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Usability and Accessibility of OERs and MOOCs among Students with Special Needs in Open and Distance Leaning

Zahid Majeed*

Abstract

The purpose of the study was to explore the issues and barriers in usability and accessibility of Open Education Resources and MOOCs by the students with special needs in distance learning. The study also highlighted the problems and issues faced by the designers, developers, instructors and administrators while designing, developing, offering and conducting the MOOCs and developing OERs. The study was descriptive in nature and survey method was used to collect the data. It was limited to students with hearing impairment, visual impairment and physically handicapped enrolled in Open and Distance Learning system. The researcher found that large numbers of students with special needs were concerned with usability and accessibility because they were not familiar with the OERs, MOOCs and technologies associated. Special need students pointed out the problems/issues in using assistive technologies while navigating in the MOOC environment, in automated assessment and the process of engaging with fellow students through forum posts and collaborative group work. It is recommended by the researcher that these problems and issues may be considered while developing e-content, conducting online classes and assessment in MOOCs and OERs with maximum usability and accessibility issues.

Keywords: ODL, students with special needs, MOOCs, OERs

* Assistant Professor, Department of Special Education, AIOU Islamabad,
Email: zahid_majeed@aiou.edu.pk

Introduction

Special need students, teachers and researchers of every field commonly use Open educational resources (OER) because of freely accessible, openly licensed documents and media. The visually impaired students are often access or reuse OER for their learning and research. They access these resources through common use software like JAWS Screen Reader, NVDA (Windows), Serotak System Access (Windows), Apple VoiceOver (OS X), ORCA (Linux), BRLTTY (Linux), Emacspeak (Linux), Spoken Web and Chrome Vox. The use of open file format to be an important feature of OER but this is not a universal recognized requirement. Kauppinen (2013) said that OER development and promotion is mostly motivated by a need to curb the commodifcation of knowledge and also provide a substitute or enhance educational paradigm (Sanchez, 2013).

The 21st century is Information Communication Technology century which circled all section of our life. We also experience a major paradigm shift in traditional ODL or formal system of education and training to online or eLearning. With online learning there was issue of cost and skills needed for the ICT skills. Also the time, location and number of issues related to online learning. Usability and accessibility of OER and MOOCs (massive open online courses) among special need students were very minor highlighted by instructional designer or developer. Massively Open Online Courses (MOOCs) have become the buzzword these days and are very popular because of for masses and open from all formalities and cost. MOOCs and OER are recent and extensively researched development in Open and Distance learning and introduced in 2008 (Bozkurt, 2015) and emerged as a well-accepted form of learning in 2012. The major aim of MOOCs is participation of unlimited people/learner and it is open through the web. Many MOOCs providers offer interactive platforms which support community interaction among students, teachers, and other stakeholders of teaching-learning process. This interaction is well supported by traditional course materials like video recorded lectures, reading and problems sets.

In early years of OER most of the emphasis was on features of open-access, like content open licensing, structure and learning goals, for the promotion of reuse and remixing of these resources. In the later years OER used closed licenses for the course materials while maintaining free access for students (Pappano, 2012; Lewin, 2012; Wiley, 2013; Cheverie, 2013). On other hand we have criticism on OER as Robert

Zemsky (2014) said it passed its peak: "OERs came; conquered very little; and now they face substantially diminished prospects".

Massive Open Online Courses and Open Education Resources are best examples of development of online or eLearning environment for a radical computer and mobile-based set-up along with Web 2.0 (social media) technologies that will direct to the developing the different types of learning applications which improve the communication and collaboration process. The accessibility of MOOC and reusability to OER platforms are still barriers for special need students because of lack of usability and accessibility on the learning resources as per their special needs. All such issues of MOOCs and OER are present ultimately as barriers of accessibility and reusability respectively which also add extra difficulties for special need students. The issues of accessibility and reusability are problems/issues such as the need to develop particular digital or even social skills for special need students.

In practice, e-learning, MOOCs and OER facilities are delivered mostly through technologies of web. Paradigm for web accessibility is actually of web technologies. For this reason, OER and MOOCs correspond into an area/circle in which the paradigm for web accessibility is of colossal function of application. So as per this, the WAI from World Wide Web Consortium (W3C) promotes accessibility by means of guidelines related to the content Web Content Accessibility Guidelines, the authoring tools Authoring Tools Accessibility Guidelines (ATTG) and the user agents User Agent Accessibility Guidelines (UAAG). MOOCs has platform designs of multimedia which is much accepted and supported on inventive content with visual and audio support with a sound of high level of sound quality and picture along with likewise engaging the services to make the students participation and interaction by facilitating the students with special needs to change them into active online users and learner (Francisco, 2015).

Pupil with special needs and people with disabilities may have problems while using the assistive technologies also in accessing the content of MOOCs and OERs, especially in the process of online registration for MOOCs and also in the using the e-content placed or available at Learning Management System. More issues and demands appear while doing largely automated assessments and the process of engaging with fellow students through forum posts or collaborative group work (Francisco, 2015).

Assistive technologies are major tools for usability and accessibility for the people with disabilities. The content and learning material available in MOOCs and OER are not much accessible and usable for

them because of number of barriers and problems with respect to instructional designing. With time, instructional developers of e-content MOOCs and OERs considering such issues on the demands of usability and accessibility among students with disabilities. There was dire need to conduct a study on demands of usability and accessibility of MOOCs and OERs among students with disabilities that as instructional designers of MOOCs and OERs we came to know what are the demands of people with special needs, especially physically disabled, visually impaired and hearing impaired.

Literature Review

Open Education Resources (OER) idea has several operational definitions. UNESCO's 2002 was the first forum in Paris, France OC (Open Courseware) and designated "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work" (UNESCO, 2002).

According to William and Flora (2013) OERs are resources of teaching; learning and research exist in the communal domain or have been released under an intellectual property license that allows their free use and re-purposing by others. It is included total course, or material of the course, modules of the courses, textbooks, live or recorded videos, quizzes, any software or any other tools, materials and techniques learner used to support access to acknowledge.

If we go with the literature on Open Educational Resources (OER) we can conclude that OERs are getting popularity with the time because of freely accessible, openly licensed documents and media that are useful for teaching, learning, and assessing as well as for research purposes. Now a days, it is a one of the leading trend in Open and Distance Learning system as a result of the movement of openness. In literature, we also found that there are researchers or experts with the point of view that use of an open file format should be an important feature of OER, which is not a universal acknowledged requirement (Bozkurt, 2015).

There are number of issues contagious to usability, access, quality and costs of information and knowledge over the OER as well as MOOCs. These are also related to provision of content and learning material available at OER and in MOOCs (Hylen, 2008; Matera, 2011).

The growth of MOOCs and OER provided number of opportunities for all types of users especially people with disabilities for improving access and transmit of knowledge and information in educational and related institutions. The experts and researchers of OERs and MOOCs concluded that there is an imperative need to address these issues especially for people with disabilities. In developing countries like Pakistan, India, Bangladesh and Sri Lanka, we need to clarify or define the technical and legal frameworks and polices for sustainability of these initiatives.

Usability and accessibility are two most important aspects of openness; there should be no technical, cost and legal barriers for the users. But unfortunately instructional designers are not trained for considering such issues for the people with disabilities. The studies on OER and MOOCs recommended that the end user be able to use or read the resources available and they can adapt, build upon it and thereby reuse with attribution to creator/authors (Missea, 2014).

Accessibility address the discrimination in aspect of users equivalent experience especially for persons with any special need or disability, people of old age, and facing impairment of hearing and visual. In accessibility, our concern for access is web access of people with disabilities that how they can perceive, comprehend or understand, reach out/navigate and interact with the websites and tools without barriers. On the other hand usability means that the extent to which a product can used by special need people to achieve their goals effectively, efficiently and with satisfaction in a specified context of use (Shawn, 2016).

A Massive Online Open Courses (MOOCs) is an online course with the aim to be available or accessible for unlimited people through internet on web (Yuan, 2014). It provides an interactive user platform as compared to tradition face to face more rigid course materials like live lectures, more reading material and set of problems. It is a recent research based development in open and distance learning system/education. It was first time introduced in 2006 and then become a popular mode of education or learning in 2012 (Parr (2013).

As we know now that MOOCs are in developmental stage and have two distinct kinds or types. The two types of MOOCs highlights the philosophy of connectivist and very much resemble with our traditional courses. To differentiate, Stephen Downes suggested or proposed the two terms cMOOC and xMOOC (Prpic, 2015 & Yuan, 2014). Let us talk on these two types: first is cMOOCs these courses are based on the principles from the pedagogy of connectivists which highlights that material in it should be collected during the course not pre-selected, also

can be remixable, re-purposable and target the future learning (Kop, 2011 & Bell, 2011). On the other hand, xMOOCs are structured in our traditional course structure like very clearly specified syllabus of pre-recorded lectures, discussions and e-assessment on self-test problems. In xMOOCs, original MOOCs elements are employed. The online instructor or e-tutor is the expert providing knowledge, in which students' interaction with the tutor and advised to get help from each other (Kaplan, 2016;Williams, & Mackness, 2010).

The ideas of both OER and e-content in MOOCs are flourishing at the moment: its responsibility of creator, administrators and management to address the challenges and issues (accessibility and usability) rose by the users (especially people with disabilities). In a study conducted by Hylen (2008), three challenges or issues were identified which are lack of awareness regarding copy rights, quality in open content and sustainability in the longer run. In other studies conducted in context of users especially people with disabilities issues mostly reported were quality, software, internet, accessibility and usability (Baneral, & Franeceo, 2015).

Current OERs and MOOCs are designed for specific uses that typically focus on allowing users to enter and access fairly structured data like contacts, lists, dates, financial information and memos, to send and receive particular information through the software. Here we mean usability and accessibility of e-content, materials, files, documents available at OERs and MOOCs. But instructional designers of MOOCs and OERs developers they can work well for the issues of open and fair accessibility and usability for people with disabilities like physically disable, hearing impaired and visually impaired.

Accessibility is an increasingly significant factor in the provision of learning and training and is the key to strategies to support 'inclusion and participation of people with disabilities' (Phipps et al., 2002). Instructional designers or MOOCs and OERs recommended number of strategies to improve accessibility of people with disabilities. The moral case that promoting inclusion and participation of disabled people through 'inclusive' product design is a moral and ethical activity. Social responsibility is in the sense that society defines and constructs notions of disability. This is a social model of disability and puts the case that disabled people do not face disadvantage because of accessibility and usability issues. Technical efficiency, namely that accessible technology in MOOCs and OERs will usually be more interoperable and so reduce future development costs. Legal requirements like in UK, the Disability

Discrimination Act 1995 (DDA) and Special Educational Needs and Disability Act 2001 (SENDA) prescribe minimum levels of accessibility.

Assistive technologies are any items, pieces of equipment or product systems, whether acquired commercially off-the-shelf, modified, or customized, used to increase, maintain or improve functional capabilities of individuals with disabilities in education and at home. Accessibility and usability in OERs and MOOCs are major issues and problems of people with disabilities. In number of survey studies on accessibility and usability with Mobile devices, computers, assistive technologies, disabled students/people highlighted problems of web accessibility, audio visual content of MOOCs, e-content, quality of sound and image, services which are interactive in nature helps the special need students for maximum contribution of the participants/pupils with physical/functional disabilities (OpenScout, 2012). They also pointed out the problems/issues in using assistive technologies while navigating in the MOOC environment, in automated assessment and the process of engaging with fellow students through forum posts and collaborative group work. A large number of disabled students also concerned with use and accessibility of OERs because they are not familiar with the policies and rules of usability and accessibility. In conclusion, it is recommended that designer, developers, administrators and instructors should consider problems and issues of people with disabilities while developing, conducting and assessment in MOOCs and OERs for maximum usability and accessibility.

Statement of the Problem

Open Education Resources and Massive Open Online Courses are relatively new phenomenon at the moment. Both OER and MOOCs are seen as recent new trends towards openness, accessibility and usability of knowledge through internet. All types of users like academicians, writers, creators, learners are accessing these resources with more open and easier way due to openness and free availability. The people with disabilities are always ignored or not considered for quality and free learning resources especially available at internet/online. The usability and accessibility are most common issues reported by people with disabilities. The current study was conducted to survey the issues and barriers related to OER and MOOCs.

Objectives of the Study

The objectives of the study were:

- To explore the issues and barriers in usability and accessibility of Open Education Resources by the people with disabilities.
- To find out the issues and barriers in usability and accessibility of Massive Open Online Courses by the people with disabilities.
- To collect the suggestions/recommendations of special need students studying in ODL system in usability and accessibility of OER and MOOCs.
- To give recommendations to instructional designers, developers, instructors and administrators to overcome or consider the usability and accessibility issues of people with disabilities.

Significance of the Study

People with disabilities are always neglected or not considered while devising new technologies, equipment and software. The current trends of "Open Educational Resources" and "Massive Open Online Courses" are digitized materials offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research (Hylen, 2008).

The learners and teachers in open and distance learning faced number of issues and barriers but in recent trends of OER and MOOCs 'learning Content, courseware, content modules, learning objects, collections and journals, tools, software, use, re-use and delivery of learning content including searching and organization of content, content and learning management systems, content development tools, and on-line learning communities are common issues. Implementation Resources: Intellectual property licenses to promote open publishing of materials, design principles of best practice, and localization of content are also reported barriers in OER and MOOCs.

The current study will help the instructional designers, online course developers, e-tutors, course developers and students with special needs themselves to design and develop more accessible and useable educational e-resources. The study will explore the areas related to issues of accessibility for compatible software and assistive technologies for the special need users. The internet providers, website designers, e-content developers and developers of multimedia support will benefit with the recommendations given by people with disabilities and researchers to

design more accessible and usable e-content, software and assistive technologies that the special need users can use and access these recourses according to their special need. The study findings will be much helpful for the AIOU especially because they just start journey of development of OER and MOOCs and they will consider these issues while development.

Methodology

As the study involved people with disabilities or special need students so mixed research method (qualitative and qualitative) was applied for collecting the data about problems, issues and barriers related to usability and accessibility in MOOCs and OER through questionnaire and interviews. The population of the study was special students studying in different programs of Allama Iqbal Open University, Islamabad. The sample of the study was 112 special need students (15 hearing impaired, 46 visually impaired and 52 physically disabled) studying in AIOU, Islamabad and 100% available population was the sample of the study. As the study was unique in nature and first time conducted at AIOU so the respondents of the study were invited for one-day orientation about OER and MOOCs. The concept of OER and MOOCs was discussed with the special need students and different sources were also shared with them. A five-point Likert scale questionnaire consisted on 20 items was used to collect the issues and problems on usability and accessibility to OER and MOOCs.

Scale: 01--Not Usable or Accessible
02-- Least Usable and Accessible
03—Sometime Usable or Accessible
04-- Usable or Accessible
05—Usable or Accessible

The main areas of questionnaire were i) web accessibility, ii) audiovisual content or, e-content, iii) quality of sound and image, iv) interactive services that makes the participation and communication of the participants/students with physical/functional disabilities, v) assistive technology, vi) software, navigational problems, vii) automated system, viii) web 2.0, and legal aspects or copy rights. The researcher also

interviewed 25% of the sample for in-depth information on issues related to usability and accessibility to OER and MOOCs and based on the questionnaire main areas mentioned above. Researcher also checked the reliability and validity of both instruments and for that these were pilot tested. Reliability was 0.73 and validated by OERs and MOOCs experts from AIOU and VU, Pakistan. Both instruments were administered personally by the researcher. The data collected through questionnaire and interview was analyzed by simple method of frequency and percentage with ranking of issues. Discourse analysis was done for interview data.

Results and Discussion

A large number of disabled students were concerned with the policies and rules of usability and accessibility of OER and MOOCs because they were not well aware and familiar. It is recommended by the researcher that designer, developers, administrators and instructors should consider these problems and issues while developing, conducting and assessing in MOOCs and OERs for maximum usability and accessibility.

Table 1

Demands of Usability and Accessibility among People with Disabilities

Demands	Average Score	N
Usability	2.35	112
Accessibility	2.16	

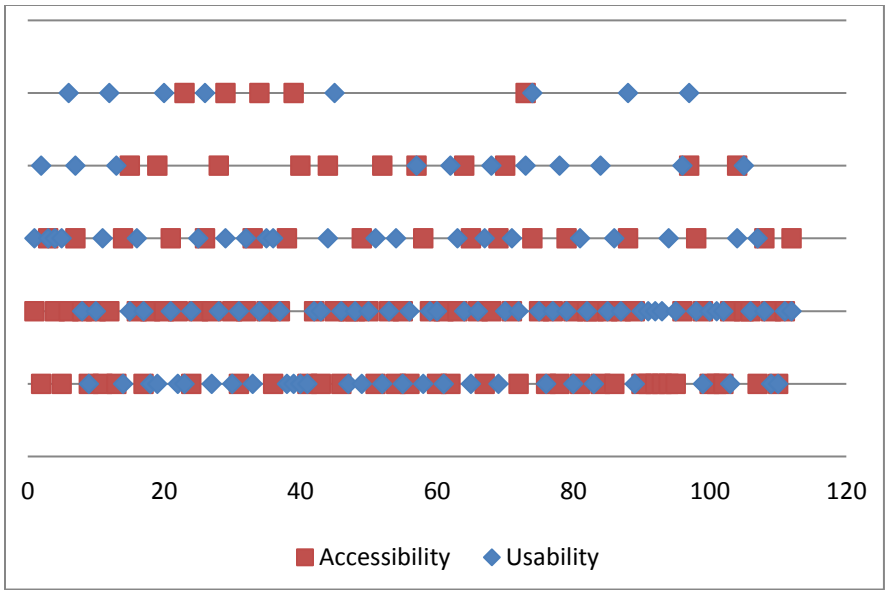

Figure 1: Usability and Accessibility Demands

Table 1 depicts that both usability and accessibility demands are below the demands as the scale score 2 is least demands and maximum lies in 3. Both demands are above 02 but below 3 so we can conclude that demands of usability and accessibility have problems and issues.

Table 2

Deamnd of Usability among stduents with different disabilities (N=112)

People with Disabilities (PWD)	Usability Average Score
Hearing Impaired (N=14)	2.01
Visually Impaired (46)	3.25
Physically/Functional Disabled (52)	3.85

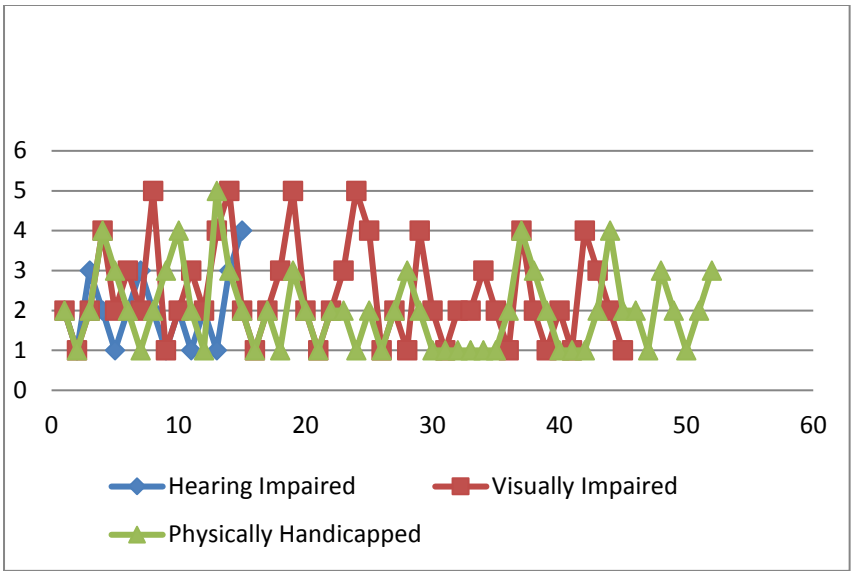

Figure 2: Demand of Usability among students with different disabilities

Table 2 revealed that demand of usability of OER and MOOCs among different disabilities is also below average score i.e. 3. But it is above average with physically handicapped and visually impaired students. It is less in hearing impaired students. We can conclude that hearing impaired students are not much interested in using OERs and MOOCs. But the interest of visually and physically disabled is very high because they are using these resources frequently and having feedback which motivated them for more and more use.

Table 3

Demand of Accessibility among students with different disabilities (N=112)

People with Disabilities (PWD)	Accessibility Average Score
Hearing Impaired (N=14)	1.43
Visually Impaired (46)	2.16
Physically/Functional Disabled (52)	2.88

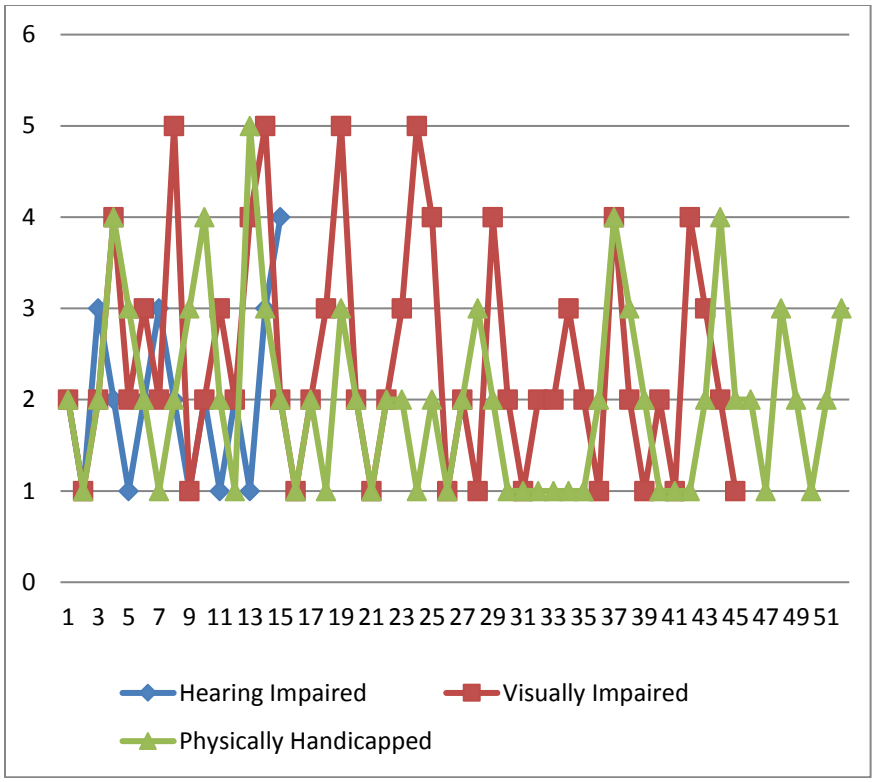

Figure 3: Demand of Accessibility among students with different disabilities

Table 3 reflects the demand of accessibility among students with different disabilities. Number of software and assistive technologies are helping to access these resources so it is high with physically handicapped and then in visually impaired stunts because they are mostly using JAZ software to access e-content at website and online courses.

Qualitative Data Analysis

Total 28 participants (hearing impaired 4, visually impaired 11 and 13 physically disabled) were interviewed on issued and problems related to usability and accessibility. The information collected through interviews were analyzed and found acknowledgement of quantative data. Most of the disabled people reported that they can't access websites, material available their and files attached. The hearing

impaired students were not able to use video clips lectures or discussions because there was no caption with voice. Physically disabled people were with issues of assistive technologies and visually impaired students can't access e-content due to non-supporting talking software with OER sites and MOOCs. They suggested that instructional designers and writers with software experts must plan together in consultation with people with disabilities.

Conclusions

OERs and MOOCs are most popular sources of information and knowledge. Hundreds and thousands of people benefited with these resources but more than 10% of total world population facing problems in usability and accessibility in OERs and MOOCs.

For usability, MOOCs are paradigms of the development of e-Learning environments towards more a revolutionary computer and internet-based scenario along with web 2.0 technologies that lead to the emergence of new kinds of learning resources and applications to enhance communication and collaboration processes not only for normal person but for disabled too. Though there are tremendous developments in e-learning or computer based learning through internet but still barriers and issues are present as reported in this study. There is lack of usability and accessibility among people with disabilities and they are not benefiting as others. These issues and barriers adding extra difficulties for special need students in ODL. This and such other studies highlighting number of areas need special attention of instructional designers and assistive technologists for future developments in OERs and MOOCs. Most of the respondents (visually and hearing impaired) reported web accessibility is main issue for them. The studies recommending Web Accessibility Initiative (WAI) from W3C can promote accessibility by means of guidelines related to the content (WCAG), the authoring tools (ATAG), and the user agents (UAAG) (Francisco, 2015). The study also concluded that most of the respondents (visually impaired) raised issue of multimedia formats based on audiovisual content with sound, images and interactive services for participation and communication are barriers for them. But on the other hand physically disabled people/students said that it facilitated the accessibility to OERs and MOOCs.

The disabled or visually impaired students using assistive technologies faced problems of navigation especially in accessing the MOOCs. They also pointed out the issues of registration process in MOOCs and even using the e-content available at OERs. In MOOCs,

issues of automated assessment or e-assessment is another issue reported by visually impaired people with group activities or activities for engaging the learners with each other.

In terms of interface elements such as logging in, logging out, navigating in courses and content and communicating with all stakeholders, MOOC environments have - like other LCMS - multi-layered structures across which users with disabilities must be able to navigate. Moreover, this accessibility, if it exists, is aimed largely at the student, rather than the instructor or administrative roles. There seems to be a gap in the scientific analysis of how instructors using assistive technologies can use these systems also as learning creators.Francisco (2015) reported that in MOOCs, Flash format is most frequently used to create the multimedia elements and in the study visually impaired/color blind/low vision people highlight it as major issue or problem while using or accessing such content/files. It is also recommended that instructional designers or multimedia experts may use Flash Player 6 compatible with MSAA for link between multimedia material and the support technologies, also recommended applications of Windows-Eyes and JAWS to access material in OERs and MOOCs. The study finally recommend that team involved in development of OER and e-content for MOOC must have orientation and information of special need of people with disabilities that while developing instructional material we can control/minimize or manage them accordingly.

A short discussion of the diversity being the concept of MOOCs would be useful. The divergence between xMOOC and cMOOC should be considered as they based on very different pedagogical models.

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