1. Introduction

Educational research suggests that text adaptation can facilitate reading comprehension of content and English language skills development for English language learners (ELLs) (Carlo, August, McLaughlin, Snow, Dressler, Lippman, Lively, & White, 2004; Echevarria, Vogt and Short, 2004; Yano, Long and Ross, 1994). Currently, text adaptation involves teachers’ manual modification of a text. Adaptations may include text summaries, vocabulary support (e.g., providing synonyms), and translation. Text adaptation is a time-consuming practice, but it is critical for K-12 teachers who teach ELLs, since appropriate texts are often unavailable. The transition to automated text adaptation is well-matched to natural language processing (NLP) methods. Therefore, we have implemented the Automated Text Adaptation Tool v.1.0 (ATA v.1.0): an innovative, educational tool that generates various text adaptation types. We have also completed a teacher pilot study with the tool. To our knowledge, Schwarm and Ostendorf (2005) is the only other research addressing the development of NLP-based reading support tools, including automated text adaptation.

During our demonstration, conference participants will (a) login to the Internet-accessible tool, (b) import ready-made or newly created text files, and (c) experiment with adaptation features described in this extended abstract (e.g., vocabulary support, generation of English and Spanish marginal notes, and English and Spanish text-to-speech synthesis.) Our primary source of feedback has been from teachers in order to develop the tool from an educational perspective. We are currently interested in feedback from the computational linguistics community in order to inform tool development related to (a) feature enhancement, and (b) ideas for new NLP-based features.

2. The Automated Text Adaptation Tool

ATA v.1.0 contains these NLP-based, automated text adaptation capabilities (see Figure 1.) English-based adaptations are helpful for ELLs with any language background; the Spanish features will provide additional help for native Spanish speakers.

2.1 English and Spanish Marginal Notes

Pedagogically, marginal notes are a kind of text summary. An automatic summarization tool (Marcu, 2000) is used to produce marginal notes in English. The amount of marginal notes generated can be increased or decreased based on students’ needs. Using an English-to-Spanish machine translation system, a Spanish version of the English marginal notes can be created as native language support.1

2.2 Vocabulary Support

Synonyms for lower frequency (more difficult) words are output using a statistically-generated word similarity matrix (Lin, 1998). ATA v.1.0 generates antonyms for vocabulary in the text using WordNet®.2 Cognates are words which have the same spelling and meaning in two languages (e.g., animal in English and Spanish). The tool generates these using an ETS English/Spanish cognate lexicon.

2.3 English and Spanish Text-to-Speech

The tool offers English and Spanish text-to-speech (TTS)3. English TTS may be useful for

2 See http://wordnet.princeton.edu/
pronunciation support, while Spanish TTS provides access to the Spanish texts for Spanish-speaking ELLs who are not literate in Spanish.

3. Pilot Study with Teachers

Twelve middle school teachers evaluated the tool. We collected teachers’ survey feedback related to a) the tool’s usability, b) the utility of each tool feature, and c) ideas about how the tool fit into teachers’ practice. Teachers generally liked the tool. They also commented that it could be improved by adding an editing capability, allowing manual adjustments to the vocabulary support and English marginal notes and Spanish translations. Teachers viewed the tool either as lesson planning support, or as a student tool for independent work.

4. Future Research

ATA v.1.0 is a young application that uses NLP methods to create text adaptations. The teacher pilot evaluation suggested that the tool produces adaptations that have potential as effective support for ELLs. It could also save teachers lesson planning time. We will implement teacher-suggested modifications (e.g., editing function), and begin a school-based pilot in 2007 to evaluate the tool’s utility and effectiveness in terms of students’ measurable learning gains with regard to reading comprehension and English language skill growth.

References


