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Supporting Content Creators in Creating Accessible Digital Materials in Higher Education

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Abstract: The recent growth of the digitalization of education has increased the importance of digital accessibility. In higher education, faculty members and administrative staff are the main content creators who are responsible for creating and publishing digital content for both students and university staff. Literature shows that these content creators do not have the necessary knowledge to create accessible digital content. At the same time, there is an abundance of information available online about how to create accessible digital content. However, due to the lack of time the content creators are often not able to find the necessary information to help them with the particular accessibility task they have at hand. In this study we have developed an online guide aiming at assisting content creators to create accessible content where target users have been involved in the iterative design, development and evaluation process. A summative evaluation was also conducted with a mixed-method approach, combining observation, survey, semi-structured interview, and document inspection. The results show that the online guide has potential to help faculty members and administrative staff to improve the accessibility of their digital content.

Keywords: Digital accessibility, content creator, higher education, summative evaluation

1. Introduction

The recent growth of the digitalization of education has increased the importance of digital accessibility (Chen, 2022; Lazar, 2022) which refers to the design and development of digital content, technologies, and environments that can be accessed and used by all people, regardless of their disabilities or impairments. Many students who have previously experienced barriers in the digital part of their education risk complete exclusion from the university experience after the education has gone mostly or entirely digital (Lazar, 2022).

Digital technologies and content that students use include websites, e-books, content/learning management systems for courses, registration mechanisms, video and other multimedia content (Lazar, 2021), as well as learning materials and documents in various formats such as .docx and PDF, presentations such as PowerPoint files. In higher education, faculty members and administrative staff are the main content creators who are responsible for creating and publishing digital content for both students and university staff. Content creators use many different languages, platforms, devices, operating systems, and cloud-based as well as locally installed software when creating digital content.

Literature has shown that content creators in higher education, such as faculty members, do not have the necessary knowledge to make their digital content accessible (Sanderson et al., 2022). There is already a wealth of online resources where one can learn about digital accessibility and how to make content accessible such as the information provided by the Web Accessibility Initiative (WAI) and many YouTube videos. However, due to the lack of time, it is often difficult for faculty members and administrative staff to look for the necessary information that can help them with the particular accessibility task they have

at hand. It is, therefore, necessary to provide customized guidance and support to content creators so that they can gain practical knowledge in the process of making digital materials accessible.

The goal of this research is to better support content creators in creating accessible digital materials in the context of higher education. We developed an online guide for assisting content creators and conducted a summative evaluation with the target users to understand how the online guide can contribute to improving the accessibility of the content created by faculty members and administrative staff in higher education.

2. Related Research

Digital technologies have been viewed in scientific literature as resources for achieving inclusion education, both in virtual and in-class environments (Perera-Rodríguez & Díez, 2019). However, studies have shown that digital technologies create new barriers for students with disabilities. Inaccessible information and technology have been found to be one of the main barriers for students with disabilities in higher education (Moriña, 2017). The inaccessible digital materials, including peer-reviewed journal databases and digital tools and environments, hinder the full participation of students (Seale et al., 2015). Fichten and colleagues (2022) argued that future publishers, web designers and educators must be trained on the fundamentals of accessible documents and web design.

Several studies examining accessibility and inclusion in higher education have highlighted that faculty members and administrative staff lack the necessary knowledge of accessibility (Shinohara et al., 2018). A more recent study (Sanderson et al., 2022) conducted interviews with 35 faculty members in the faculties of computer science and engineering. The findings from the study showed that most participants lack sufficient understanding of digital barriers and practical knowledge on how to make digital learning materials and courses accessible. Providing training to faculty members and administrative staff is considered essential to increase competencies in digital accessibility (Bong & Chen, 2021). However, despite of the willingness to learn, faculty and staff were found in lack of time and resources to gain knowledge about and implement digital accessibility in addition to their already full workload (Sanderson et al., 2022).

3. The Interactive Guide for Content Creators

The Interactive guide is a website where content creators can look for guidance for creating accessible digital materials based on the task they are working on.

The first step in the design of the interactive guide is to gather the types of digital content often used in higher education and the accessibility requirements and guidelines. Digital content comes in many file formats ranging from word processor documents, spreadsheets, and presentations to web-based content presented in text and structured HTML, with presentation styled in CSS and possibly being made interactive either using native constructs of the HTML language or by being supplemented with JavaScript. Multimedia such as bitmap images, Scalable Vector Graphics, audio, and video are presented within different types of files and web pages. In addition to accessibility guidelines and standards such as the Web Content Accessibility Guidelines (WCAG), which have clear requirements concerning digital content, different software, platforms, and operating systems have also developed their own guidelines for creating accessible content. For example, Microsoft has supporting videos and manuals on how to make accessible Word documents and PowerPoint presentations for different versions and operating systems. Apple has provided guidelines for accessible documents and presentations.

The interactive guide was developed through an iterative process. Three iterations of prototyping and user testing were carried out. During the iterations three participants were involved in the testing process and gave feedback on the design, content, and organization of the content in the interactive guide (uuguiden.no). Figure 1 shows that users can apply

filters to the guide to get the necessary information related to the task they are working on. The filters include the types of content and the software they use, as shown in Figure 1. Another option for users is to browse a table of contents.

Figure 1. The interface where users can apply filters to the guide.

4. Evaluation

4.1 Method

The summative evaluation included two parts which collected both qualitative and quantitative data. The first part was a usability study with observations and interviews. The participants were asked to test the interactive guide by completing some tasks in creating accessible digital content or finding information about making a component (e.g. table, image) accessible. Observation notes were taken during the testing, followed by a semi-structured individual interview. The interview questions focused on the participant's experience with the interactive guide. The interview was audio recorded and analyzed using a thematic analysis approach. The second part involved document inspection. Each participant was first asked to submit one of their Word documents or PowerPoint presentations (source file) and the corresponding PDF file. Then they were asked to make the documents (both sources and PDF files) accessible using the information provided by the interactive guide and submit the accessible source files and the accessible PDF files. The Word and PowerPoint files were analyzed using the Accessibility Checker built into Microsoft 365 and manual checks. PDF files were analyzed using the Accessibility Checker in Adobe Acrobat Pro, and the command-line exiftool for checking the meta-data of the PDF files. At the end of each part of the evaluation, the participants were asked to complete the System Usability Scale (SUS) questionnaire (Brooke, 1995) which includes ten statements adapted to the interactive guide. The study was reported to the Data Protection Services in the National Agency for Shared Services in Education and Research (Sikt) which evaluated and approved the processing of personal data in this study.

4.2 Results

4.2.1 Participants

The participants were recruited using a convenience sampling method. Emails were sent to colleagues in the university and in our professional networks. Six participants (P1-P6) took

part in the usability testing and eight (P7-P14) took part in the document inspection. All participants completed the SUS questionnaire. The working areas of the participants are shown in Table 1.

Table 1. *The working areas of the participants*

Position type	Participants
Administrative	P1, P2, P4, P5, P12
Teaching and Research	P3, P6, P7, P8, P10, P11, P13, P14
Library	P9

4.2.2 Document Inspection

Seven participants submitted the *before* and *after* versions of Word documents and PDF files and one participant submitted the before and after version of a PowerPoint presentation. The accessibility inspection of the submitted Word documents, PowerPoint presentations and the corresponding PDF file focused on the components including title, language, heading, text, image, table, link, reading order and slide title for PowerPoint presentations and language and bookmark in PDF files.

Table 2 presents the results from the document inspection. Because the prototype of the interactive guide has not yet provided all the guidance concerning the components, in Table 2 we only include those that the guide has covered. The document inspection showed that participants were able to improve their documents in text alternatives of images, color contrast, and the correct use of headings. Accessibility issues have also been found in document titles, language (both in source and PDF files) and PDF bookmarks. Most of the accessibility issues found with tables were not corrected after the participants used the interactive guide. One possible explanation could be that some of those issues are not covered by the built-in accessibility checker in Microsoft 365, which is the case for tables missing heading rows. The automatic checker did report tables with split or merged cells, but those errors were not fixed by the participants in this study. It could be that this topic needed to be addressed better in the interactive guide or that the participants needed more motivation or time to correct them.

Table 2. *Accessibility issues found in document inspection (before/after)*

Components	**Before**	**After**
Heading	29	28
Text*	136	36
Image*	96	65
Table*	49	46
Link*	1	1
Reading order (PowerPoint)	5	4
Slide title (PowerPoint)	1	1

Note: components with * mean that the interactive guide does not cover all the accessibility issues, and the number in the table for these components shows only the covered issues.

4.2.3 SUS Score

The lowest SUS score is 42.5 given by P9 and the highest is 82.5 given by P12. The mean score is 66.1 and standard deviation is 15.2. According to Bangor et al. (2009), if a SUS mean score is over 60 the system evaluated can be considered “Good”, and only when the mean score is over 75 can the system be considered “Excellent”. In our study, the mean score is 66.1, so it has only reached the “Good” level.

4.2.4 Results from Qualitative Analysis

The qualitative data is collected through observations and semi-structured interviews associated with user testing and the open-ended questions after the SUS questionnaire.

The participants generally thought the interactive guide was clear and easy to use. We observed that the participants had different preferences concerning using the table of content or the filters. The table of contents gave an overview of the guides, including the important points for users to remember when creating accessible content. Some participants preferred the filtering function while others felt that they did not need the filter options because the table of contents is not very long. The participants have also reported that they have learned new techniques from the online guide, the websites linked from the online guide and through discussions during the user testing sessions. For example, one participant was asked to create an accessible table in the user testing. The participant carried out the task as s/he used to do. After being encouraged to look at the online guide and the linked video from the guide, the participant was able to create an accessible table. Soon after the testing, the participant needed to prepare a large report with many tables and was happy to report back that s/he was able to put the new skills to use.

The participants have also provided valuable feedback to improve the online guide concerning both the usability and the content of the guide. Some suggested more content, including more details related to image text alternatives, working with tables in an HTML source editor in an LMS, and captioning videos. Several participants suggested the guide should be more practically oriented and use images, short videos or more advanced HTML code examples to demonstrate the techniques.

For people who would not have the expertise, […] it's difficult for them to understand what it means without pictures or images that should demonstrate how things should be done. […] if it's a user guide you have pictures to guide the users on how to do things. (P9).

Concerning the organization of the content in the online guide, one of the participants suggested that the topics should be organized in different ways (e.g. based on software or applications) so that they satisfy the needs of users with different preferences.

5. Discussion

Studies have shown that students with disabilities face a series of barriers that hinder their success in higher education and faculty members have been identified as one of the main barriers for students with disabilities in higher education (Zhang et al., 2018). Research has also shown that faculty members lack motivation and relevant knowledge and skills to respond to the needs of students with disabilities. Staff training and administrative support have been recommended as measures to address the barriers related to faculty members.

Several studies (Chen et al., 2018; Linder et al., 2015; Sanderson et al., 2022) have argued that in order to provide training and support to faculty members, higher education institutions should establish policies and strategies, and allocate resources for implementation. Some participants in our study have also commented on the responsibilities of institutions and pointed out that faculty members should not be the only responsible party. In our study, the participants are motivated to learn and make their digital content accessible. They are aware that they lack the necessary knowledge and skills and expressed that they wish to have someone they can ask when facing challenges with the accessibility of their digital content or get help about what tools are good and how to use them. They thought that this online guide was timely and important.

The online guide does not cover all possible accessibility issues. The accessibility improvements the participants made in their files when using the online guide were not very impressive, but there were some improvements. Some participants had yet to improve on all the issues the guide covered after using it. This could partly be explained by how motivated the participants were and how much time they were willing to spend testing the guide and improving their files in a busy life. Nevertheless, the data suggest that the online guide has potential but needs further improvement.

6. Conclusion and Future Work

The research presented in this paper aims to address the challenges faced by content creators in higher education in creating accessible digital content by providing an easy-to-use online guide. The online guide includes carefully selected content which can help content creators with the task at hand so that they do not have to search through a large amount of online information. Despite some usability challenges, the participants were able to use the guide to learn new techniques and improve the accessibility of their digital contents. The results suggest that there is potential in an online guide such as this to help content creators in creating accessible digital content.

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