The iBraille Challenge App for iOS

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The iBraille Challenge Mobile App

The iBraille Challenge Mobile App project is a five-year, federally funded, Office of Special Education Stepping Up Technology project whose principal investigators are Cheryl Kamei-Hannan, California State University at Los Angeles, Benjamin Pomeroy, Braille Institute of America, and Nancy Niebrugge, Braille Institute of America. The overall goal of the project is to increase technology and braille literacy skills through the development, evaluation, validation, and widespread dissemination of a iBraille Challenge (iBC) mobile application that incorporates evidence based instructional strategies using a mainstream device. The Braille Challenge is a popular contest in the United States and Canada sponsored annually by the Braille Institute, and the iBC will reinforce and supplement literacy activities for students who are braille readers. Four major objectives of this project are:

## Objective 1: Develop the iBC, using an iterative process of identification of needed resources, development, evaluation, and revision, which provides teachers and parents of students who read braille with a high quality, evidence-based literacy instructional tool using a mobile device and refreshable braille display.

## Objective 2: Create and validate the iBC as a way to increase academic achievement of braille literacy skills of students with visual impairments in four specific areas determined by the project’s leadership team.

## Objective 3: Identify training needs and increase knowledge of teachers and parents of students with visual impairments in the use of mobile devices with peripheral refreshable braille displays.

## Objective 4: Increase the use of mainstream technology tools through dissemination of the iBC to students with visual impairments, teachers of students with visual impairments, and parents of children with visual impairments.

The iBC has been developed for Apple iOS (internetwork Operating System) and works on so-called "i-devices" such as iPads and iPad Minis, along with various braille displays. The iBC includes reading assessment materials and activities that can be used to identify strengths and weaknesses in literacy skills, using the Common Core Standards (CCS). It is designed to support literacy skills of students in grades 1-12, who read braille, by assessing their baseline literacy skills, providing activities to support basic skills, and monitoring progress over time. The skills measured by the app are aligned to the CCSS and include:

## 1. Reading:

### Speed & accuracy

### Types of miscues

### Reading comprehension

## 2. Writing

### Speed & accuracy (through dictation)

### Types of writing errors

### Knowledge of braille contraction rules

### Proofreading

The reading passages have been selected from current grade level materials and are typical of what a child would read in his or her reading and language arts program. The activities and games are based on research and employ the best evidence-based reading practices that we know of in the field of braille literacy.

## Description of the iBC Activities

## Teachers can add individual students into the app to keep track of that student's activities and progress. Each student has information in the activity center that holds test content specifically chosen for their current age/level of expertise. Instructors can add the student’s name and photo to their page to personalize it.

## The first step is for teachers to determine a student’s level in reading and writing by administering the placement tests in the app. Both the reading and writing sections of the app provide a set of placement tests that allow instructors to gauge a student’s ability. Once identified, a student’s age / level can be added through the student profile page, assuring that test content is age/level appropriate. Age/level is particularly important for early readers; for example at the beginning of 1st grade skills differ than in the middle or at the end of 1st grade.

## The reading placement and challenge tests offer timed reading of an age/level appropriate reading passages. The student’s voice is recorded (on those tests that measure reading fluency). The student answers five multiple choice questions that correlate to common core standards to measure reading comprehension. Instructor listens to the student’s audio recording and codes the students' miscues, such as substitutions, omissions, and insertions, and whether those miscues are self-corrected, use unacceptable semantics, or unacceptable syntax. Braille errors are also noted, such as whether the students' miscue indicates an added dot (for example, reading the letter l as a p), a missed dot (e.g., reading a p as an s), or a reversal (e.g., reading the word "more" as "shall"). Once completed, the instructor can review the results and submit to the database.

In addition to the placement and challenge practice tests, reading games and activities have been designed to help students practice particular braille reading and writing skills. **Braille Hunt** is a game designed to promote tactile acuity and fluency. Students use the braille display to search a string of characters. **Deduction Detective** is a game designed to improve reading comprehension. The student reads a passage and responds to two questions, one recall and one inference. The student’s reading time and correct/incorrect responses are recorded. The **Repeated Readings activity** recycles the *fluency* test content from the Reading Challenge contest and allows the student to re-attempt these contests up to 5 times, or until they achieve a perfect score.

## Writing Placement and Contest activities are also built into the app. Some of these are still under construction, but are similar to the reading activities in that they reinforce evidence-based writing skills and provide practice for writing with speed and accuracy, including correct spelling and punctuation.

iBraille Challenge App Research Questions

This project has the potential to collect a great deal of useful data about braille reading and writing. Some questions will be answered qualitatively with data collected from surveying participants who will respond to questions of app quality, usefulness, and relevance. In addition, actual data from reading performance will be analyzed to learn about braille readers who use an electronic format to read and to validate the iBC as a tool that has potential to increase literacy skills in students who use it..

The first set of research questions are focused on determining if the items within each test are relevant, high-quality, accessible and useful to the construct of the items. The method of assessment will include a series of self-reflective questions to which the students respond for each item on the list.

Teachers and parents will complete a survey in several stages of the project to address questions related to the needs, quality, usability, accessibility, and validity of the app. These data will be part of the formative process.

A summative survey will focus on the need, relevance, quality, accessibility, usefulness, and validity of the app once it has been developed to the point of dissemination.

Other targeted questions addressed by the project are:

* Does the iBC contribute to improving literacy skills? This question will be addressed using objective measures as well as surveys addressed to parents, teachers, and the leadership team.
* Do students who use the iBC show improvement in literacy after 16 weeks of consistently using the app at least twice a week for 30-minutes a session?
* Does using mainstream technology facilitate teacher training which leads to widespread use?
* Do the individual activities reinforce important braille literacy skills such as reading fluency, comprehension skills, spelling, and accurate braille writing?

# Significant accomplishments, including goals achieved to date:

## The project is currently in its fourth of five years, and a great deal of progress has been made as of spring 2016. So far, progress includes these actions:

## Project staff conducted needs assessment

## Creation of the blueprint of the app

## Determined the flow of information

## Developed the app and back end supports

## Developed three web-based data management components

## Teacher / Student validation and demographic information

## Contest / Activity content management system

## Test results database and export tools

## Tested at four school sites during the development phase

## Integrated feedback into a second version

## Conducted over a dozen training sessions to over 60 teachers

* Piloted the iBC with more than 60 students in grades 1-12

## Standardized the training by creating 8 training videos

## Provided technical support throughout

* Conducted 6 professional development workshops for participants

## Analyzed data collected to date.

## Participants so far have felt that the app was of high quality, useful, and relevant to improving literacy, and could be used to improve literacy skills of children. Participants reported using the app weekly and that the students' technology skills improved through use of the app. The teachers' technology skills have also improved through the use of the app and students are engaged in using the technology beyond the scope of the iBC for task such as checking email, taking notes, and using the Internet.

The project is currently in its pilot stage (prior to a dissemination phase). During this pilot phase, teachers, parents, and students are using the mobile app at home and at school with a portable braille device. The research involves teachers giving students a grade level reading assessment that has been adapted into mobile app platform, followed by completing several reading activities that are designed to improve reading skills for children who read braille, monitoring their progress, and giving them a final post-test. A parent component of pilot research will begin this summer, and recruitment for fall testing will occur this spring.

There has been a great deal of interest in the app both within the United States and in other English-speaking countries. Once the app is completed, it will be available through the Apple iTunes store at no charge. Project staff anticipate that the app will be ready for dissemination in 2017.

For more information about this project, contact Cheryl Kamei-Hannan, the principal investigator, at ckameih@calstatela.edu.