Chapter 7
Application of VoiceXML in e-Learning Systems

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EXECUTIVE SUMMARY

This chapter examines the learning environment of visually impaired students in the school for the blind. The level of Information and Communication Technology (ICT) utilization and adoption is reported with specific interest in VoiceXML and its application areas. As a case study, a prototype voice-based e-Learning application for course registration and examination was developed and reported. The system was evaluated using ISO 9241-11 usability criteria. The outcome of the usability evaluation is also presented. The voice-based e-Learning technology described in this chapter will improve accessibility to education, including distance learning for learners who are visually impaired in the school for the blind.

BACKGROUND

The use of the Internet and web based instructional aids is now viewed as an integral part of the learning environment. As a result, students now have real-time online access to e-Learning contents and opportunities, and most tertiary institutions now offer courses through distance learning. Although some people would argue against the merits of e-Learning, it is clear that with the pace of e-Learning implementation, students such as those with visual impairments have been left behind due to the lack of an accessible content delivery system to ameliorate their disabilities.

The various options available for most learning environments are face to face, telephone, electronic mail, chat room, instant messaging, etc. However,

this becomes a more difficult task for those with disabilities. A blind person cannot see or communicate through mail or electronic means that require ability to see the screen. Lack of provision for voice in the existing learning methods has excluded support for people with limited capabilities such as the visually impaired that affect either data entry, or ability to read (and therefore check) what they have entered, since these applications are visual in nature and require sight to see the blackboard or computer screen and manipulate the computer keyboard.

Several e-Learning design methodologies have been proposed in literature. However, not too many works were dedicated to the design and implementation of e-Learning for the disabled (Sirithumgul *et al.*, 2007, p. 1). The blind and vision impaired students, who are particularly affected by the technological change, face a range of difficulties from the act of typing a letter to the use of computers in educational institutions. The increasingly widening gap between the people who are technologically able and those who are not gives cause for great concern.

This is the case of a particular school for the blind, a privately owned educational institution located in Lagos, Nigeria, that provides a learning environment for the blind and partially sighted children at primary and secondary school levels. The school also admits people who became blind in the course of their life, for rehabilitation at higher education level (at university level). The school is headed by a principal assisted by a vice principal. There are thirty five teachers in the school and they all report directly to the school administrator while the school administrator reports to the principal.

The school's foundation was laid by the Catholic Church on the 16th of June, 1960 and it was officially opened in 1962. The total number of pupils in 1962 was four, two boys and two girls in the primary school category. The population later increased to accommodate secondary school students. Thereafter, the federal government took over all schools in Nigeria but later handed over the ownership and management of the school back to Catholic Church missionaries, the original proprietor in the year 1970. The school provides the traditional form of learning, where the teachers meet physically with the students in class.

Presently, the school is managed by the Catholic Church of Nigeria and funded by charitable individuals and organizations. It operates the same primary and secondary school curriculum as other private and public institutions within its category in Nigeria. The school spends an average of six million, six hundred thousand naira (N6,600,000) annually on capital and recurrent expenditure while its annual income is an average of seven million, two hundred and fifty naira (N7,000,250). The total number of students is one hundred and six, and they are all accommodated in the school premises.

The report presented in this chapter examines the learning environment of vision impaired students in the school used as case study. The resulting information was used to provide an assistive voice-based e-Learning platform to support learning in the school. A number of challenges were identified after the implementation of the project. However, suggestions and recommendations were made on how to overcome them. The educational institution used as case study in this project is referred to as 'the school' in the subsequent sections of this chapter.

SETTING THE STAGE

This section examines the technology utilization of the school prior to initiation of the project. It also describes the application areas of voice technology that was used to provide a solution to the case studied.

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