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Using MOOCs to Promote Digital Accessibility and Universal Design, the MOOCAP Experience

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Abstract. The recently completed Massive Open Online Course for Accessibility Partnership project (MOOCAP), had the twin aims of establishing a strategic partnership around the promotion of Universal Design and Accessibility for ICT professionals and of developing a suite of Open Educational resources(OERs) in this domain. MOOCAP's eight university partners from Germany, Norway, Greece, Ireland, the UK and Austria have a significant history in developing and providing courses in the domains of Universal Design and Accessibility, as well as leading research and advocacy roles within Europe. The MOOCAP project consisted of two phases: the development of an introductory MOOC on Digital Accessibility and the delivery of set of online courses with more in-depth and focused learning topics. During the lifetime of the project over 10,000 students signed up for these courses. This paper reflects on the challenges of creating and delivering MOOCs, especially in topics around Digital Accessibility and Universal Design. It considers the outcomes, impacts and legacies of the project. Based on our experiences of integrating these materials into our courses and on feedback and project evaluations, this paper will assess the potential of MOOCs to promote Universal Design for ICT and other professionals, while pointing up the possible trials and opportunities of such activities.

Keywords. Universal Design, Massive Open Online Course, MOOC, Digital Accessibility

1. Introduction

The Massive Open Online Course for Accessibility Partnership project (MOOCAP), (http://gpii.eu/moocap/), coordinated by Prof Gottfried Zimmermann of Stuttgart Media University, was funded the ERASMUS+ Key Action 2 (KA2) grant program of the European Union[2] .

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[2] KA2 Erasmus+ (https://eacea.ec.europa.eu/erasmus-plus/actions/key-action-2-cooperation-for-innovation-and-exchange-good-practices_en) grant no. 2014-1-DE01-KA203-000679, through the German Academic Exchange Service (DAAD). The partners were the Technical University of Dresden, Germany, Johannes Kepler University Linz, Austria, Dublin Institute of Technology, Ireland, Oslo and Akershus University College of Applied Sciences, Norway, Université Paris 8, France, University of Southampton, UK and University of the Aegean, Greece. The University of York, UK has also contributed to the initial stages of the project.

The CEN Workshop Agreement: Curriculum Training for ICT professionals in Universal Design, [13] states that "In order for ICT industry to adopt Universal Design principles, methods and solutions, the professionals involved will need to acquire the necessary knowledge and skills". The aim of the MOOCAP project was to develop MOOCS to help these professionals acquire the necessary knowledge.

The project consisted of two phases: the development of an introductory MOOC on Digital Accessibility and the delivery of set of online courses with more in-depth and focused learning topics. The main activities in the 3-year project are shown in Figure 1. During the lifetime of the project over 10,000 students signed up for these courses.

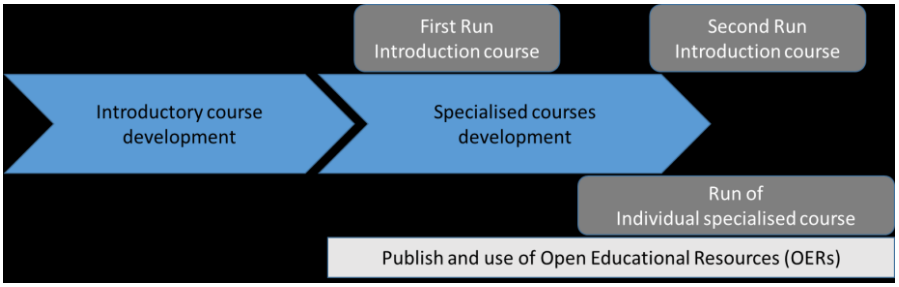

Figure 1. Main activities in the MOOCAP project.

This paper reflects on the challenges of creating and delivering MOOCs, especially in topics around Digital Accessibility and Universal Design. It considers the outcomes, impacts and legacies of the project, in particular the Open Educational Resources (OERs). Based on our experiences of integrating these materials into our courses and on feedback and project evaluations, this paper will advocate the use of MOOCs to promote Universal Design for ICT and other professionals.

2. The introductory MOOC on Digital Accessibility

The purpose of the initial course was to introduce the idea of Digital Accessibility with across the broad categories of ICT namely desktop, mobile, web and every day devices. The course ran over five weeks. Each week required 3-5 hours of engagement and promoted major accessibility initiatives. This meant that students would engage with core accessibility strategies and ideas. It was designed so that it was possible that students retained some of these, even if they failed to complete the course.

Curriculum design was influenced by our own courses, research and experiences, the CEN Workshop Agreement [13], and major accessibility resources such as the web accessibility guidelines (http://www.w3.org/TR/WCAG20/).

The introductory MOOC on Digital Accessibility was run on the FutureLearn Platform, (https://www.futurelearn.com/) and hosted by the University of Southampton on behalf of the consortium. The critical success factors in this choice included capacity, potential audience, and scalability. Since this was a learning experience for the partnership, access to experienced MOOC developers was particularly important in relation to some of the skillsets of the partners for example, video production.

It is an obvious and primary goal of this course that the content itself be accessible. The FutureLearn platform was chosen in large part because of its commitment to accessibility, (https://about.futurelearn.com/terms/accessibility-policy/). Practical

supports including Video captioning were also provided. The MOOCA partnership committed to best accessible practice in producing learning materials, especially the Web Content Accessibility Guidelines (http://www.w3.org/TR/WCAG20/).

Project ethical guidelines and Data Protection Protocols which have at their heart the principles of Voluntary Informed Consent, [3] were discussed previously, [7]. Any materials produced should also be respectful of the participants, especially disabled participants, [2].

During the two runs of the introductory course, the MOOCA partners acted as moderators of discussion content in order to foster discussion and to manage the respectful netiquette of content, (https://about.futurelearn.com/terms/).

One of the more complex aspects of MOOC development revolves around the intellectual property rights (IPR) of the learning materials being used. The general nature of legal issues in relation to MOOC delivery were discussed previously, [7]. This is especially difficult in a transnational partnership where different laws can apply in different countries. Eventually a supplementary agreement ("deed"), was signed by all project partners, which covered liability, indemnity, licensing and ownership. For the Open Educational Resources (OERs). the Creative Commons CC-BY 4.0 license was preferred.

3. Course Structure and Content

The initial course was run over five weeks. Week 1 introduced Accessibility in broad terms. Desktop Computing is the focus of Week 2. Week 3 concerns itself with Mobile Technology and Accessibility options. Week 4 considers Web Content Accessibility. Finally Week 5 looks at Accessibility issues in everyday ICT, for example in ATMs and Televisions. The role of Universal Design in the accessible design of everyday ICT products and services, was considered here.

A stepwise methodological approach to produce the weekly content based on FutureLearn approach, was adopted [6]. By basing the work on very small individual steps for each activity it was possible to effectively divide up the workload between authors and reviewers. This approach was facilitated through the use of shared documents on a cloud storage service, video chats, email discussions and a matrix of requirements for individual text and media artefacts.

The pedagogical challenges included the inherent massive audience, the community of learners at the centre of learning experience, the use of videos, quizzes and peer discussion, [7].

Peer discussion is an enabler of student centred learning on MOOCS. This was a key attribute of the Digital Accessibility MOOC. Topics were discussed and critical insights offered. For example, when discussing the topic of the accessibility of domestic appliances, such as washing machines or cookers, where controls are often touch panels, people shared their experiences on accessibility issues, gave examples of barriers and enablers and provided many links to valuable resources.

Each week is illustrated with Day in the Life Stories, [9]. While not as developed as formal personas in the sense of work by people like Cooper, [5], using stories to convey the needs and preferences of people with disabilities aspired to build on the success of others in this regard, [1,14]. Lotisch et al, [11] in their review of the effectiveness of the MOOCAP Day in the Life stories concluded that these were a positive inclusion in the course content and were helpful in developing an appreciation of the challenges people

with disability have accessing technology. The commentary these stories provoked was interesting. Over two runs of the course, there were over 2100 comments offered in response with story each yielding 273 comments on average.

4. Who Took the Course?

Over two deliveries/runs of the MOOC on "Digital Accessibility" 7,758 individuals registered and 4.432 active learners participated. The breakdown of participating information in the two runs is shown in Table 1. It is usual for only 10% who start a MOOC to finish, but over the combined runs of this course, over 750 learners, (17%) actively engaged till the end.

Table 1. The breakdown of participating information in the two runs. (Active Learners: who have completed at least one step at any time in any course week, including those who go on to leave the course. Social Learners: who have posted at least one comment on any step)

	Registered learners	**Active learners**	**Comments**	**Social learners**
First run (17 Oct.-20 Nov.2016)	2972	1126	8199	513
Second run (6 Feb.-10 Mar. 2017)	4786	1749	8543	631

ICT professionals envisaged by the CEN Workshop Agreement, [13] were software developers, ICT managers and others working in the ICT professions. However, an outcome of the MOOCAP project is that the majority of those who took the course are from outside this group. Among 609 learners (400 females: 209 males) who completed our pre-course survey, IT and information services (19%), Teaching and education (25%), public sector (8%),Health and social care (6%), Others e.g. banking, graphic designs and retail, (32%). Anecdotal evidence provided in the discussion forums indicated that many from ICT were content providers rather than programmers or developers. This has implications for course content, in terms of technical level.

While there was no standard approach to identifying people with disabilities some participants in course discussions shared their experiences as people with Physical, Cognitive and Sensory disabilities and as expert users of Assistive Technology. Their contribution enriched the learning experience of all. The commitment to provide accessible materials facilitated equitable participation in the course regardless of disability.

5. Evaluation of the MOOC on Digital Accessibility

The numbers of registered students show that there is real interest in the topics of Digital Accessibility. Will this be replicated if the materials are made available in other languages. Localisation work is beginning in this regard, (e.g. https://app.cristin.no/projects/show.jsf?id=541167).

Course participants were positive in their reaction to the course both in their reflective comments at the end of each week and in their responses to a post-course survey.

94% of the participants found that the course met or exceeded their expectations regarding its subject matter. Over 76% of the participants found the course length about right.

The majority of users visited the course a few times a week with more learners visiting daily on the second run than during the first. While learners were most likely to do the course at home; many also did the course at work.

The post-course survey also sought learners' opinions on different aspects of the course design and content. Videos were especially popular. Learners enjoyed reading other learners' comments. Learners also liked receiving feedback, discussing things with other learners, and giving and receiving peer review on assignments.

It was indicated that the course orientation materials, subtitles and written transcripts of all material, the use of animations in videos, and the ability to download video content all enhanced the learning experience.

Around 85% of the participants found the educators engaging and found the study skills advice, and discussions between experts particularly useful.

As well as the survey the comments posted in discussion forums at the end of each course step provided an indication of peoples' engagement with the course. A total of 16.737 comments were made over both courses. The average number of comments per social learner per week was 6-7 (a social learner has to comment at least once).

The partnership also had access to evaluations from students and interested others in their own institutions who were taking the MOOC as part of a blended course. In general, their evaluations rated the whole experience as positive, both in terms of learning about digital accessibility, as well as being part of a learning community.

The students on one blended course, reported that they found it helpful to refer to the materials when working through their project work for their degree course. In contrast to the findings of Loitsch, [11] they reported that the personal anecdotes from fellow MOOC learners were useful to them, but they were less happy with the Day in the Life stories. Some learners dismissed them as 'artifices'. This may be a peculiarity of the particular cohorts, in that that they preferred lived 'authentic' experiences to 'rhetorical' devices.

In terms of the delivery of the materials, all reported enjoyment of the steps, although they expressed a wish for larger chunks of material. They particularly enjoyed the videos and found the transcripts and subtitles very helpful. Some explained that this was because they had difficulty understanding some of the audio, not just because it was not in their native language, as many are fluent speakers and proficient in the use of English language, but because some of the speakers themselves had accents. They generally felt that it was good practice to have transcripts as they are useful for further study.

In terms of participation in the learning process, they admitted that they did not write many comments preferring instead to 'lurk' although those who did comment reported it took them some time to craft their comments less because of language fluency and more because they wanted to 'fit' in with the style and tone of the other learners. They further explained that they felt very rewarded when their comment(s) provoked some response from fellow learners or the tutors.

Finally, many reported that although they had followed other types of online learning, such as one-off tutorials, or other online materials, enrolling in a MOOC was a

first for them. They enjoyed the experience, felt that it was an interesting way to learn, and many stated that they intended to enrol in the future courses.

6. MOOCS as a vehicle for promoting Awareness around Universal Design Topics

Can MOOCs be a successful vehicle for promoting awareness around the topics of Universal Design? The numbers of people who engaged with the introductory MOOC on Digital Accessibility would suggest that there is a public appetite for such endeavours.

While the topics addressed in all weeks of the course have emerged on Universal Design websites (e.g. http://universaldesign.ie/Technology-ICT/) Week 5 of the Digital Accessibility Course had a special relevance. It looked at ICT in everyday living and discussed Universal Design specifically.

Allowing for the natural dramatic falloff in MOOC engagement over time there were still healthy and wide-ranging discussions on Universal Design topics yielding over 1800 comments. For example, an invitation to learners to share their experiences of difficulties with domestic appliances and self-service terminals, yielded a large range of responses. In addition, there were descriptions from people with disabilities, who gave a personal account of how these shortcomings impacted them. Sometimes the learners also offered helpful tips, whilst recognising that these were only temporary remedies. Others took a more analytical approach, and recognised that that there can be elements of technological phobia as well as digital illiteracy compounding the inaccessibility of the machines.

Training support staff, to better explain the features of a device, and to recognise what kind of help users may need was proposed. Other suggestions were for improved documentation and for more consistency in interfaces across machines with similar functionality, possibly aided by standardisation efforts.

Moving beyond the initial prompt to share experiences to propose solutions is a fairly frequent phenomenon in design, as people naturally try to find resolve problems. However, in the context of a MOOC, it had some interesting and positive results. The learners often commented on proposed solutions, pointing out shortcomings, even sometimes in the solutions they themselves had proposed. This made for interesting mini-discussions that increased the interest for all, and reinforced the sense of a community of learners. Further, in response to a prompt to share innovative practices, learners responded with resources (in the form of urls pointing to videos and materials). The learners asked the MOOC organisers to compile a list of all the resources, both those provided by the learning materials and those offered by the learners themselves. This had an immediate multiplier effect, of increasing the number of resources. However, it was also useful in reinforcing the messages in the learning materials, as personal stories are powerful in learning experiences, [8] and several learners commented to this effect at the end of the course.

In terms of awareness, we report one instance of ‘awareness raising’ There were a number of interesting responses and reflections in response to a ‘step’ with information about the United Nations Convention on the Rights of People with Disabilities (UNCPRD) ending with a question to learners: “Have you heard anyone talk about the UNCRPD? What do you think is its importance?” Only a very small percentage of those who replied to this question had heard of the UNCPRD (6%). Many commented that they would now look into it, some said they had already started, and some commented that they found the site, and the text in it, rather inaccessible! Others commented that this was an important piece of work and they were pleased to have been made aware of it.

One person noted that it could provide a good basis for standardisation with regard to accessibility. This was a good cue for one of the MOOCA moderators to point out the relevant article and paragraph[3] of the convention. This discussion also possibly aided in strengthening the understanding of the social model of disability, a concept that had been introduced earlier in the MOOC.

7. Summary and Conclusions

In 2011 the need for promoting Universal Design amongst ICT professionals was highlighted in the CEN Community Workshop agreement, [13]. The MOOCA partnership provided a series of publicly available online courses representing a comprehensive curriculum framework on digital accessibility in Europe. More than 10.000 students and professionals engaged with these courses. People with disabilities were integrated as course participants.

With regard to the profile of learners, there is growing evidence that a wide range of people are interested in this way of learning, from students in formal educational settings who use them to supplement institutional courses, to learners in workplace settings, seeking to enhance their knowledge, across a spectrum to people just interested in learning more and looking to share their experiences of the distance between theory and application, especially with regard to Universal Design. However, given the backgrounds of the participants the profile of ICT professionals as envisioned in 2011 would need to be revisited. This has implications for the course content and particularly the technical level of the presented materials.

Literature has shown that more efforts are needed to integrate universal design and digital accessibility into formal computer science and engineering related curricula in higher education, [4,10,12,16,17]. The OERs created in this project, which are available publicly, (https://moocap.gpii.eu/) allow educators to re-use and re-purpose the course materials.

MOOCAP has been an enlightening journey into the world of MOOCs. While there are considerable benefits, MOOCS are not without pedagogical and organizational challenges. The commitment and resources required to create and deliver a MOOC are not to be underestimated. In spite of this caution, an important and enduring result of this project is that it has bequeathed a valuable legacy of OERs available to promote Universal Design and this is of considerable benefit as a starting point for any future endeavours.

The experiences of MOOCAP would suggest that MOOCs are an appropriate way to disseminate awareness of Universal Design. MOOCS in themselves can reach a wide audience particularly through well-established platforms with many subscribers such as FutureLearn. Engagement can be optimised through thought provoking Day in the Life stories and everyday scenarios that are relevant to the participants. A key finding is that there is great potential to explore the topics through well monitored discussion forums.

[3] Paragraph f of Article 4 of UNCRPD

To undertake or promote research and development of universally designed goods, services, equipment and facilities, as defined in article 2 of the present Convention, which should require the minimum possible adaptation and the least cost to meet the specific needs of a person with disabilities, to promote their availability and use, and to promote universal design in the development of standards and guidelines

There has been some discussion that the 'c' in MOOC stands not only for course, but for community [15].

In conclusion, we can speculate that MOOCs will continue to evolve pushed by factors from within the educational sector, such as the desire to establish 'virtual campuses'; to offer supplemental material and blended learning on physical campuses; to update 1870s model of 'lecture courses' etc.. There are also factors from outside this sector, such as the need for 'just in time learning' or for updating existing skill sets, the lack of resources (time and money) to enroll in more formal learning, the acceptance of MOOC certificates as proof of – if not accredited knowledge- then credit for-self-directed learning capabilities,. , the 'fit' of this type of learning to mobile platforms that are increasingly widespread, and of great interest to Universal Design, especially to those for whom existing educational resources are not accessible (because of disability, remoteness etc.) . Against this background, the use of MOOCs to promote learning, and perhaps communities of learning, and to exchange and to create new knowledge about Universal Design can only be beneficial, to all those involved, both learners and content providers. We have experienced that the roles can be interchanged, enabling fluid movement from roles of designers and developers of learning content about accessibility to learning from our participants and becoming with them, new knowledge creators.

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