Chapter X
A Computer-Based Reading Tutor for Young Language Learners

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ABSTRACT
This chapter describes the first year of research on the effectiveness of automated speech recognition (ASR) for ESL learners in the early school years. The aim was to learn how such technology can enhance literacy learning as an element of L2 development, using prototype research software entitled the Reading Tutor (RT). In addition to assessing learners’ gains in reading scores, the attitudinal dimension of speech recognition technology was investigated in an effort to explain the effectiveness of the software. We found that both heritage language (L1) and level of English proficiency were linked to students’ reading gains with the RT. Further, the RT was shown to be equally effective to a more time-intensive volunteer tutoring program. A positive affective impact of the RT was demonstrated in the interview data but not in two widely used attitudinal scales. An Appendix describes the technical implementation of the project.
INTRODUCTION: THE LISTENING TO DIVERSE LEARNERS PROJECT

Background to the Project

Disproportionate numbers of adult Canadian immigrants are reported to have poor literacy abilities (Statistics Canada, 2005) and this serves as one indicator of their difficulty in acquiring the full range of skills in one of the two official languages of Canada, French or English, as an additional language. Further, home literacy practices and adult-child language-literacy interactions are widely believed by literacy researchers to affect children's literacy acquisition (Kendrick, Anderson, Smythe, & McKay, 2003; Purcell-Gates, Jacobson, & Degener, 2004; Reeder & Shapiro, 1997; Reeder, Watson, Shapiro, & Goelman, 1996). A steady increase in the numbers of children with diverse language and cultural backgrounds means that well over 50 percent of the school populations in Vancouver and Toronto have languages other than English at home (Gunderson & Clarke, 1998), suggesting an increasing proportion of young Canadian learners is at risk for difficulties in acquiring literacy. This is underlined by results of reading comprehension testing of 41,962 grade 4 students in British Columbia which showed that 32 percent of students, designated as learners of English as a Second Language (ESL), were reading at levels “below expectations” compared to 19 percent of non-ESL students tested (Edudata Canada, 2002). Such statistics are worrying literacy educators as this indicates that effective early reading and writing instruction is, therefore, necessary to establish good long term literacy practice in young learners (Strickland, 2002).

One promising approach to enhancing literacy for ESL learners is to customize instruction by integrating technology into classroom teaching but a major limitation of most current reading software is its inability to “hear” readers (Casey, 2000). Recently, research prototype software from Project LISTEN, Carnegie Mellon University, entitled The Reading Tutor, (abbreviated to RT throughout) addressed this limitation by using automated speech recognition (ASR) to assist children with oral reading (Mostow, 2001; Project LISTEN, 2004). It listens to children read aloud age-graded texts displayed on screen, and offers to read key words or whole sentences aloud, or provide word meanings when children click on a word for help or when the program senses that they are experiencing difficulty as indicated by long pauses or non-fluent oral performance. A detailed description of our project’s technical implementation of the RT in its school settings appears in the Appendix. In Project LISTEN’s ongoing trials of the RT had been shown to be a promising learning technology for young native speakers of English. Due to the fact that the RT had not been assessed using young second language learners at the outset of the present project, its potential as an effective literacy intervention for a major population of North American urban children remained unknown.

This chapter describes the first year of research on the effectiveness of speech recognition technology for ESL learners in the early school years, with the ultimate aim of learning how such technology can assist teachers in enhancing literacy learning as a critical element of second language development using the RT program as a case in point. The attitudinal dimension of speech recognition technology also was studied in an effort to explain rather than merely describe the relative effectiveness of this type of software, and ultimately, to deepen our understanding of the appropriate and effective uses of speech recognition technology in early literacy teaching and learning for the widest possible range of children.

The project asked four research questions:

1. What roles do home language background and levels of English language proficiency play in determining the benefits of the RT for English language learners?
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