Calidad y Accesibilidad de la Formación Virtual

Luis Bengochea
José Ramón Hilera
(Editores)

OBRAS COLECTIVAS
TECNOLOGÍA 15

UAH

Proyecto cofinanciado por la UE

Calidad y Accesibilidad de la Formación Virtual

Luis Bengochea
José Ramón Hilera
(Editores)

OBRAS COLECTIVAS
TECNOLOGÍA 15

Universidad de Alcalá

UNIVERSIDAD Galileo Guatemala, C. A.

Faculdade de Letras

virtual educa

Actas del
III Congreso Iberoamericano sobre Calidad y Accesibilidad de la Formación Virtual
(CAFVIR 2012)

Escuela Técnica Superior de Ingeniería Informática
Universidad de Alcalá
Alcalá de Henares (España)
25 - 27 de Abril de 2012

Editores:

Luis Bengochea Martínez (Universidad de Alcalá)
José Ramón Hilera González (Universidad de Alcalá)

Universidad de Alcalá
SERVICIO DE PUBLICACIONES

Universidad de Alcalá
Servicio de Publicaciones
Plaza de San Diego, s/n
28801 Alcalá de Henares
www.uah.es

ISBN: 978-84-8138-367-6

Depósito Legal: M-15730-2012

Impresión y encuadernación: Imprenta UAH
Fotografía y diseño de la portada: Luis Bengochea
Impreso en España

Esta publicación es el resultado del congreso organizado en el marco del proyecto "ESVIAL: Educación superior virtual inclusiva - América Latina: mejora de la accesibilidad en la educación superior virtual en América Latina", financiado por la Unión Europea con contrato DCI-ALA/19.09.01/11/21526/279-146/ALFAIII(2011)11.

Índice de Contenidos

Área: 2. Aspectos académicos y de contenidos

Área: 3. Aspectos generales y de gestión

Área: 4. Aspectos culturales e institucionales

Área: 5. Aspectos tecnológicos y avanzados

Área: 6. Evaluación de la calidad

Área: 7. Casos prácticos

Requirements elicitation to design an accessible chat as a synchronous tool in m-learning environments

Rocío Calvo [1], Lourdes Moreno[1], Ana Iglesias[1]

[1] Universidad Carlos III, Av. Universidad 30,
28911 Leganés, Spain
{mrcalvo, lmoreno, aiglesia}@inf.uc3m.es

Abstract. Nowadays, our diary life is being influenced by Mobile Devices (MD). We use MDs almost every day to communicate and collaborate with friends or colleagues in different environments. This paper is focused on the use of this technology for learning contexts as Computer Supported Collaborative Learning (CSCL) environments. There are many tools to support CSCL such as: blogs, wikis or chats. However, most of them present accessibility problems which provoke that a great amount of people cannot use these useful collaborative learning tools. Therefore, the main objective of this paper is to study how to design an accessible synchronous CSCL tool for MDs which could be used by everybody without exception. Particularly, the study is focused on eliciting requirements for accessible chats.

Keywords: m-learning, CSCL, accessibility, chat, synchronous.

1 Introduction

Nowadays, Mobile Devices (MDs) are used by everybody regardless of its social level, disability or country. There are many developing countries in which poor people have a MD, even if they do not have money to eat [1]. So, the use of MDs in learning environments can be a solution to reduce the gap and barriers that people have to face when they want to learn and they do not have enough resources [2]. Several laws in many countries try to solve these barriers protecting the students' rights like: DDA [3], LOE [4] or IDEA [5].

On the other hand, it is necessary to remark the importance of collaboration in learning environments [6]. Communication techniques are becoming nowadays powerful tools in Computer Supported Collaborative Learning (CSCL) environments. Due to it, collaboration is up-to-date because people are joined to environments like social networks or blogs where people collaborate with each other to share information and knowledge.

Previous researchers have shown the usefulness of MDs in CSCL environments (m-CSCL)[7]; however, many accessibility problems affect to: people with disabilities; users that use it in environments which limit users' capacities like hands-free or noisy environments; users without experience and so on [8].

Therefore, this study[1] is focused on eliciting requirements for accessible chats in MDs from the point of view of user experiences.

This paper is structured as follows: the second section presents the state of art of m-CSCLs and their accessibility problems; next, the third section presents the requirements needed for accessible chats in MDs; finally, conclusion and future work are exposed.

2 Background

This section introduces m-CSCLSs and the accessibility problems that people have to face when they use them.

2.1 Collaborative Learning in Mobile Devices

Nowadays, MDs are used to support individual and collaborative learning. In concrete, the use of m-CSCL can be an important issue because students are able to study and collaborate with each other [9].

There are some projects that integrate m-CSCLs. For instance, the study provided by [10] implements it with primary school children. Another example is the project implemented in the Arizona University, which uses MDs to support a student group project. As a result, the students were able to improve their oral and written skills among other capabilities [11].

Moreover, due to the importance that MDs are taking in this environment, many learning content management systems (LCMSs) like Moodle[2] or Blackboard[3] have added mobile learning (m-learning) environments as a complement to their e-learning systems. Besides, these tools provide CSCL features like: chats, wikis, blogs and so on which allow students to collaborate with each other through their MDs.

2.2 Accessibility Problems in Collaborative Learning

Many users have to face difficulties when accessing and using current CSCL tools. Some typical accessibility barriers that are presented today in many CSCL tools are that the main information is not accessible through keyboard [12].

Particularly, regarding to the accessibility of synchronous communication tools, people usually find accessibility barriers when using some advanced functionalities of the tool or with the use of the MD's keyboard [13].

Specifically, the communication tool studied in this paper, chat, usually presents problems of accessibility due to developers do not use the technology in an efficient way. For example, chats are created in Flash or Javascript or developers do not follow

[1] This study has been partially funded by the MA2VICMR (S2009/TIC-1542) and GEMMA (TSI-020302-2010-141) research projects.

[2] See http://moodle.org/ (18 March 2012)

[3] See http://www.blackboard.com (18 March 2012)

accessibility guidelines [14]. However, the main problem is related to follow the flow and rhythm of the communication. For instance, the convert of text-to speech or speech-to-text in real time is complex depending on the velocity of writing of the emitter. Besides if one of the emitters is not able to write quickly, the other emitter will be bored or not able to follow the conversation [15]. Moreover, some chats do not provide support for text-to-speech or text-to-braille and use hierarchy navigation [12].

There are some previous works related to accessibility in this kind of tools. An example is AMobile which is an online accessible m-CSCL [16]. Its objective is to stimulate students to learn while collaborate with each other. Specially, it provides specific features for visually impaired students to allow them to use this tool.

Moreover, some previous chats approximations like Ichat[4] or Achat[5] are centered in solving the accessibility problems related to technological aspects. Specifically, in MDs AssistiveChat [6] provides new features for people with speech disabilities. However, they are not centered in the main problems of interaction that users have to face when they use chats. That is why the main goal of this study is to elicit the requirements needed to solve these accessibility problems of interaction.

3 Theoretical Approach

The approach explains how has been elicited the essential requirements needed to design an accessible synchronous and m-CSCL tool. In concrete, the selected m-CSCL tool for this paper is Chat. Thus, the study is based on standards, guidelines, methods and techniques used to capture the requirements needed to make frequently used mobile chats accessible.

The structure of the proposal is divided as follows. Firstly, it represents the context of the proposal in a mobile Learning Management System (LMS). Secondly, the guidelines and standards needed to create a synchronous m-CSCL module are selected. Finally, the m-CSCL module chat is selected and the requirements needed to the creation of an accessible chat are explained.

3.1 Context in a LMS environment

A LMS should have different modules which are needed to support a course. This study is based on the Jin's framework [17] which specifies different modules for a mobile LMS. A collaborative module is added to this framework [18], which is considered an important module in learning environments nowadays. There are different authors who specify the main components of a CSCL module [19] [20] [21]. This study is based on the IMS [21] specification which specifies how the CSCL tools should be to be accessible. Moreover, this specification shows that the synchronous tools should be: chat, audio-conferencing, video-conferencing, whiteboard, Multiuser domain object oriented environments.

[4] See http://www.apple.com/es/macosx/apps/all.html (18 March 2012)
[5] See http://atutor.ca/achat/ . (18 March 2012)
[6] See http://www.assistiveapps.com/ (18 March 2012)

The Figure 1 shows a structure of the Jin's business logic layer of a mobile LMS, the inclusion of a collaborative module and the synchronous tools specified by IMS.

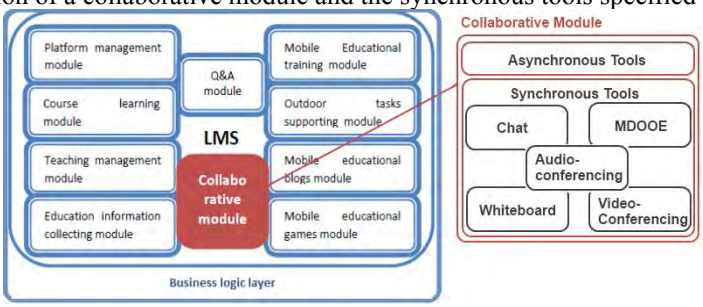

Fig 1. Context of Collaborative Module and its Asynchronous and Synchronous Tools.

3.2 Standards and Guidelines

The main objective of this study is to elicit he essential requirements needed to design an accessible m -CSCL for every body. To achieve it, our developm ent is based on different standards and guidelines which are showed in Figure 2.

Regarding to accessibility, the WCAG 2.0 guidelines [22], which specify how to create accessible we b cont ent, are c onsidered. M oreover, the de veloper s hould consider the guidelines MWABP [23] and MWBP 1.0 [24] which are related to the creation of accessible web and applications in MDs.

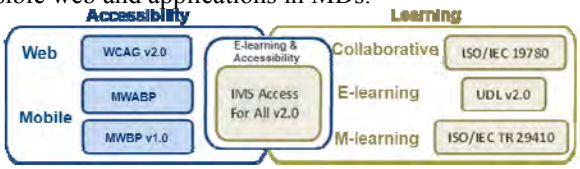

Fig 2. Standards and guidelines followed to the development of a m-CSCL.

On t he ot her han d, a l earning t ool sh ould acc omplish s ome st andards a nd guidelines to be more usable and comprehensible. It has been considered the standard ISO/IEC 19780 to cr eate a C SCL env ironment and the stan dard ISO/IEC TR 29 410 for m -learning. More over, t he guideline s UDL v2.0 [25] expl ains how t o re duce barriers to access the learning content.

Finally, there are othe r specifications which are centere d in the creation of CSCL and accessible tools. This guideline [21] s pecifies some specifications t o develop an accessible collaborative learning tool.

3.3 Requirements Elicitation for an Accessible Chat

There are m any d efinitions of ch at; ho wever, th ere are no t m any d efinitions wh ich include accessibility on it. The researc h work [26] de fines a chat and t he accessibility problems that presents: "Text ch at is a synch ronous tool, which allows sev eral users to communicate via typed text in real tim e. "... "There are two basic issues related to accessibility o f chat applica tions: fast-pac ed conve rsation and the ne ed to track

multiple simultaneous threads present problems for users with difficulties reading, composing, or typing under time constraints; and, confusing interfaces and inconsistent navigation can be difficult and frustrating for users with cognitive or mobility disabilities."

In order to solve these accessibility barriers, this research work proposes to use a User Centered Design (UCD) approach to elicit the requirements needed to design an accessible chat for MDs. Taking into account it, usability techniques like Personas technique [27] and Scenarios technique [28] have been used. The Personas technique has been used to categorize the main users that use chats in MDs. And finally, Scenarios technique is used to obtain information related to how users interact with chats in MDs. Moreover, the guidelines and standards selected in section 3.2 are taking into account to design chat that accomplishes them.

A minimum example of the scenarios used to obtain the requirements for the accessible chat is explained in natural language next:

> *A student, Antonio, has bought, a tactile MD, but he is not used to tactile keyboards. Moreover, he has decided to use a chat to communicate with his classmates because he has some doubts related to an exam. Antonio logs into the application chat and creates a conversation with Rosa, his colleague. So, he selected Rosa and pressed "Create a conversation". Then, Antonio writes a message and presses "Send". Rosa is much more quickly than Antonio writing messages in a tactile keyboard. As a result, Antonio is not able to follow the conversation and feels uncomfortable with it. Latter, Antonio writes a message and attaches a file. Rosa receives the image; however, she has decided previously not to show images in her MD to reduce her download limit, so she cannot see the image and understand the whole message. Moreover, Rosa is on the move so she cannot read it well and follow the conversation. Finally, Antonio decides to leave the conversation and presses "Leave conversation".*

The difficulties found in this scenario are relative to: the conversation flow, the attached files and the messages format. To solve these problems, some new features, which are represented in Figure 3, have been included in the requirements of an accessible chat in MDs. Next, these new features are explained and related to each problem.

The conversation flow: "*Antonio cannot follow the conversation because he is not used to tactile keyboards"*. It means that the time that he needs to answer is higher than usual. This problem is similar to the problems that people with motor impairments or older people have when they try to use this kind of keyboards. To solve it IMS [21~~22~~] expresses that people could be able to refresh messages manually and help people who communicate slowly. So, a new functionality to stop the auto refresh conversation is added, *"Stop auto refresh conversation"* in Figure 3. It consists on stopping the instant messages until the person considers it. In the previous example the situation will change as follows:

> *"… Antonio writes a message and presses 'Send'. Rosa replies to it quickly. As a result, Antonio is not able to follow the conversation and feels uncomfortable with it; so he presses 'stop the auto refresh'. The system informs Rosa about it with the message 'Antonio is busy'. Rosa waits. Antonio presses 'send' message, 'Refresh conversation' and the conversation is refreshed…"*

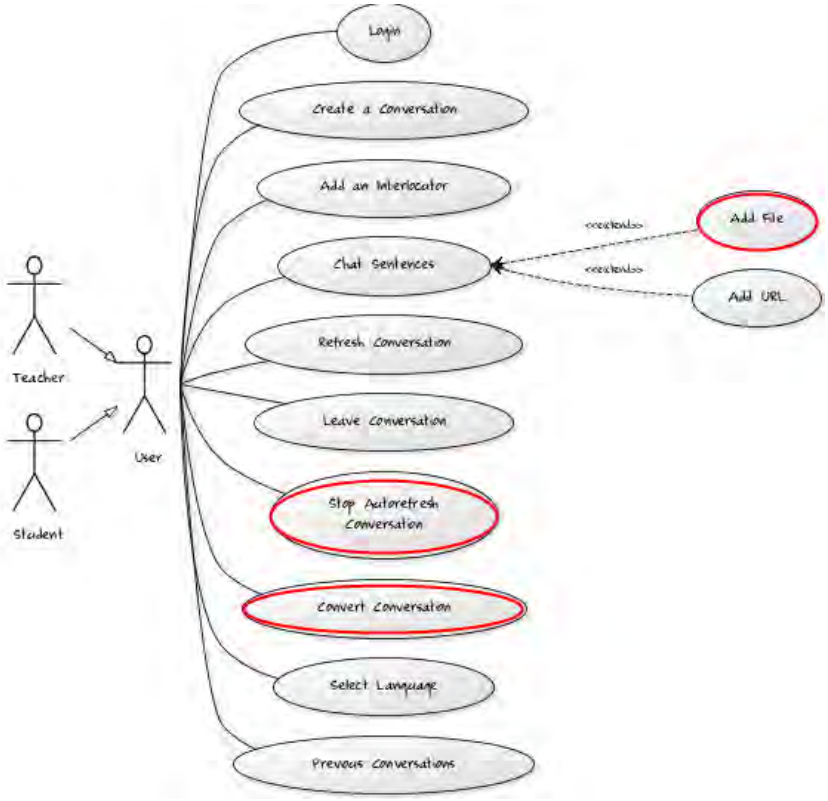

Fig 3. Chat Use Case Diagram UML

The attached files: *"Rosa receives the image; however, she has decided previously not to show images in her MD to reduce her download limit, so she cannot see the image and understand the whole message".* In this situation the user is not able to understand the message because she cannot access to the image. This problem is similar to the problems that people with visual impairments have to face when someone sends them an image. Basing on the guidelines [22][23][24], it is necessary to provide alternative content to the non-textual content. Thus, the functionality *"Add file"* can improve it because it asks the user for an alternative content to the images uploaded just in case the other person was not able to access to the content. Then the previous example will be:

> *"… Antonio writes a message and attaches a file. The system shows the message: 'Some people could not access to the file. You can provide an alternative text to the image to avoid it'. Then Antonio writes a description of the image. Finally, Rosa receives the image and an explanation of the image; so she can understand the whole message…"*

The messages format: *"Rosa is on the move so she cannot read it well and follow the conversation".* It means that Rosa cannot read the messages because she is moving. Visual impaired people can have the same problems because sometimes they cannot read the text because they can see the text moved, blurred or they cannot see

anything. The study [12~~9~~], specifies that a typical problem in chats is that they do not usually provide (text-to-speech or text-to-braille) to adapt it to his necessities and circumstances. Thus, a new functionality is added *"Convert conversation"* in Figure 3 which includes it. Then the previous example will be:

> *"… Rosa is on the move so she decides to use the functionality 'Convert conversation' and selects 'text-to-speech'. Then, she receives voice messages…"*

Our proposal considers user experience and real-time as essential factors; as a result, some recommendations are proposed to design an accessible chat for MDs. The flow of the conversation could be stopped and users with problems to follow it would be able to understand the whole conversation. Moreover, alternatives to the content sent should be provided in order to follow the conversation properly. And finally, the information should be showed in different ways to adapt it to the user's necessities.

Taking into account these situations and the recommendations provided, the users could communicate with each other through a chat and the problems of interaction can be minimized.

4 Conclusions and Future Work

Many people have to face with different accessibility problems when use a chat in MDs. These accessibility problems are not faced only by people with disabilities, but it also depends on the context of use of the tools, as the scenario in section 3 shows. To solve them, this study to elicit the requirements needed to create an accessible chat in MDs for everybody following the UCD approach. Besides, it proposes solutions to the problems related to: the flow of the conversation; impossibility of access to files sent; and the messages format. As a result, the accessibility barriers of chats can be removed and the user experience would be improved. Moreover, people could get a profit of it in m-CSCL because they could learn while they are collaborating with each other without any barrier.

In future trends, an implementation of this approach is taking to end, with the aim to validate the solutions proposed to solve the accessibility problems founded.

References

1. BBC. Over 5 billion mobile phone connections worldwide. http://www.bbc.co.uk/news/10569081
2. Brown T.: M-learning in Africa: Doing the unthinkable and reaching the unreachable. International Handbook of Information Technology in Primary and Secondary Education. Springer International Handbooks of Education, Volume 20, 9, 861-871 (2008)
3. Disability Discrimination Act (DDA), http://www.direct.gov.uk/en/DisabledPeople/RightsAndObligations/DisabilityRights/DG_4001068
4. Boletín Oficial del Estado, LEY 2/2006, de 3 de mayo, de educación, http://www.boe.es/aeboe/consultas/bases_datos/doc.php?id=BOE-A-2006-7899
5. Individuals with Disabilities Education Act (IDEA), http://idea.ed.gov/

6. Bruffee, K.: Collaborative Learning: Higher Education, Interdependence, and the Authority of Knowledge. Baltimore (1999)
7. Sharples, M.: Learning As C onversation: Tr ansforming Education in th e Mobile Age. In : Proceedings Se eing Understandi ng Lea rning in the Mobil e Age , pp. 147 -152, Budapest (2005)
8. Harper, S. : Mo bile W eb: Rein venting the W heel? ACM SIGACCESS Accessibilit y and Computing, vol.90 pp16.-18. (2008)
9. Uden, L.: Activ ity theor y fo r designing mob ile learn ing. Int. J. Mobile Learning and Organisation, Vol. 1, No. 1, pp.81–102. (2007)
10. Zurita, G., Nussbaum, M.: Mobile CSCL applic ations supported b y mobile comp uting. In: Multi-agent architectures fo r dist ributed learni ng environm ents workshop, pp. 4 1-48, San Antonio (2004)
11. Yau, S ., G upta, S ., K arim, F ., A hamed, S ., Wang, Y ., W ang, B: S mart Classroom: Enhancing Collaborative Learning Using Pervasive Computing Techno logy. In : the 2nd ASEE International Colloquium on Engineering Education, Nashville (2003)
12. Schoeberlein, J ., W ang, Y.: Ev aluating Groupwa re Accessibi lity. In: C. Stephan idis (ed.): Universal Access in HCI, Part III, HCII 2009. LNCS, vol5616, pp. 414–423, (2009)
13. Resta, P., Laferrière, T.: Technology in Support of Collaborative Learning. In: Educational Psychology Review. Vol 19, pp. 65-83 (2007)
14. Fisseler, B ., B ühler, C.: Accessible E- Learning and Educational Technology - . In : International Conference of Interactive computer aided learning, pp.1-15. Villach. (2007)
15. Guenaga, M ., B urguer, D. Oliv er, J .: Ac cessibility for e-l earning Environm ents. In: 9th International Conference, Paris, LNCS, vol. 3118, pp. 157--163. (2004)
16. Arrigo, M., Di Giuseppe, O., Fulantelli, G., Gentile, M., Nov ara, G., Seta, L. Taibi, D. A collaborative m learning env ironment. In: the 6th int ernational conf erence o n m obile Learning. Melbourne (2007)
17. Jin, Y.: Res earch of One M obile L earning S ystem. In: In ternational Confer ence on Wireless Networks and Information Systems, pp.162-165, (2009)
18. Calvo, R, Igles ias, A, M oreno, L.: A theore tical a ccessible a pproach for coll aborative learning in mo bile devices. I n: Intern ational Conferen ce on Computer Supported Education, pp:375-382. Noordwijkerhout (2011)
19. Kantel, E. , To var, G. and Ser rano, A. Dis eño de un En torno Colaborativo Móvil para Apoyo al Aprendizaje a través de Dispositivos Móviles de Tercera Generación. IEEE-RITA Vol. 5 (4)(2010)
20. Martínez, A. and Gómez, A. Diseño de Un Entorno Colabo rativo y su Aplicación a Plataformas de Aprendizaje. (2005)
21. IMS Guidelines for Developing Accessible Learn ing Applications, http://www.imsglobal.org/accessibility/accessiblevers/index.html
22. W3C. Web Content Accessibility Guidelines, http://www.w3.org/TR/WCAG/
23. W3C. Mobile Web Application Best Practices 1.0, http://www.w3.org/TR/mwabp/
24. W3C. Mobile Web Best Practices 1.0, http://www.w3.org/TR/mobile-bp/
25. UDL. http://www.udlcenter.org/aboutudl/udlguidelines
26. National Cen ter on Accessible Inform ation Technology in E ducation. Accessibility of Electronic Tools & F eatures Us ed in Dis tance Learning , http://adasoutheast.org/ed/edpublications/itseries/8_etools.pdf
27. Cooper, A., Reimann, A.: Abou t Face 2.0: Th e Essentials of Interaction Design. In: Wiley Publishing, Chichester (2003)
28. Carroll, J .M.: S cenario-Based Design. In: Hel ander, M ., L andauer, T ., P rabhu, P . (eds.) Handbook of Human-Computer Interaction, 2nd edn. North-Holland, Amsterdam (1997)