

Calidad y Accesibilidad de la Formación Virtual



Luis Bengochea
José Ramón Hilera
(Editores)

OBRAS COLECTIVAS
TECNOLOGÍA 15

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por la UE

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**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**

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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.

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Índice de Contenidos

Prólogo

José Ramón Hilera González y Rocael Hernández Rizzardini 13

Conferencia Invitada

La Calidad del Proceso: Hacia un Aprendizaje Interconectado 23
Leonor Margalef García

Ponencias

Área: 1. Accesibilidad de formación virtual

MEKANTA, Herramienta para el Aprendizaje del Teclado del Ordenador, 37
Accesible a niños y niñas con discapacidad visual.
M^a Ángeles Lafuente de Frutos

TEA (Tecnologías E learning Accesibles) 47
*Félix Buendía, Miguel Sánchez-Cerviño, Juan V. Oltra, Germán Moltó,
M.J. Castro-Bleda, Jose Miguel Valiente y Alberto González*

Accesibilidad en Smartphones para el acceso a contenidos e-learning 55
*Ricardo Rios, Eva García, Antonio Garcia-Cabot, Luis De-Marcos, Sal-
vador Otón, Jose-Maria Gutierrez-Martinez, Jose-Javier Martinez-
Herraiz, Jose-Antonio Gutierrez-De-Mesa, Roberto Barchino y Jonathan
Bar-Magen*

Estudio comparativo de accesibilidad web en portales informativos de universidades peruanas de educación a distancia <i>Miguel Ángel Córdova Solís</i>	63
Evaluación de la accesibilidad de portales Web en instituciones educativas en el área de Centroamérica <i>Rocael Hernandez Rizzardini y Hector R. Amado-Salvatierra</i>	74
Accesibilidad de la formación virtual <i>Ana Isabel Vegas, Isabel López Gil, José Darío Aldana M</i>	81
Impacto social de la estrategia de inclusión educativa del Programa de Alfabetización Virtual Asistida, PAVA, en jóvenes y adultos alfabetizados <i>Francisco Luis Ángel Franco</i>	90
e-Inclusión Educativa para Alumnos con Graves Dificultades Motoras <i>Cristina Manresa-Yee, Joan Jordi Muntaner y Cecilia Sanz</i>	97
Norma ISO/IEC 24751: Acceso para todos <i>Concha Batanero, Eva García, Antonio García y Nelson O. Piedra</i>	105
Proyecto: E-Inclusión. Implementación de estándares de accesibilidad en el proceso de diseño de cursos en ambiente de aprendizaje virtual <i>Hector R. Amado-Salvatierra, Rocael Hernandez Rizzardini, José R. Hilera</i>	113
Videotutoriales subtítulos, un material didáctico accesible <i>Luis Bengochea, Flor Budia y José Amelio Medina</i>	120
Cuantificación de la accesibilidad de la formación virtual aplicando estándares <i>Jose R. Hilera, Covadonga Rodrigo y Abel Gonzalez</i>	128
Accesibilidad de la formación virtual para personas con discapacidad visual. <i>Julián García Villalobos</i>	136
La accesibilidad multimodal en entornos virtuales para el aprendizaje de idiomas <i>Teresa Magal-Royo, Jesús García Laborda y Jose Luis Giménez-López</i>	139
Retos de accesibilidad en la formación virtual para personas con discapacidad motriz en las extremidades superiores <i>Oscar Leon Rodriguez y Luis Bengochea</i>	145
Accessibility and readability of university websites in Finland <i>Markku Karhu, Jose R. Hilera, Luis Fernandez y Ricardo Ríos</i>	151

La accesibilidad en la formación y en la información como parte integrante del derecho a la educación y del principio de no discriminación <i>Isabel Cano Ruiz</i>	159
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Área: 2. Aspectos académicos y de contenidos

EducanetWork , un Cambio en los Paradigmas del E-Learning <i>Miriam Martínez, Jose Antonio Gutierrez, Lourdes Jimenez , Raul Renales</i>	166
Wikipedia como herramienta de mejora de calidad en los trabajos escritos. <i>Jesús García García y M^a Isabel Alonso De Magdaleno</i>	171
Desarrollo de una aplicación para dispositivo móvil para registrar las interacciones del usuario con objetos docentes basados en web <i>Angel Garcia, Eva Garcia, Antonio Garcia-Cabot y Jonathan Bar-Magen</i>	177
Metodología del desarrollo de aprendizaje colaborativo con enfoque constructivista en entornos virtuales. <i>ÁlvaroHugo Gómez Rosero</i>	185
Propuesta de Formación en Tecnología de Aprendizaje para Educadores Diferenciales de la Universidad Central de Chile <i>Pabla Rivera</i>	192
Enseñanza a través de laboratorios virtuales <i>Raúl Marín Rodríguez, Alfredo Rupérez Rodríguez, Luis Usero y Ángel Arroyo Castillo</i>	200
Diseño de una experiencia educativa gamificada en el ámbito del e-learning <i>Adrián Domínguez Díaz, Joseba Saenz de Navarrete Royo, Luis de Marcos Ortega y José Javier Martínez Herráiz</i>	206
Desarrollo de competencias a través de actividades: Estudio del caso de materias on-line en la UEM <i>Gema Santiago Gómez, Juan José Escribano Otero, Sara Redondo Duarte, Pedro José Lara Bercial</i>	214
Moodle como herramienta para una enseñanza de calidad: El caso del Campus Virtual de la FEDEV <i>Paola Dellepiane</i>	222
Dinamicidad e integración en el desarrollo de exámenes para la Prueba General de Bachillerato a Distancia <i>Jesús García Laborda, Teresa Magal-Royo, Mary Frances Litzler Jerman</i>	226

Estudio comparativo entre el aprendizaje presencial y E-learning en alumnos pertenecientes al grado de Enfermería 231
Amalia Coca Barbado, Lourdes Jimenez, Jorge Luis Gómez y Jose Maria Santamaría

Aprendizaje Colaborativo con Wiki en Modalidad Híbrida 238
José Luis Castillo, Miguel Angel Navarro y Jaime Oyarzo

Área: 3. Aspectos generales y de gestión

Moodle como herramienta para la gestión de la formación en los sistemas de calidad basados en la norma ISO 9001:2008 246
Jose Amelio Medina, Carmen de Pablos, Lourdes Jimenez, Luis Bengochea y David Cid

Portafolio Docente Digital, Sistema de Apoyo a la Docencia Universitaria Virtual de Calidad. 250
Mario Bustamante Aguilar, Guillermo Cuadra Escobar y Mauro San Martin Ramas

A Review of Learning Object Quality Factors 258
Jacqueline Guzmán y Regina Motz

Medición de la calidad de un entorno de aprendizaje virtual en un centro formativo certificado en calidad 268
Daniel Pons y Carmen Pagés

Educacion Inclusiva sin distancias, sin limitaciones. 275
Blanca Nubia Gonzalez Jaramillo

Área: 4. Aspectos culturales e institucionales

EL LIBRO DE ESTILO, madurez, estandarización, el camino hacia la calidad de cursos eLearning 282
Pedro Antonio de Alarcón

ATENEA, la primera plataforma de campus virtual con certificado de accesibilidad 287
María Hortensia Álvarez, Daniel Guash, Isabel Gallego, Francisco Villas, Oriol Sánchez, Enric Ribot y Ferran Recio

La importancia de la calidad en el Campus Virtual de la UHU. Estrategias de formación para el profesorado <i>Cristina Muñiz Ronchel, Alfonso Infante Moro y Nieves Santos Fernández</i>	295
Aspectos culturales e institucionales <i>José Darío Aldana Méndez, Sebastián Jiménez y Juan Luis Pérez</i>	301
Kit alter-nativa: Empoderando a los profesores para una educación en contextos de diversidad. <i>Emmanuelle Gutiérrez Y Restrepo, Regina Medina, Ruth Briones, Indra Córdova, Giovanna Medina, Sonia Pinzón, Paulo Coronado, Carlos Vanezas, Cecile Finat, Jesús G. Boticario, Domingo Méndez, Antonio Sacco, Fernando Andrade, Santiago Rodríguez, María Isabel Ginocchio, Obed Zeledón Membreño y Joao Sarraipa</i>	309
Construyendo la identidad digital en el entorno de aprendizaje <i>Miguel Zapata-Ros y Nora Lizenberg</i>	319

Área: 5. Aspectos tecnológicos y avanzados

Mobile learning & commuting: entrevista contextual y di-seño de escenarios móviles <i>Eva Patricia Gil-Rodríguez, Pablo Rebaque-Rivas y Julià Minguillón Alfonso</i>	332
Uso de mapas conceptuales como gestores de calidad en el diseño de plataformas Web 2.0. Un caso práctico: Diseño de una Wiki colaborativa <i>Sergio Gallardo Vázquez y Juan Suardáz Muro</i>	341
La implantación del Tablet Pc en el proceso de aprendizaje a distancia <i>Sonia Janeth Romero Martínez, Sonia Pamplona Roche, Maria José Perez Fructuoso y Jordi Manel Monferrer</i>	349
Requirements elicitation to design an accessible chat as a synchronous tool in m-learning environments <i>Rocío Calvo, Lourdes Moreno, Ana Iglesias</i>	357

Área: 6. Evaluación de la calidad

Modelo de Procesos para la un sistema de Calidad de asignaturas universitarias impartidas en modalidad b-learning según ISO/IEC 19796-1 <i>Jose Luis Martín Núñez, Pilar Martínez y Jesús Sánchez López</i>	365
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Un modelo centrado en el profesor para la evaluación y guía de creación de Materiales Didácticos Digitales de calidad <i>Ana Fernández-Pampillón, Elena Domínguez y Isabel de Armas</i>	371
Sistema Institucional de Calidad y Acreditación (SICA) <i>Juan de Jesús Alvarado Ortiz y Mónica Arellano</i>	378
Enseñanza online y Recursos de Aprendizaje Abiertos: Recomendaciones de procedimientos basados en modelos de calidad <i>Rosana Montes, Guadalupe Rodríguez-Pina, Miguel González y Miguel Gea</i>	386
El reto para evaluar los posgrados a distancia de la Universidad Nacional Autónoma de México <i>José Pedro Rocha Reyes</i>	394
La importancia de la calidad en el Campus Andaluz Virtual <i>Nieves Santos Fernández, José Ignacio Aguaded Gómez y Cristina Muñiz Ronchel</i>	403
ECALEAD: Evaluación de Calidad en Educación a Distancia. Aplicación en un caso de estudio <i>Gladys Gorga, Cecilia Sanz, Cristina Madoz, Cristina Manresa Yee y María José Abásolo</i>	409
Criterios para la evaluación de programas e-learning en educación universitaria <i>Sara Redondo Duarte, Gema Santiago Gómez y Juan José Escribano Otero</i>	417
Aplicando una categorización a diseños educativos de cursos en entornos virtuales <i>Virginia Rodés, Luciana Canuti, Nancy Peré, Regina Motz y Alén Perez Casas</i>	425
Evaluación de la calidad de un programa académico en la modalidad Blended-Learning desde la perspectiva de estudiantes y profesores <i>Gabriela Croda y Jacqueline Bada</i>	433
El monitoreo de rendimiento de estudiantes en un LMS para medir el proceso enseñanza-aprendizaje en un entorno virtual <i>Ana Isabel García Guzman, Rocael Hernandez Rizzardini, Hector R. Amado-Salvatierra y Byron Linares</i>	441

Innovación docente y calidad en la creación del primer Centro de Educación Virtual de Paraguay UNA. 449
Carmen Varela y Antonio Miñán Espigares

Calidad centrada en el aprendizaje en sistemas de gestión que integren tecnología móvil y software social 457
Miguel Zapata-Ros

Área: 7. Casos prácticos

Impacto del uso de las Aulas Virtuales en el Posgrado de la Universidad Nacional Autónoma de México 468
José Pedro Rocha Reyes y Jorge León Martínez

Uso de plataformas de aprendizaje en el Departamento de Salud de la Ribera: guía e-learning e indicadores de calidad 476
Juan Vicente Izquierdo Soriano, Félix Buendía García, Jose Luis Ortega Monzo y Eduardo Taberero Alba

Reflexión crítica y competencia intercultural en la enseñanza universitaria a distancia: Implementación y percepciones del alumnado en plataformas virtuales homogéneas. 485
Manuel F. Rábano

Videojuegos: una innovación extracurricular en modalidad b-learning 493
Margarita García, Karina Núñez, Raquel Painean y Samuel López

El aprendizaje de Geología en la E.T.S.I. Minas de Madrid mediante enseñanza virtual 501
José Eugenio Ortiz, José Antonio Espi, Trinidad Torres, Domingo Martín-Sánchez, Isabel Arribas y Esther Rodríguez-Sánchez

End user quality of service measurement on Web based labs. A case study: eDSPlab 509
Sergio Gallardo Vázquez y Juan Suardiaz Muro

RubriCalc. Una herramienta Web muy versátil que facilita la evaluación transparente y formativa de calidad. 517
Alberto Domingo

Desarrollo e Implementación de Objetos Virtuales de Aprendizaje, Para Ciencias no Tradicionales 525
Rocael Hernández y Miguel Morales

- Virtual classroom in Parasitology: application of simulations for understanding the biology, diagnosis y control of parasites with the platforms Netlogo® y Blackboard®. 535
Angel Criado-Fornelio
- La enseñanza virtual de la asignatura “La Energía Nuclear a Debate”: experiencias desde un enfoque interdisciplinar 543
Ximena Lazo-Vitoria, Mónica Giménez-Baldazo, Marta Rodríguez-Martínez, María Del Val Sandin-Vazquez y Reyes Abad-Perotín
- Una primera evaluación del Programa de Uso y Difusión de Tecnologías de Aprendizaje en docencia universitaria de la Universidad de La Serena 549
Mauricio Godoy, Jorge Catalán y Carlos Garrido

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

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Abstract. Nowadays, our daily 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 study¹ 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-CSCLs 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 Moodle² or Blackboard³ 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 Ichat⁴ or Achat⁵ are centered in solving the accessibility problems related to technological aspects. Specifically, in MDs AssistiveChat⁶ 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. The rest 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/macosex/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.

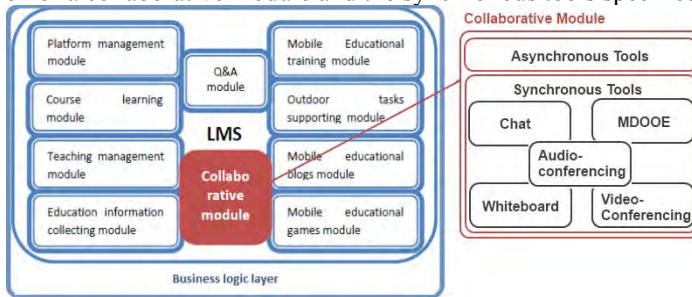


Fig 1. Context of Collaborative Module and its Asynchronous and Synchronous Tools.

3.2 Standards and Guidelines

The main objective of this study is to elicit the essential requirements needed to design an accessible m-CSCL for every body. To achieve it, our development 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 web content, are considered. Moreover, the developers should consider the guidelines MWABP [23] and MWBP 1.0 [24] which are related to the creation of accessible web and applications in MDs.

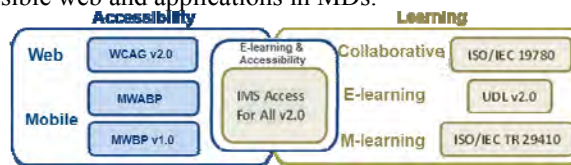


Fig 2. Standards and guidelines followed to the development of a m-CSCL.

On the other hand, a learning tool should accomplish some standards and guidelines to be more usable and comprehensible. It has been considered the standard ISO/IEC 19780 to create a CSCL environment and the standard ISO/IEC TR 29410 for m-learning. Moreover, the guidelines UDL v2.0 [25] explains how to reduce barriers to access the learning content.

Finally, there are other specifications which are centered in the creation of CSCL and accessible tools. This guideline [21] specifies some specifications to develop an accessible collaborative learning tool.

3.3 Requirements Elicitation for an Accessible Chat

There are many definitions of chat; however, there are not many definitions which include accessibility on it. The research work [26] defines a chat and the accessibility problems that presents: “Text chat is a synchronous tool, which allows several users to communicate via typed text in real time. “... “There are two basic issues related to accessibility of chat applications: fast-paced conversation and the need 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. Later, 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 [2122] 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...”

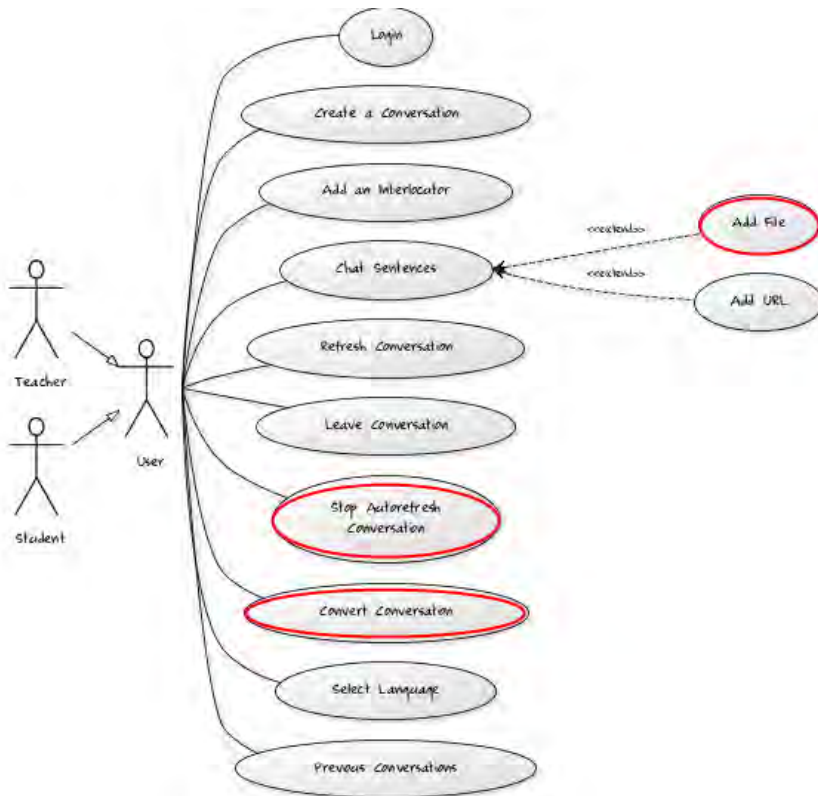


Fig 3. Chat Use Case Diagram UML

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 [129], 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-CSCB 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.

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