Introduction

According to the American Library Association, 14% of United States adults cannot "search, comprehend, and use continuous texts" [1], and these individuals receive only limited government assistance. Additionally, smartphone users account for 52% of Americans with less than a high school education [2], making mobile applications an ideal way to reach these students.

Therefore, we present CAPITAL, a mobile software suite designed to make high-quality learning resources available to users of all literacy levels. In particular, we target native English-speaking adults at the most basic levels of literacy.

Interface Design

Since CAPITAL Words’ target audience is low-literacy users, the software must be designed with them in mind, avoiding using many words when possible.

We endeavored to avoid branching menus and screens full of words and to make the app as intuitive as possible. For example, pictures rather than words are used to represent components like courses, and the flow through the system is highly linear.

We performed a usability study with 11 adult learners, 4 of whom had never used a smartphone, and nearly 100% of them were able to perform all core tasks in the app with at most one error.

Back-End Resources

The CAPITAL system comprises an instructor website, where instructors generate and customize learning materials, and a student application, where students practice them. Exercises are generated through the website, which stores its data in a MySQL database and uses several resources to make intelligent decisions about individual words:

- The Google dictionary, for audio pronunciations, and Google Text-to-Speech, for non-dictionary words
- The CMU Pronouncing Dictionary, for the breakdown of a word into its component phonemes
- The Moby Hyphenator, for the hyphenation of words, which often corresponds to their syllable breakdown

We measure precision and accuracy according to Precision = \# correctly identified as computer \# correctly identified and Accuracy = \# correctly identified \# total questions

and our results are summarized in Tables 1 and 2.

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<thead>
<tr>
<th></th>
<th>L1</th>
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<th>L3</th>
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Table 1: Pick the Misspelling results.

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Table 2: Spell the Word results.

On average, participants did even worse than chance in distinguishing between human- and computer-generated questions, allowing us to say with confidence that our CAPITAL Words algorithms generate realistic and convincing questions.

We are currently developing another application called CAPITAL Passages in order to expand our learning system and reach a more advanced group of literacy users. Passages targets users on the single- and multiple-sentence level by automatically generating reading comprehension questions that test students on information found throughout the passage.

References