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Social Accessibility Action to Improve Quality of OER User-generated Video-classes and Associated Resources

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Abstract

Social Accessibility is an approach to shorten the time for making web content more accessible by allowing ICT volunteers to improve its quality through collaborative work. In this context new forms of volunteerism have emerged through the creative and innovative use of ICTs. The first action in social ICT volunteering at UNED, the largest public distance university in Spain, took place in 2013 by enrolling 13 student volunteers. In 2014, the second action started with promising outcomes and more than 60 volunteers. The overall project aimed to improve the accessibility of original user-generated video learning resources contained in a multimedia repository of the university commonly used by the vast community of a quarter of a million students. The video classes were textually transcribed, subtitled and converted into mp3 audio. Its semantic labelling in the repository was also improved through collaborative volunteer metadata authoring. Main contribution of this paper is to show the ICT-based volunteering experience and the corresponding discussion on main findings. The experience has demonstrated the capacity of ICTs to promote social innovation at the universities and bring about citizen empowerment, in this case developing conscious awareness of the difficulties that must be faced daily by people with functional diversity and the benefits of implementing universal web accessibility.

Keywords: social accessibility; on-line volunteering; digital inclusion; multimedia repository; educational resources; people with functional diversity
1. Introduction

The concept of Digital Inclusion comes from the idea that technology and the ubiquity of the Internet can bring about challenges and new opportunities for communities and individuals alike and can reach all layers of the population (Almuwil et al., 2011). However, it is necessary to bring the technology to the people and train them properly in such a way that they begin to consider the technology as a social good. The digital challenges and opportunities are not evenly distributed, the access to it is not equitable and participation in the online environment is not even for people with functional diversity, adding extra difficulties such as the need to develop specific digital or even social skills (Emiliani & Stephanidis, 2005). Thanks to ITC the integration of people to a new order with different relationships at the global scale is favoured. As Warschauer (2004) remarks, “Access to ICT is embedded in a complex array of factors encompassing physical, digital, human, and social resources and relationships. Content and language, literacy and education, and community and institutional structures must be taken into account if meaningful access to new technologies is to be provided.”

In this context, the flexibility of the learning service provided by Internet based scenarios allows students to learn at their own time, place and pace, enhancing continuous communication and interaction between all participants in knowledge and community building. E-learning systems and learning (content) management systems offer open access to life-long learning content and services independent of time and location barriers. These services are increasingly accessible through technologies and devices, offering new opportunities for learning experiences especially for people with social inclusion, thus improving their opportunities. But eLearning environments are rapidly evolving towards a more revolutionary computer and mobile-based scenario (Kukulska-Hulme & Shield) along with social technologies that will lead to the emergence of new kinds of learning applications that enhance communication and collaboration processes.

According to the “Access and use of ICT by people with disability” report (2013) drawn up and recently published by the Fundación Vodafone-España, it must be noted that 91.8% of people with a disability in Spain use a mobile telephone, 42.8% of them a computer and 32.5% the Internet. These figures are somewhat lower than those on average within the overall Spanish population (95.5%, 72.7% and 75.1%, respectively for each technology) even though the use of the mobile telephone among people with visual, auditory and mobility disability is practically universal. The collective of people with an auditory disability are the ones that make most use of ICT, making the computer (47.5%) and Internet (61.8%) the most used technologies, even though, because of the limitations of their disability, this population faces the greatest problems of accessibility to mobile telephones (56.3%). But in spite of that, they also participate most in social networks (56.1%) and use the services of Web pages of organisations dedicated to disability support to participate in forums (36.6%). In the case of the collective of people with a mobility disability, they have the greater perception of the use of the mobile telephone as a facilitator for communication and for enabling personal autonomy, but at the same time they use the computer less (32.6%), and 32.5% the Internet, mainly indicating that it seems very complex to them to manage (34.1%).

These figures demonstrate that there is still a lot of work to do to remove all barriers to accessing ICT by persons with functional diversity. The ubiquitous impact of ICT plays a major role across all sectors of activity, as the increased provision of ubiquitous digital services are more readily available, the location of tools, and individuals are becoming more flexible (Meloche & Hasan, 2008). Therefore no one should be excluded from using mobile phones, the Internet, computers, etc. and all the applications and services including education, health, cultural activities, e-commerce or e-government for instance. Being excluded from these ICT-enabled applications implies being shut out not only from the information society, but from the opportunity of living an independent and autonomous life. Therefore ensuring accessible ICT for persons with disabilities and expanding access to these technologies, as well as to assistive technologies, is a key element of strategies to remove the remaining barriers faced.

The paper is organized as follows. Firstly, considerations on accessible learning are presented, along with their benefits for the social inclusion of vulnerable learners such as people with disabilities. Secondly, the approach to social accessibility is presented and the context of ICT volunteering in this research work. Thirdly the online-volunteer ICT initiative launched at UNED is presented (in its first and second edition) explaining the work developed, how the coordination was carried out and the different issues that had to be tackled. Next, the main results of satisfaction surveys from students with disabilities are presented. Finally, main conclusions are expounded.
2. eLearning scenario (Background)

Web accessibility and usability are basic concepts in understanding the importance of each type of functional diversity of the users. The improvement in the accessibility to web educational resources benefits all the users, not only some collectives with functional diversity, and appear as an improvement in added value to the quality of learning. In the case of the motivation of the experience developed in this paper, the need to achieve a greater accessibility to the resources at UNED, the largest distance university in Spain, was already a must. After twenty years of smooth yearly increase, in the 2013/2014 academic year UNED enrolled 8,068 students with functional diversity (nearly 50% of Spanish university students with a disability).

The initiative presented in this paper aims to improve the accessibility level of a repository of learning resources (user-generated video based). The delivery of online educational videos in higher and K-12 education is a growing trend as depicted in a number of scientific articles and reports. The demand is clear for online repositories of video that university stakeholders could tap into, on-demand, to search for, find, and use the video clips they need. Were a service like this offered to higher education, its use would be immediate, as stated in the “Video Use and Higher Education: Options for the Future” report developed by Intelligent Television with the cooperation of New York University (2009). (Kay, 2012) also published a literature review on the use of online videos in education from 2002 to 2011.

A very complex network of more than 650 video-conferencing facilities connected to a web-conference application allowing synchronization for all interactive whiteboard and virtual-boards was developed at UNED and installed throughout Spain between 2007 and 2011. The so called AVIP architecture (Audio-Visual through IP protocol) was developed as a web-based conferencing tool built around Flash technology (Rodrigo and Read, 2010). It enabled users to connect together from a standard web browser, sharing a simulated desktop environment where presentations can be used as a backdrop for an interactive video class (enabling the speaker to take notes on the presentation or add any other details). Control is required for user participation (the same phenomena is present in face-to-face classroom teaching), to prevent everyone from speaking at the same time. Someone, typically a lecturer or tutor, defined as the moderator and could talk, control the presentation, and let other members of the group speak.

Sessions can be recorded for future use. As well as its application for standard distance education taught classes, the AVIP tool is also very useful for a lecturer (or tutor) to record small video fragments illustrating a concept related to a course s/he teaches (where no other users are present in session), which can be recorded and left for student use.

The first internal work at a technical level within the university to analyse the accessibility level of AVIP multimedia resources began in 2009 (Rodrigo, Delgado and Sastre, 2010). The objective was to facilitate and improve the use of the facilities and the audio-visual content generated from this type of classroom. The results obtained by previous work (Rodrigo, Vazquez and Vazquez, 2013) where twenty-six video-classes were transcribed and subtitled, the effort in achieving this being seven hours of work for each hour of video: two to three hours were necessary to achieve a good transcription (voiceprint is quite poor due to the live recording of user generated videos) and another four hours to complete the resource with subtitles. This work demonstrated that it was unfeasible to achieve the accessibility to the more than 35,000 videos (at that time stored in the repository) and that it was necessary to increase the social awareness in the university to achieve more accessible multimedia resources in another way. The new approach was proposed by combining the principles of Social Accessibility and on-line ICT volunteering, to make existing content accessible by using the power of networking through an open community. Moreover, with the work of the volunteers, different formats would come out from the original user-generated video, therefore completing a full set of aggregated resources (transcriptions used for subtitling and also for content summarizing, audio mp3 for both blinders and podcasting) that benefits all participants of the university community, following the principles of the Design-for-All theory (García-Serrano et al., 2014).

New forms of volunteerism have emerged through the creative and innovative use of ICTs. Combined activities with social networking offer opportunities for people all over the world, connecting them and having social impact of the deliverables of the networking action. Social Accessibility was an approach developed by Takagi (2008) to drastically reduce the burden on web site owners and to shorten the time to provide accessible Web content by allowing volunteers worldwide to ‘renovate’ any webpage on the Internet.

Within this context, the first action in social volunteering in the context of ICT at UNED took place in 2013. The project aimed to improve the accessibility of AVIP-type user-generated video-classes (Rodrigo et al. 2010) contained in the Cadena Campus multimedia repository of the university, commonly used by the vast community of students (more than 260,000 enrolled in 2013/2014). It currently has 678 ICT enhanced classrooms distributed...
throughout the Spain (data collected in November 2014), available at all of the associated study centres and equipped with audio-visual facilities (videoconference or webconference) together with interactive digital blackboards and with the capacity to be interconnected with others simultaneously. If the user has a computer with an Internet connection, he or she will be able to follow the session live, ask the speaker questions by means of a Chat and, once recorded, reproduce it whenever he or she wants. This repository currently has a total of 14,253 active registered users who record classes of events, of which 4,502 are teachers or teacher-tutors. The portal has 62,172 stored videos which have been seen (downloaded) more than 7 million times, although only 2,894 are open and can be considered OERs (Open Educational Resources).

3. Online ICT volunteer action at UNED

The object of the first call for student volunteers was to facilitate the participation of the members of the UNED university community, specifically undergraduate students, was mainly to achieve:
1. Transcription of the didactic materials / video-classes. The volunteer will make the textual transcription of the audio corresponding to the video-class.
2. Inclusion of subtitles: the transcription may be used for the inclusion of subtitles in the audio-visual resources.
3. Semantic labelling: the volunteer is in charge of defining the metadata (title, subject code, key words, etc.) associated to the learning resources, carrying out a specific description and a semantic annotation in accordance with standards in such a way that its cataloguing within the digital repository is improved.
4. Creation of accessible documents: the volunteer is in charge of revising and completing the best degree of accessibility Microsoft Word format documents.

A community space was created on the eLearning platform of the university (alF, dotLRN open source platform personalisation) and the experience started with thirteen students. As a result of the action, forty two video-classes were textually transcribed and their semantic labelling in the repository improved through volunteer metadata authoring although it was impossible to achieve the subtitling or creation of accessible documents. A total of eight student volunteers finished their work. The action benefited from the fact that several volunteers who were taking English Studies Degrees were assigned resources originally produced in English, therefore achieving a multilingual goal (two languages, Spanish and English). Once the volunteer activity was finished, all of the transcriptions made were collected and the semantic labelling was revised.
These videos (equivalent to around 26 hours) have received an accumulated total of 4,362 visits, counted as streaming visualisations, since the end of the initiative from October 2013 to November 2014 distributed per subject area as follows (Figure 1). The evolution of the number of visits is shown in Figure 2, data collected on four different dates, equally time-spaced over one year. As can be seen in the graphs, the number of visits and its evolution per subject area is different, therefore vertical scale are different (to allow better data visualisation). Independently, an important increase in all of them is achieved, as summarized in Table 1. Reasons are depicted as follows:

- Dissemination of the experience on the collective of learner’s with functional diversity through specialized supporting department at the university.
- Survey study on students with functional diversity
- Semantic improvement through accessible annotation has improved the recall and precision on search results
- Increasing awareness of the ICT volunteering experience through video promotion on university web page, etc.
- Perceived good quality of the video-classes learning resources (results from survey study)

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>% Increase in visits since Oct 2013</th>
<th>% Increase in visits since July 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Studies</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>Computer Science</td>
<td>70</td>
<td>50</td>
</tr>
<tr>
<td>Business and Administration</td>
<td>41</td>
<td>1.7</td>
</tr>
<tr>
<td>Pedagogy</td>
<td>29.5</td>
<td>6</td>
</tr>
</tbody>
</table>
4.1 Student’s with functional diversity survey results

A survey study was conducted to collect information about the usefulness and ease of use of the new accessible collections of resources, and how comfortable students with disabilities are when using it. The original video-class is enriched with related documents (pdf, ppt files,...), internet links, textual transcription, subtitling in dxp format, mp3 audio file for podcasting, various mp4 video files (original for streaming, mobile reduced version, including subtitling), all elements together configuring a complete and accessible collection.

The sample population consisted of 8,068 students with functional diversity enrolled at UNED in the 2013/14 academic year and there were 88 answers. These figures are not surprising in the context of the experience at distance learning: delivered by survey platform, students with functional diversity, etc. The results of the survey based on a 5 point Likert-type scale and data extracted from the interviews are summarized in the following tables. Table 2 shows student data on disability, the need to use assistive technologies for learning and the studies they were carrying out. Only 21.6\% answered affirmatively that they needed some kind of assistive technology: Some of the adaptations were for instance: adapted chair or space for study, adapted pen and pencils, Bluetooth microphone (some automatically connected to headphones), screen readers, zoom, time adaptation, etc.

Table 2. Distribution of students with functional diversity

<table>
<thead>
<tr>
<th>Type of Disability</th>
<th>%</th>
<th>Use of Assistive Technologies</th>
<th>%</th>
<th>Enrolled Studies</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Disability</td>
<td>42</td>
<td>Yes</td>
<td>21.59</td>
<td>Computer Science</td>
<td>4.55</td>
</tr>
<tr>
<td>Mental Illness</td>
<td>6.5</td>
<td>No</td>
<td>68.18</td>
<td>Science Studies</td>
<td>3.41</td>
</tr>
<tr>
<td>Vision Loss and Blindness</td>
<td>5.5</td>
<td>No answer</td>
<td>10.23</td>
<td>Economics and Business Administration</td>
<td>9.09</td>
</tr>
<tr>
<td>Hearing loss and Deafness</td>
<td>9</td>
<td></td>
<td></td>
<td>Politics and Sociology Studies</td>
<td>5.68</td>
</tr>
<tr>
<td>Intellectual</td>
<td>15</td>
<td></td>
<td></td>
<td>Law Studies</td>
<td>11.36</td>
</tr>
</tbody>
</table>
When asking about the improvement in the degree accessibilty of the video-classes (see Table 3), not all the students answered to the questions. Nearly 60% of the answers emphasize that the degree of content accessibility was enhanced and over 50% considered the quality of transcriptions was good. 42.25% of students with functional diversity considered it very important to have both transcriptions and subtitling and 47.89% confirmed that transcriptions are very useful text-based materials to be used as student’s notes, etc. 53.52% of students agree that the content now is more useful for learning.

### 4. Conclusion

The implementation of this first experience of a network of on-line volunteers has been especially valued from the University, as a commitment to social entrepreneurialism in the context of ITCs and Volunteering. As a pilot, this first action in on-line ICT volunteers to improve the accessibility level of user-generated video educational resources and convert them into real accessible Collections of OERs, has demonstrated the capacity of the new technologies to promote social innovation and bring about citizen empowerment, fully accomplishing the goals of social accessibility. Likewise, this particular collective of student volunteers has been also sensitised to the barriers to academic service that the students with functional diversity have to face every day while learning. Moreover, they have been also been informed and trained in technological aspects, both products such as transcriptions, subtitling, etc. and software tools that can be used to break down these barriers.

In the words of the student awarded a prize by the UNED – Fundación Vodafone Chair, “if all of us contributed our little grain of sand, we would be able to achieve much more accessible content so as to help people with special needs”. The great work in awareness is evident, since with experience like this one, the volunteers learn that “in the transcription you also have to include everything relative to the context in which the class is produced, such as questions from the students, possible noises or external elements, etc.” as the student pointed out. That is, volunteers also learn to put themselves in the place of people with special needs and better understand the problems

<table>
<thead>
<tr>
<th>Disability</th>
<th>Education Studies</th>
<th>Philology Studies</th>
<th>Philosophy Studies</th>
<th>History and Geography Studies</th>
<th>Psychology Studies</th>
<th>Doctorate Courses</th>
<th>Access to University Courses</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disability</td>
<td>2.27</td>
<td>6.82</td>
<td>3.41</td>
<td>12.50</td>
<td>15.91</td>
<td>1.14</td>
<td>9.09</td>
<td>14.77</td>
</tr>
</tbody>
</table>

Table 3. Usefulness and ease of use survey results

<table>
<thead>
<tr>
<th>Degree of Content (video) accessibility</th>
<th>%</th>
<th>Quality of transcriptions</th>
<th>%</th>
<th>Content usefulness for learning</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully agree</td>
<td>23</td>
<td>32.39</td>
<td>7</td>
<td>9.86</td>
<td>14</td>
</tr>
<tr>
<td>Partially Agree</td>
<td>19</td>
<td>26.76</td>
<td>29</td>
<td>40.85</td>
<td>24</td>
</tr>
<tr>
<td>Neutral</td>
<td>8</td>
<td>11.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>5</td>
<td>7.04</td>
<td>4</td>
<td>5.63</td>
<td>12</td>
</tr>
<tr>
<td>Fully Disagree</td>
<td>6</td>
<td>8.45</td>
<td>1</td>
<td>1.41</td>
<td>6</td>
</tr>
<tr>
<td>No answer</td>
<td>10</td>
<td>14.08</td>
<td>30</td>
<td>42.25</td>
<td>15</td>
</tr>
</tbody>
</table>
that they encounter in everyday academic life through the Internet.

The objectives that have been considered as achieved with this experience of a pilot network of volunteers have been:
1. Promoting the adoption and better use of content, services, tools and ICT access by the university community.
2. Breaking down the barriers that impede the knowledge and use of Information and Communication Technologies.
3. Promoting participation by means of ICTs and the responsible use of these tools among the students.
4. Promoting the creation, awareness and mobilisation of a technological volunteer program.
5. (In a general sense) Create social awareness: generating positive social and cultural attitudes in the importance of Information and Communication Technologies for the development and advance of society.

Recently, in October 2014, a new call was released, this edition starting with more than sixty volunteers (six times more participants than in the first edition). With this starting point of multiplying the number of volunteers by a factor of five, it is hoped to repeat the experience with greater success and have useful results by the spring of 2015.

Acknowledgements

We are grateful for the availability of the corpus of educational videos at the Cadena Campus repository of the UNED and the support of the Research Chair “Technology and Accessibility” UNED - Fundación Vodafone.

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