Chapter 11
A Usability Guide to Intelligent Web Tools for the Literacy of Deaf People

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ABSTRACT
The need of literacy tools for deaf people is well documented in the literature of deaf studies. This chapter aims at drawing the attention of the HCI and AI worlds on the need of intelligent web tools for the literacy of deaf people. It reviews several such e-tools. The review tries to cover complementary and diverse literacy aspects, ranging from word knowledge to global reasoning on texts. The authors assess whether the tools conform to the User Centred Design Methodology, and put forward a first set of usability guidelines based on such a methodology for the design of more intelligent web e-tools for the literacy of deaf people. The chapter concludes by eliciting a debate on the need of a deaf user centred design.

INTRODUCTION
Good literacy is essential for everyone. It ensures a continuous process of personal maturation and a positive social integration. Educators, linguists and psychologists working on deaf studies report that deaf and hard-of-hearing people encounter difficulties in learning to read and write with proficiency, e.g., see (Marschark & Spencer, 2003). However, the level of literacy of deaf people is varied and can depend on several factors.

For instance, the degree of deafness as well as the age they become deaf can affect the communication abilities of deaf people (RIT, 2008). There are, basically, four degrees of deafness: mild, moderate, severe and profound. In this chapter, the term “deafness” refers to any of the aforementioned degrees. Even a mild hearing loss can be serious for children still learning to speak. People who are born deaf or who lose their hearing prior to the age at which
speech is acquired learn a verbal language mainly through artificial means, i.e., reading.

Moreover, which education method is adopted can play a key role in the literacy of a deaf person in a verbal language (VL). Nowadays, there are education programs for teaching various the national sign languages (SL). Note that an SL is a full-fledged gestural-visual language with signs as lexical units, whereas a VL is an oral-auditive language with words as lexical units. Among the main literacy education methods for deaf people include, we have: oral education only to the national VL; oral education with manual aids such as lip-reading or finger-spelling; bimodal education to the national VL and SL. Other combinations are possible resulting in a richly varied spectrum of education methods (Reynolds & Fletcher-Janzen, 2001). Issues of language, literacy and integration often include debate and even controversy, with different viewpoints from within deaf and hearing circles (Marschark and Wauters, 2008).

Comprehensive research on SLs in modern linguistics dates back to the 1960s, mainly influenced by the communication mode of SLs, that is, the body instead of the voice, and by the fact that SLs are face-to-face unwritten languages. Recent research in information technology has concentrated on the creation of e-tools for SLs, mostly, on e-dictionaries (Branson & Miller, 1997).

There is a large amount of work that is being undertaken by organisations for deaf people to develop literacy in deaf people in VLs, e.g. (Bruegge-mann, 2004). In particular, “the research literature has shown that interactive storybook reading, sign print, extensive reading and writing experiences, and social interaction around literacy activities support the deaf child’s emergent and early literacy development” (Schirmer & Williams, 2003, p. 119). However, information technologists seem to be paying less attention to e-tools for improving the literacy of deaf people. Literacy is also a critical issue, as substantiated by linguists and psychologists working in deaf studies, crucial for the integration of deaf people into the hearing society.

This chapter aims at eliciting the interests of Human Computer Interaction (HCI) and Artificial Intelligence (AI) researchers and practitioners on the creation of intelligent web tools that can contribute to the literacy of deaf people. Web-based architectures, being cross-platform, should make the tools as widely available as possible, overcoming geographical or technological constraints. The tools should be intelligent in that they adopt techniques or technologies from AI, with the aim of improving the interaction and feedback specific to deaf users.

More precisely, this chapter describes the state of the art in the literature of e-tools for the literacy of deaf people. This review tries covering complementary and diverse literacy aspects in a VL, ranging from word knowledge to global reasoning on texts. This chapter aims at highlighting the role that the user centred design methodology (UCDM) can play in their design and development.

Why Do We Propose the UCDM, Which Focuses on Usability?

To the best of our knowledge, there are no standard usability guidelines specific for designing and developing web tools that are usable by deaf people. When it comes to designing for people with disabilities (deaf people in particular), the popular terms are adaptive or assistive. For instance, (Berry, 2004) recommends to provide all auditory information visually, captions with all multimedia presentations, and ensure that all visual cues are noticeable even if the user is not looking straight at the screen; important information should catch the user’s attention, even through peripheral vision in order to maintain user interfaces accessible by deaf people. (Fajardo, 2005) and others suggest that web resources should provide a translation of their contents into the SL of the intended deaf users, whenever possible.

Still, “just because a design is theoretically accessible, doesn’t mean that it’s easy to use”
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