključuje več načinov predstavljanja (za omogočanje različnih načinov pridobivanja informacij in znanja), več načinov izražanja (za omogočanje alternativ za dokazovanje znanja) in več načinov angažiranja (za ustrezen izziv, za motiviranje ter omogočiti učencem, da izrazijo in sodelujejo pri svojih interesih). UDL je primeren za muzeje, ker predlaga osredotočenost na razširitev načinov predstavitve razstavnih komponent in vrst interakcij, ki jih izzovejo pri obiskovalcih. Kombinirana uporaba načel univerzalnega oblikovanja in uporaba interoperabilne digitalne platforme vodi k izboljšanju dostopnosti.

Skupina mednarodnih raziskovalcev iz štirih evropskih držav je skupaj delala na projektu Erasmus+ AD HOC (Dostopna in digitalizirana kulturna dediščina). Namen projekta je bil ustvariti strateško partnerstvo na področju visokega šolstva z namenom ustvarjanja in deljenja inovativnih praks pri digitalizaciji kulturne dediščine in njeni dostopnosti za osebe s posebnimi potrebami. Platforma, razvita v okviru tega projekta, je spletna platforma, ki omogoča hiter dostop do informacij v zvezi z arheološkimi najdišči in kulturno dediščino v Makedoniji, Sloveniji, Grčiji in Italiji. Za obiskovalce, ki so gluhi, slepi ali intelektualno ovirani, poveča

raven znanja v smislu fleksibilnosti, zaznave in enostavnosti. Ta programska oprema je odprtokodni sistem za gradnjo in predstavitev zbirk informacij. Dodana sta bila dva vtičnika za: Osebe s slabšim vidom (z uporabo pretvorbe besedila v govor, ki je različna za različne jezike); Osebe z okvarjenim sluhom (z dodajanjem videov v znakovnem jeziku za vsako pripoved ali zgodbo). Izdelana je poenostavljena spletna stran za osebe z motnjo v duševnem razvoju. Ta platforma je bila v celoti zasnovana v skladu s smernicami za dostopnost spletne vsebine (WCAG) 2.1, ki spodbuja dostopno spletno vsebino. Upoštevane so bile tudi osnovne in napredne smernice Unesca za pripravo na dostopno digitalno dokumentarno dediščino (UNESCO 2020). Na vsakem koraku digitalizacije dokumentov smo upoštevali dostopnost, namenili smo dovolj sredstev za invalidnost, v vsak korak smo vključili invalide in strokovnjake s področja invalidnosti, vsebino smo opisali v preprostem in razumljivem jeziku. Celotna platforma je bila ustvarjena z mislijo na dostopnost, za različne zainteresirane strani pa je bilo organizirano usposabljanje za ozaveščanje o dostopnosti.

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