

# Creating accessible digital educational content: learning outcomes in Finland

Antonio Garcia-Cabot<sup>1</sup>, Eva Garcia-Lopez<sup>1</sup>, Markku Karhu<sup>2</sup>

<sup>1</sup> University of Alcalá, Spain

<sup>2</sup> Helsinki Metropolia University of Applied Sciences, Finland  
a.garcia@uah.es, eva.garcial@uah.es, markku.karhu@metropolia.fi

**Abstract.** This paper presents the learning results obtained in a course called “Creating accessible digital educational content”, and taught in Finland. This course was aimed at teachers conducting virtual training, and its objective was training teachers in how to create digital educational content that any student can use, whether or not they have any kind of physical or sensory disabilities. The course was created collaboratively by university partners of the ESVI-AL project. The results obtained in the first version of the English spoken course are positive. This course is also a good opportunity for teachers from non-Spanish speaking countries.

**Keywords:** Accessibility, Digital Educational Content, Course

## 1 Introduction

The United Nations signed the Convention on the Rights of Persons with Disabilities in 2006 [1], by which each country should ensure that people with disabilities should have access to primary and secondary education, higher education, job training, adult education and lifelong learning, without discrimination and on an equal basis with others.

To move towards inclusive education, progressively and substantially increasing alternative education practices based on the Information Technologies and Communications (ITC) are needed through the implementation of accessible virtual learning, understanding accessibility as "the extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use" [2].

Extending the concept of accessibility to the virtual educational context [3] in which teachers use digital educational content, it should be ensured that the content is accessible, i.e. understandable, usable and perceivable by any student who has the prior knowledge required to enroll in the training, and that having any kind of disability is not a barrier to complete the training [4].

WCAG (Web Content Accessibility Guidelines) [5] is a well-known recommendation that contains accessibility guidelines to create accessible web

content, but there are also other methods and/or mechanisms to make all digital content accessible. For these reasons, a course has been created which aims to teach the main techniques that a teacher has to know to create accessible digital educational content in the most commonly used formats in virtual training, such as text documents, slide presentations, PDF files, videos, audiobooks or web pages. This course, entitled “Creating accessible digital educational content” [7, 8], is aimed at teachers conducting virtual training, and its objective is to provide training for teachers to create digital educational content that any student can use, whether or not they have some kind of physical or sensory disabilities. The course is organized by university partners in cooperation with the ESVI-AL project [6], which aims to promoting virtual inclusive higher education in Latin America.

This paper presents a new course on creating accessible educational content and the learning results obtained in the course taught in Finland. In the following section (Section 2) both the content of the course and the structure are analyzed. Section 3 introduces the methodology followed and the instruments used in teaching the course. Section 4 explains the learning results obtained by the students during the course, and finally conclusions and future work are discussed in Section 5.

## 2 The course

The aim of the course was to train teachers and students so they can create digital educational content in a way that is accessible to any student, whether or not they have any physical or sensory disability.

Based on the European Credit Transfer System (ECTS), the mandatory part of the course yields 3 credits, since this system considers that 25 hours of student work equate to one ECTS credit.

The course was composed of four mandatory lessons (Lessons 1 to 4) and one optional lesson (Lesson 5) [9]. We decided to add the last lesson as an optional lesson because many teachers do not have technical skills; therefore, they would not have been able to follow the content in Lesson 5 because it requires some knowledge of programming, but still it could be interesting for some of them. The main topics to be explained in each lesson are shown in Fig. 1.



**Fig. 1.** Syllabus of the course

### **Lesson 1. How to create accessible text documents.**

- Guidelines for creating accessible content in Microsoft Word. Some guidelines are given, including that "the content should be written in brief and simple language", "the language of the document should be indicated" and "a sans-serif font of at least 12 points should be used".

- Accessibility evaluation tools. Some tools for evaluating accessibility in documents are shown, such as Microsoft Office and AccessODF.

**Lesson 2. How to create accessible presentations.**

- Creating accessible Microsoft PowerPoint presentations. Good practices for designing and creating accessible presentations are explained, and some general tips are given for creating effective presentations and presenting in an accessible way.
- Checking the accessibility of Microsoft PowerPoint presentations. In this section, students learn how to execute the accessibility checker and interpret the information about the issues found.

**Lesson 3. How to create accessible PDF documents.**

- Accessibility in PDF documents. This section explains how people with disabilities access the content of a PDF document. The characteristics of an accessible PDF, some WCAG principles that are applicable to PDF documents and tools for analysis and correction are also explained.
- Creating accessible PDF documents. This part explains how to create accessible PDF documents from other accessible documents already created. How to evaluate the accessibility of a PDF document is also explained, as well as how to make an initial checking for detecting issues that require modifying the source document, and how to correct accessibility issues directly in a PDF file.

**Lesson 4. How to create accessible audiovisual content.**

- Properties of an accessible video. This section explains what an accessible video should contain (transcription in text format, captions, audio description, sign language interpretation), listing also some tools that can be used to create accessible audiovisual content.
- Creating accessible video tutorials. Best practices to create effective video tutorials are explained, as well as some techniques for creating and editing videos, and uploading them to YouTube.
- Accessible educational content with audio. This section explains how to create accessible audiobooks from Word documents with the Balabolka tool. How to insert audio in PDF documents is also explained.
- Checking the accessibility in video and audio files. One checklist for accessibility in audio documents and another one for accessibility in videos are provided.

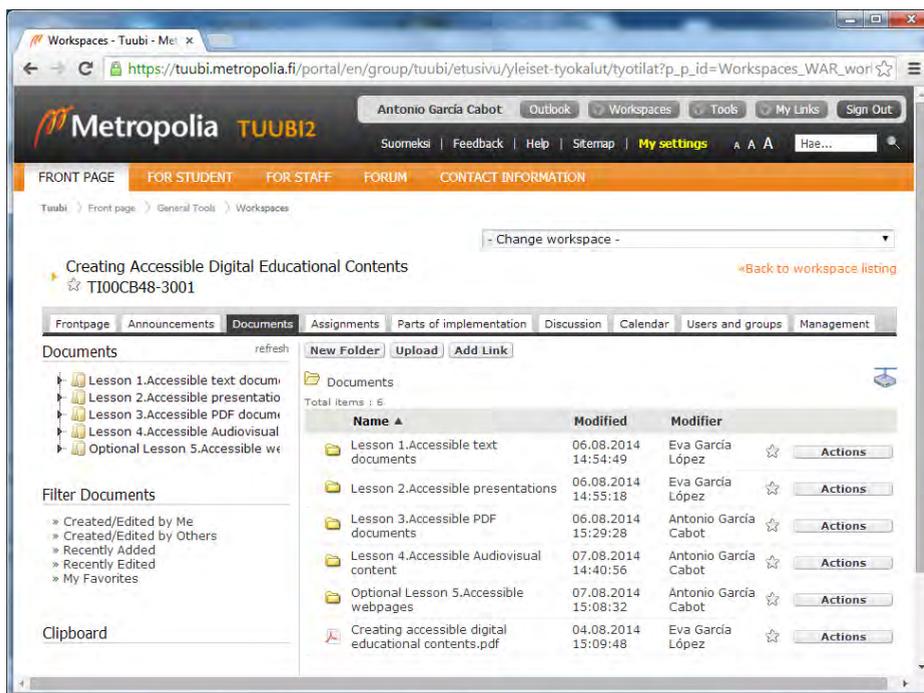
**Optional Lesson 5. How to create accessible websites.**

- Developing an accessible website. Some guidelines for developing an accessible website are given, such as identifying the language, including the title of the page, and not using color as the only visual means of conveying information.
- Accessibility of the elements of a webpage. This section explains how to make accessible the elements of a webpage, such as images, multimedia (audio, video, and slideshows), forms, and tables.
- Overall evaluation of the accessibility of a web page. Some techniques to evaluate the accessibility of a web page are explained.

### 3 Methodology, instruments and methods

The course was delivered as a blended learning course, comprising one week of classroom lectures and four weeks for online exercises.

Each lesson included a lecture by the teachers dealing with the main ideas and topics. In addition, a document with the whole learning content and two exercises was presented. One of the exercises was solved in order for the students to learn how to solve it; and the other one was not. It was not assessable, and it was given to students just for their training.



**Fig. 2.** Tuubi: e-learning platform used for online exercises

The classroom lectures were held from 4th until 7th of August 2014 at the Helsinki Metropolia University of Applied Sciences, on Leppävaara Campus, Espoo (Finland). The online exercises were carried out using an e-learning platform called TUUBI2 Portal (Fig. 2).

Evaluation of the course was based on one exam and one practical exercise per lesson, i.e., four exams and four practical exercises in total. The four exams counted for 40 % of the final grade and the exercises for 60 % of the final grade. The optional lesson was not assessed.

### 3.1 Methodological strategies

The same methodology was applied in each lesson, which consisted of the following teaching activities:

- Studying educational content: Students had to spend time reading and learning the contents of the lesson, which were presented in a sequence of interactive web pages. The students had the opportunity to download the contents of a lesson as a PDF or DOC file, if they wanted to read the description in these formats.
- Conducting a self-assessment of knowledge: in order for the students to check they had properly assimilated the educational contents, they could perform a self-assessment at any time while studying a lesson and check their level of knowledge.
- Participating in a discussion forum: the tutors created a discussion thread related to the content of the lesson, and the students discussed it during the week assigned to the lesson.
- Studying a case study solved: Students could read about a practical case related to the theoretical content of the lesson, as well as about the solution to the exercise, which enabled learning how to solve similar cases.
- Conducting practical classroom activities: one week was dedicated to performing practical classroom activities, in 4 sessions of 4 hours each. In these sessions, the tutor-student interaction was promoted, concentrating on practical cases and discussing the results in common.  
As a proof of completion of the classroom activities, the students had to send a description of the work completed in the classroom sessions to the tutors. They could do this at the end of the week, or later to have the opportunity to review the written work and, if necessary, to improve their work before sending it to the tutor.

### 3.2 Educational contents and resources

The main materials used in the course were:

- Online content: The online training content was offered in various formats: web, PDF, Word, PowerPoint and video.
- Resources for practical work: The students were presented the practical work to be carried out during each lesson, and the required software was provided. The software was generally free to use, except in the case of Microsoft Office 2007 or 2010 Suite for lessons 1 and 2. If the students did not have the required programs, a corresponding exercise could be performed with a similar free editor, such as LibreOffice, although the contents were designed for Microsoft Office because it offers tools to automatically evaluate the accessibility of documents and presentations.
- Resources for classroom practices: In general, the same programs were used in classroom exercises and in online exercises. The classroom exercises were conducted in a classroom equipped with a computer for each student, and with the required software installed.

## 4 Results

29 students enrolled in the course. They were from 17 different countries: Finland, Ghana, Nigeria, Canada, Bulgaria, Zambia, Bangladesh, Ethiopia, Iran, Estonia, Nepal, Russia, United Kingdom, Vietnam, Guatemala, Kenya and China. It is important to highlight that 59 % of the students were from non-European countries.

On course competition, 15 students in total had carried out the exercises and taken the exams, from which 13 students passed the course. General grades (from 0 to 10, where 5 means a pass grade and 10 means outstanding) are shown in Table 1.

*Table 1: Grading results of the course*

	Exams				Exercises				
	#1	#2	#3	#4	#1	#2	#3	#4	Overall grade
<b>Mean</b>	8.267	5.867	6.933	6.400	9.036	9.000	9.143	8.778	7.342
<b>Std. dev.</b>	2.658	2.503	2.404	2.947	2.635	2.631	2.656	3.308	2.744

After the course the students completed a satisfaction questionnaire based on the 1 – 5 Likert-scales. The level of satisfaction of the students was high in general, although some points should be improved for next editions of the course. The results of the satisfaction questionnaire are shown in Table 2.

*Table 2: Results of the satisfaction questionnaire*

Statement	Num. of Answers	Mean
Atmosphere was good for learning	4	4.50
Teaching was of high expertise	4	4.75
I reached the learning objects	4	4.50
Workload was well-related to the credit points	5	3.00

In general, the satisfaction was very positive. The last statement “Workload was well-related to the credit points” had a value of 3 corresponding a statement “not too little, not too much, but a fair amount of ECTS”.

## 5 Conclusions and future work

The created course teaches participating students to create accessible digital educational content. Previously, this course had been offered to different test groups in Latin America and the results have been positive. In this first English spoken course delivered in Finland the results were also positive.

In the pilot groups it was noticed that extra effort is required to make an existing document accessible. Furthermore, if an existing document has been created incorrectly (i.e. ignoring the general best practices for creating documents, presentations, by for example not using templates, titles or styles), it is difficult to

make it accessible and it might be better to create again the source document following the rules of general best practices.

Based on the feedback given by the students, the learning contents should be improved with more interactive materials because the materials of this first course consisted of long documents with a lot of text and images. This should be considered in further courses.

We are currently working in creating a version of this course in the MOOC (Massive Open Online Course) format so that it can reach a wider audience and the course can be entirely completed online, and that the classroom teaching of the course is not a necessary part. We think this way the importance of creating accessible educational digital content may be widely spread throughout the institutional educators.

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