Chapter 13
New Communication Technologies for Inclusive Education in and outside the Classroom

Ana Iglesias
Universidad Carlos III de Madrid, Spain

Belén Ruiz-Mezcua
Universidad Carlos III de Madrid, Spain

Juan Francisco López
Spanish Centre of Captioning and Audio Description, Spain

Diego Carrero Figueroa
Spanish Centre of Captioning and Audio Description, Spain

ABSTRACT
This chapter explores new communication technologies and methods for avoiding accessibility and communication barriers in the educational environment. It is focused on providing real-time captions so students with hearing disabilities and foreign students, among others, could participate in an inclusive way in and outside the classroom. The inclusive proposals are based on the APEINTA educational project, which aims for accessible education for all. The research work proposes the use of mobile devices for teacher and students in order to provide more flexibility using the APEINTA real-time captioning service. This allows using this service from anywhere and at anytime, not only in the classroom.

INTRODUCTION
Historically, students with functional diversity (students with special needs, students with disabilities, etc.) and foreign students have found accessibility and communication barriers while trying to access the educational system. For instance, most of the hearing impaired students do not regularly assist to the classroom because they usually face communication difficulties with the teacher or other classmates. Foreign students can also find those communication barriers when they do not have enough level in listening and understanding the language spoken in the classroom. This chapter presents new ways of communication for inclusive education inside and outside the classroom.
the classroom. The research work is based on
the inclusive proposals of the APEINTA project
(Iglesias et al., 2009) which main aim is to provide
accessibility in education, whether it is in or out
of the classroom.

APEINTA is the result of collaboration among
the Department of Computer Science and the De-
partment of Electronic Technology, Universidad
Carlos III, and the Spanish Centre of Captioning
and Audiodescription (CESyA)1. This project was
initially supported by the Ministry of Science and
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The APEINTA project is focused in two main
inclusive proposals: the first one deals with elimi-
nating the communication barriers that hearing
impaired students or foreign students usually
find in the classroom, providing automatic real-
time captioning and other mechanisms to ease
the communication with the teacher and others
students; the second one also deals in providing
an accessible Web learning platform with acces-
sible digital resources, so every student can access
them, with independence of the place where he is.

The work presented in this chapter is focused
in the first proposal, studying new communication
technologies for making easier the communica-
tion inside and outside the classroom among the
course’s participants (teachers and students), stim-
ulating the inclusive and collaborative education.

Real-time captioning has been demonstrated as
a very useful tool in educational environments for
all students. Students with hearing impairments
can literally read the teacher discourse and they
can participate in an inclusive way during the class
thinks to real-time captioning. Foreign students
who do not completely understand the teacher
discourse are able to see the correct spelling in
the captions, providing additional support to these
students. But captioning can be useful for all the
students, not only for students with disabilities or
foreign students. For instance, real-time captioning
can compensate noisy backgrounds, as it usually
occurs in a classroom. Captioning is also useful in
places where sound is not allowed, for instance,
when the student is watching a pre-recorded or on-
line video from the Web learning platform
when travelling in public transport and he is not
wearing earphones.

At this point, it is important to remark that
APEINTA project has been awarded with the
prize of the Spanish Confederation of Families of
Deaf people (FIAPAS) in its 2009 call for applied
research work related to hearing impairment in
the area of education, where the first architecture
of APEINTA was presented. It has also won the
delegates award of the 2011 edition of the Web
Accessibility Challenge in 8th International Cross-
disciplinary Conference on Web Accessibility
(W4A’112), sponsored by Microsoft, where the
new communication mechanism in APEINTA
and its new architecture described in this chapter
were presented.

BACKGROUND

During last decades, educators, pedagogues, psy-
chologists, scientists, researchers and, in general,
people from very different disciplines related to
education have tried to achieve anti-discriminatory
education environments according to the current
laws related with inclusive education. These
laws try to ensure an inclusive education system
at all levels as a right of persons with functional
diversity, rejecting segregation and discrimination.

There exist international and national laws
which regulate the inclusive education. For in-
stance, internationally, the normative of the United
Nations remarks that students have to be educated
in the least restrictive environment, according
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