ALEX: a mobile speech and language learning assistant

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ALEX: A Mobile Speech and Language Learning Assistant
Demo for the SIMPE 2012 Workshop

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ABSTRACT
For a very large number of adults in developed countries, tasks such as reading, understanding, and using everyday items are a challenge. Many community-based organizations offer resources and support for adults with limited literacy skills; unfortunately, current programs have difficulty reaching and retaining those that would benefit most. To address these challenges, we have developed a mobile application to support literacy programs and to assist low-literacy adults in today's information-centric society. ALEX© (Adult Literacy support application for EXperiential learning) is a mobile speech and language assistant that is designed to be used both in the classroom and in daily life in order to help low-literacy adults become increasingly literate and independent.

Categories and Subject Descriptors
H5.2 User interfaces: Voice I/O, Natural language, User-centered design, Evaluation/methodology. K3.1 Computer Uses in Education: Computer-assisted instruction.

General Terms
Design, Experimentation, Human Factors.

Keywords
Mobile computing, interface design, mobile learning, assistive technology, speech and language support.

1. Motivation
In 2000, nearly 25% of adults (aged 16 to 65) in the world's richest countries were reported to be functionally illiterate [2]. In Canada, 50% of adults are considered to have low literacy skills [1]. For adult literacy students, understanding everyday items such as bus schedules, food labels, news articles, or medical information is a challenge. Many of such adults also struggle to expand their vocabulary, and often have difficulties spelling and pronouncing new words in their own native language. In addition to the impact on an individual's daily life, these have serious consequences for the economy – businesses are struggling to find local workers who have the basic skills necessary for the demands of today's workplaces. Community organizations offer resources and support to adults with limited literacy skills, but barriers such as work, lack of financial resources, childcare, and transportation often prevent potential learners from taking part in and benefiting from such programs [1].

MobileHCI'12, September 2012, San Francisco, USA
ACM 978-1-60558-835-3/10/09.

2. A mobile approach to literacy
To address the challenges faced by adult literacy learners, we have developed ALEX – a mobile speech and language assistant for use both in the classroom and in daily life, in order to help low-literacy adults become increasingly literate and independent. It is an application running on ultra-mobile devices, designed to help develop language skills and knowledge acquisition pertaining to real life by providing intuitive access to various language-based tools (dictionaries, thesauri, etc.).

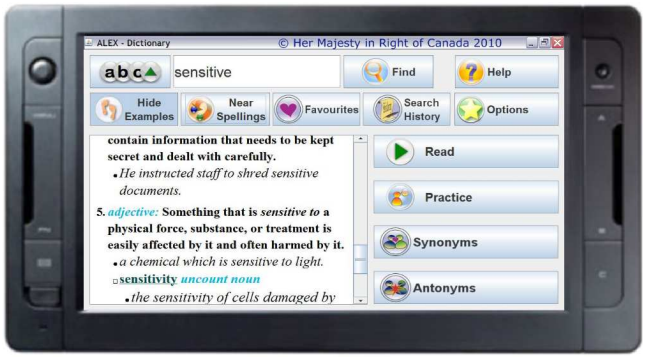
3. Application overview


Figure 1: The ALEX mobile language learning assistant. A complete description of the ALEX system can be found in [3], while the study and its key findings are extensively presented in [4].

ALEX has been designed at the National Research Council Canada [3], following guidelines for inclusive design of mobile tools. Several features are provided to assist users in their learning goals: alphabetic and QWERY soft keyboards, a near-spelling feature to facilitate dictionary look-up for users who have difficult spelling, and text-to-speech navigation of menus and functions. Text-to-speech is also used in the learning process, allowing users to hear the correct pronunciation of words or to have a dictionary definition read to them (with corresponding text being highlighted and synchronized at word level). Through automatic speech recognition, ALEX allows learners to practice their pronunciation.

The pronunciation practice functionality provides feedback in the form of a color-based dial accompanied by positive reinforcement messages. Users can hear their own recording and compare it with the correct pronunciation.

4. Evaluation

We have evaluated ALEX through a six-month study with 11 participants in two adult literacy classes. Participants used the devices both in the classroom and in daily life. Our study revealed that students perceived the device as helpful when doing homework, as well as with the pronunciation of difficult words, which is an essential component of literacy programs. We also found that such technologies can contribute to students' independence with respect to activities requiring the use of literacy skills and can increase students' confidence in their own capabilities and motivation to learn.

5. Demo proposal

At the SIMPE 2012 Workshop the authors propose to present an interactive demo of the ALEX system. Participants will have the opportunity to interact with the ALEX application on several tablet computers, as well as explore the recently-ported smartphone version of ALEX.

6. Acknowledgements

NRC wishes to acknowledge HarperCollins Publishers Ltd. for providing access to the following Works supporting this research: "Collins Cobuild Advanced Dictionary of American English" 1st Ed. © HarperCollins Publishers 2007 Dictionary Text, and "Collins Gem Thesaurus" 6th Ed. © HarperCollins Publishers 2009.

7. References

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