CAPITAL Passages Grant Proposal

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According to the American Library Association, 14% of adults in the United States cannot “search, comprehend, and use continuous texts” [1]. Current government and philanthropic funding only indirectly helps 3 of these nearly 30 million individuals. There is therefore a significant opportunity for the development of technology to help improve literacy rates. Little research has yet been done on either the design of software for low-literacy users or its long-term impact. Previous studies have designed software for illiterate users in third-world countries, but these studies aim only to be usable with insufficient literacy skills, rather than as educational tools [2].

The goal of the Comprehension and Pronunciation Instructional Tools for Adult Learners (CAPITAL) project is to make high quality learning resources accessible to users of all literacy levels. The project aims to automatically create exercises based on instructor specified parameters that will help users improve their reading skills. CAPITAL Passages aims to educate those adults with some basic literacy skills who are still working with a literacy program on passage comprehension skills. The system would include a website interface where program instructors could compile reading passages for students. From there, comprehension questions would be generated automatically from an algorithm that identifies the most important sentences in a passage and creates questions that test the facts in those sentences. Additionally, questions would be generated that test knowledge of more than one sentence, testing a deeper level of passage comprehension and ensuring the student is truly gaining understanding of what they are reading. Once the questions have been generated, the students would receive the practice passages and questions via an HTML5 smartphone app. This way, students with a multitude of smartphones can be reached as well as those who can access a computer. The system would then incorporate a preexisting platform that utilizes the spacing method to test students on material they did not understand at pre-determined, ideal time intervals throughout their use of the app.

Although automatic fact-based question generation has already been accomplished, the system will attempt to take this a step further and test a deeper comprehension. This will be accomplished by determining which facts of a passage are related, such as by a common subject, and crafting questions that require knowledge and comprehension of more than just one sentence in the passage. Linking facts about subjects in a passage poses great challenges, as it is difficult to determine which facts are important and even more difficult to formulate intelligible questions from a list of facts. However, it is important to explore this area of question generation to ensure true reading comprehension. Single fact generation provides valuable information about whether students understood a single part of a passage, but it is relatively easy to match up these fact questions with the sentence they came from in the passage. However, combining facts from different parts of the passages and changing the way these questions are formulated from the passage more effectively tests full comprehension of the passage and allows students to better learn how to read for meaning in a passage. This technique is new, innovative, and would provide a greatly expanded way to test reading comprehension.

Illiteracy is an epidemic that greatly affects the lives of more than 30 million individuals. It prevents them from obtaining employment, severely limits the types of jobs they can work, increases the chances their children will be illiterate, and limits their ability to effectively function in many facets of society. With the increasing access to smartphones and the Internet, illiterate individuals can work almost anywhere to improve their literacy skills with CAPITAL passages. Moving outside of the traditional classroom is key to reach these learners—many of whom work full time. With a smartphone app, they can work on exercises on the go. And, with automatic question generation creating limitless exercises, CAPITAL Passages has the opportunity to provide a learning environment that makes a difference for millions.

[1] ”Outreach Resources for Services to Adult New and NonReaders.” American Library Association, n.d. Web. 13 Nov. 2014.

[2] Medhi, I., Patnaik, S., Brunskill, E., Gautama, S.N., Thies, W., and Toyama, K. Designing mobile interfaces for novice and low-literacy users. ACM Trans. CHI, 18(1), 2011.