

ECE1778 Creative Applications for Mobile Applications

Professor Jonathan Rose

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Final Report: Flip the Script, A dual-language interactive storybook

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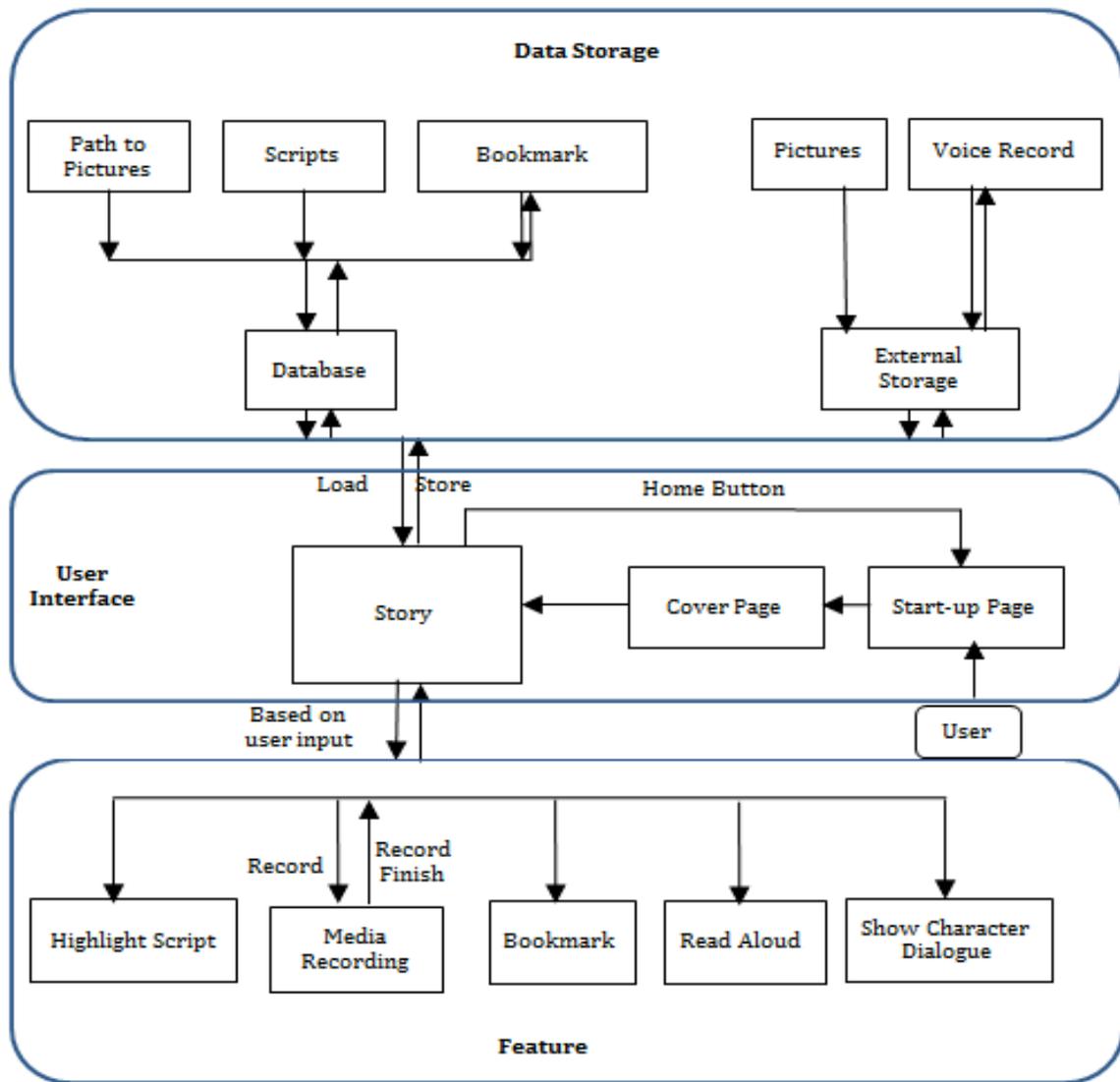
### **Introduction: *Flip the Script*, a tool for language learning**

In the elementary classroom, there are a number of students who are learning English as a second language. Learning a new language is difficult, and there is often a lack of connection between the new language and the student's heritage language or mother tongue. By creating connections between the student's mother tongue and the English language, students learn to code switch, associating meaning to new vocabulary more organically.

Dual language texts provide stories in two languages, which allow students to make connections between their mother tongue and English. These books can be used in the classroom read and lead as a read-aloud by teachers. This was the inspiration for our application.

*Flip the Script* is a dual language storybook that allows students to create meaning by making connections between English and their mother tongue, at home, on the road or in the classroom. They may use the app with a friend, parent or teacher and engage in questions and dialogue that they would hear in a classroom read-aloud. Children can listen to model recordings to improve their grasp of pronunciation and fluency, record their own readings to practice and self-assess, and read character dialogue or answer questions about the story.

## Flip the Script: Block Diagram



**Figure 1.**

Our application consists of three major layers: Data Storage, UI and Interface and Features. (see Figure 1.)

In the Data Storage layer is the database where story scripts are and bookmarks are stored and a file path to stored background pictures. External storage is used to store background pictures and audio recordings. Each time the user executes an instruction data will be retrieved from the database or the external hard drive directly for further processing.

In the User Interface layer is the Start-up Page, Cover Page and Story. Our application starts with a Start-up Page followed by a Cover Page. The Start-up Page contains a simple tap to start the application. The Cover Page contains three buttons: Read Aloud (go through story with only Read Aloud while disabling other features), Bookmark (go to the bookmarked page) and Story (go through the story with the option of using all features). When a user accesses the Story, scripts and corresponding translations for each page are loaded from the database. The background picture (following file path stored in the database) and audio recording for each page are loaded from the external hard drive. On each page the user can interact with the story using five different features.

The Features provided in our application are Highlight Script, Character Dialogue or Question, Bookmark, Read Aloud, and Media Recording.

Users are able to highlight script on each page. This function takes pre-loaded text scripts from the database, then segments the text into chunks based on a symbol previously placed in the text file. When the user taps the English text, the function determines the position the user has pressed and calculates which chunk needs to be highlighted.

A clickable speech bubble icon is available on each page. When the user taps the icon a question or character stored in the application is invoked based on the current page number. This new text will replace the story text shown by default and the user can tap on the icon again to reset back to default story text.

A bookmark button is available on each page. Clicking the button creates a bookmark flag and the flag is stored in the database as a separate column. When the user accesses the Bookmark function on the Cover Page, the flag is loaded from the database and the specific page content will be populated.

A read aloud button is available on each page. When the read-aloud option is selected, the system first checks if the correct page is visible to the user, next the system loads all of the information for that page, and then the system simultaneously implements the script-highlight and sound-play functions. The functions repeat themselves if swipe to a new page. An algorithm measures the duration of the model audio file and the length of the English text to determine how long each word will be highlighted. Margins have been added for each comma, the beginning and the end of the sound file. Once the user taps on the button, a model audio file will play and each English text word is highlighted.

Users can perform media recordings on each page. There are two icon buttons used to record sound files: Mic and Stop. The Mic button is used to start a voice recording and the Stop button is used to stop a voice recording and write data into a file and save it on the phone's disk. Additionally, a Play button is provided which works as three different functions, play, pause and resume. When playing a sound file, the Play button is replaced with the Pause button and changed back when the sound file is paused.

## Statement of Functionality

We have successfully implemented all of the functions planned in our block diagram.

### Highlight Script

If confused or curious about the meaning of a sentence, the child can highlight the text and see the corresponding translation. As shown in Figure 2a and 2b, the English text is highlighted along with its matching translation in Urdu. Once the child taps on new text segment that segment is highlighted and the previous selection returns to yellow.

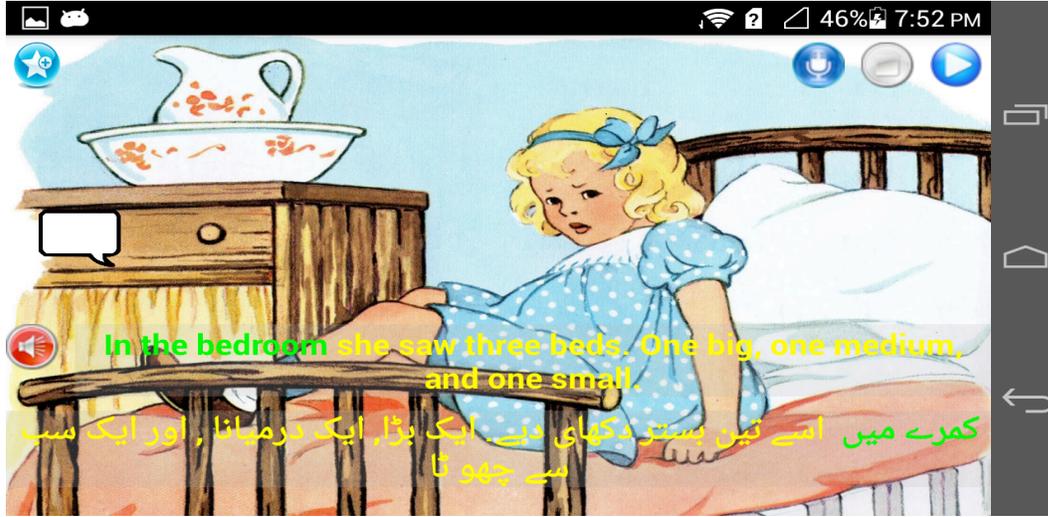


Figure 2a. Text Highlight of a Sentence Segment

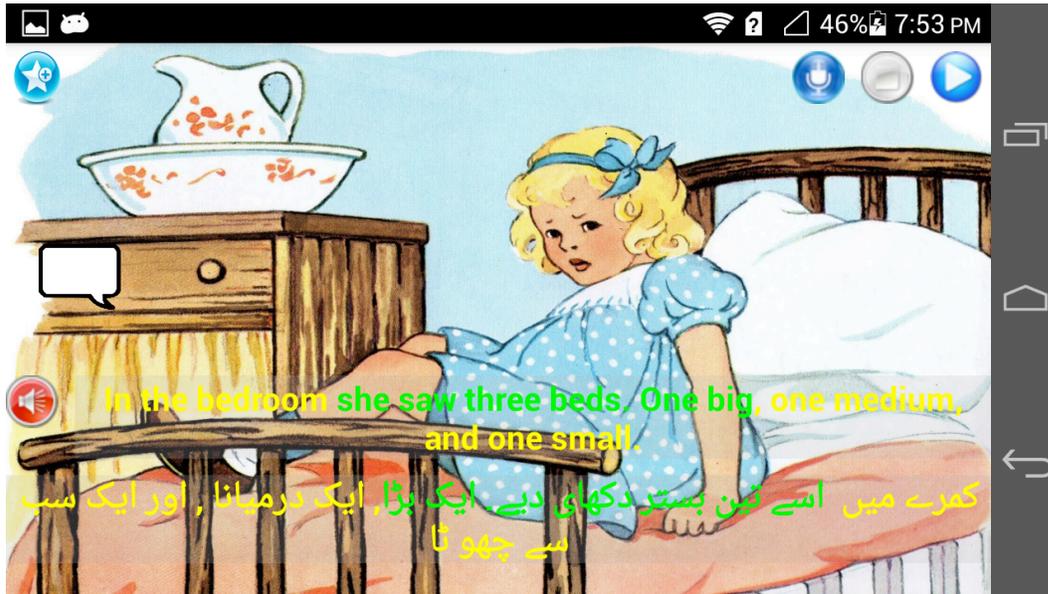


Figure 3b. Text Highlight of a Sentence Segment

### Read Aloud

The Read Aloud provides a recorded reading of the sentence, which helps children develop a sense of cadence and pronunciation. The child can tap the red speaker button beside the English text to start the Read Aloud (text highlighted word by word as the audio is played) as shown in Figures 3.



Figure 3. Read Aloud Frame 1

### Read Aloud Whole Story

If the child would like to listen to the whole story without interruption, they can select the read aloud button on the Cover Page of the application (Figure 4). By selecting this button, the system will know to automatically play the sound files and highlight text on each page.

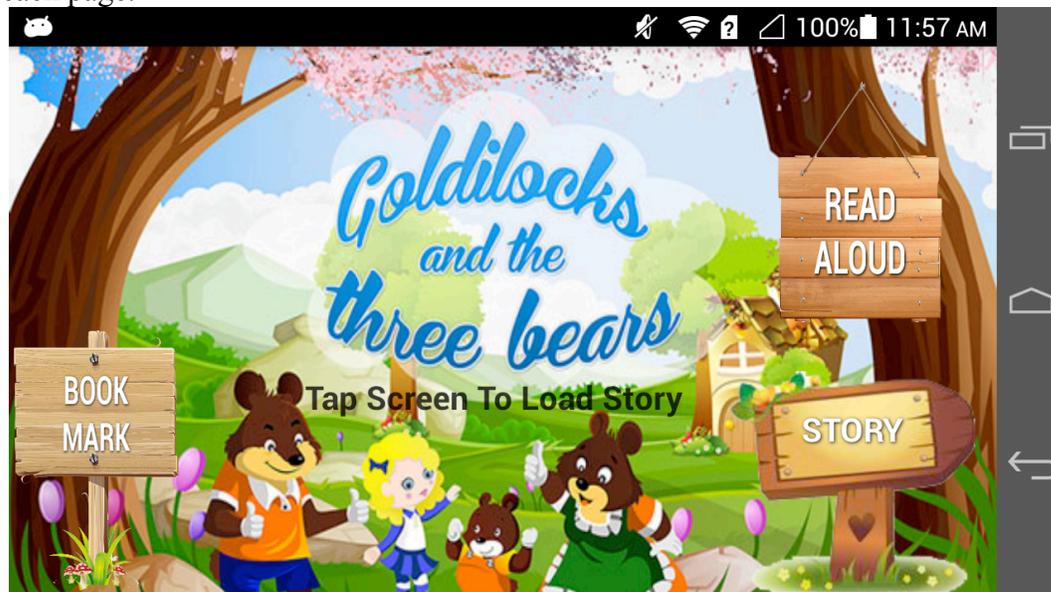


Figure 4. Read Aloud button on Cover Page

In Figures 5a and 5b, we can see that the sound and script highlight is implemented, leaving all other functions disabled. Children can swipe from page to page and the sound file and highlight function will be automatically executed.

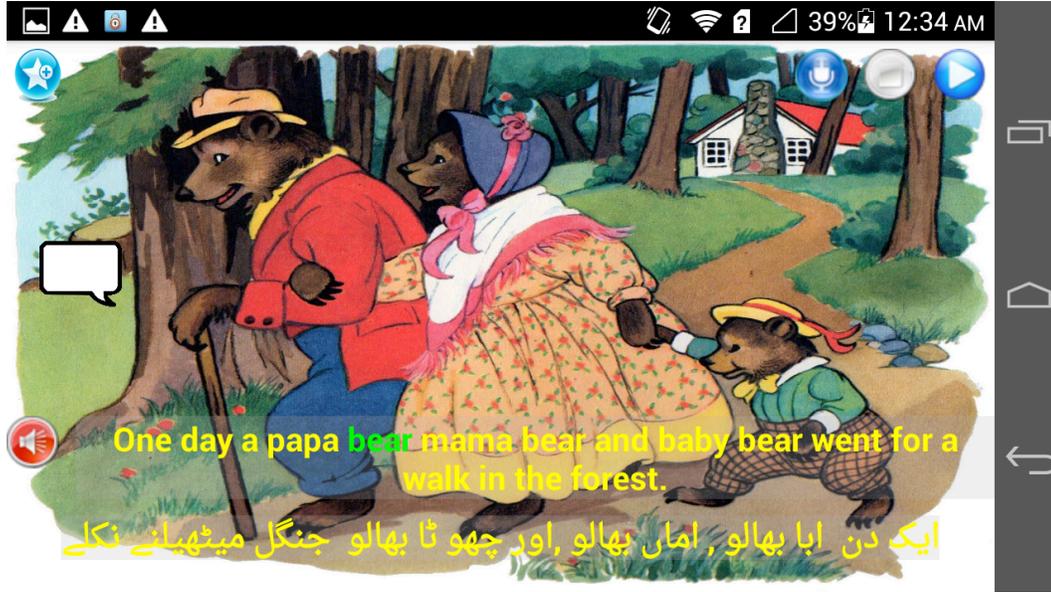


Figure 5a. Read Aloud on 1<sup>st</sup> page.



Figure 5b. Read Aloud on 2<sup>nd</sup> page.

### Character Dialogue & Questions

In order to enhance their learning experience, children can engage in dialogue or questions throughout the story. Each page contains an icon on the left above the English text. When the child taps the icon, character dialogue or a question will pop up (Shown in Figure 7).

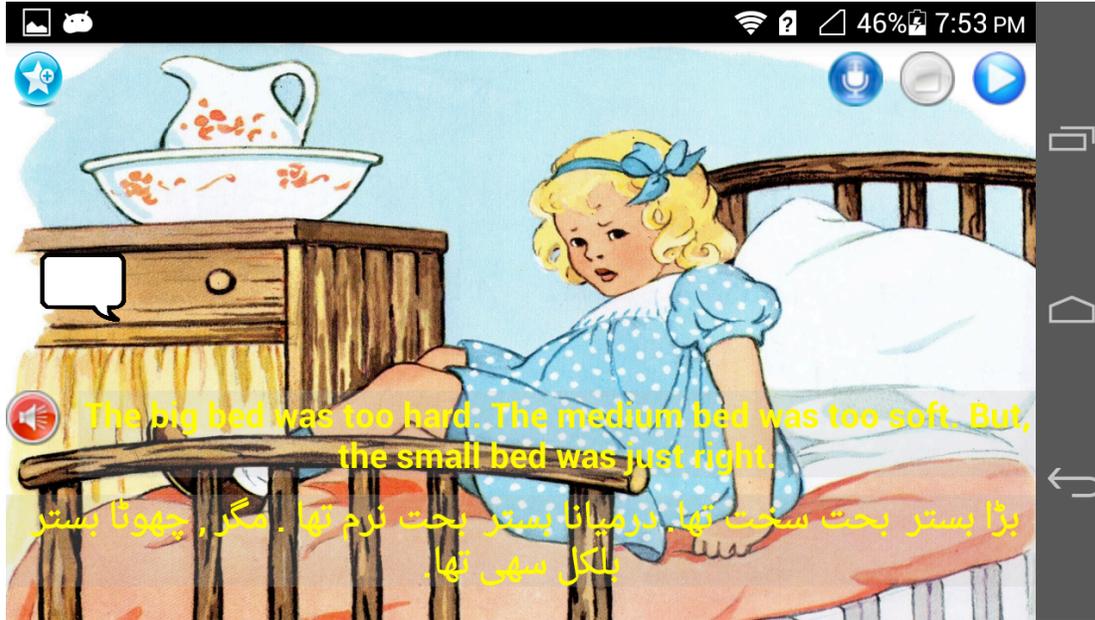


Figure 6. Screen Prior to selecting speech icon

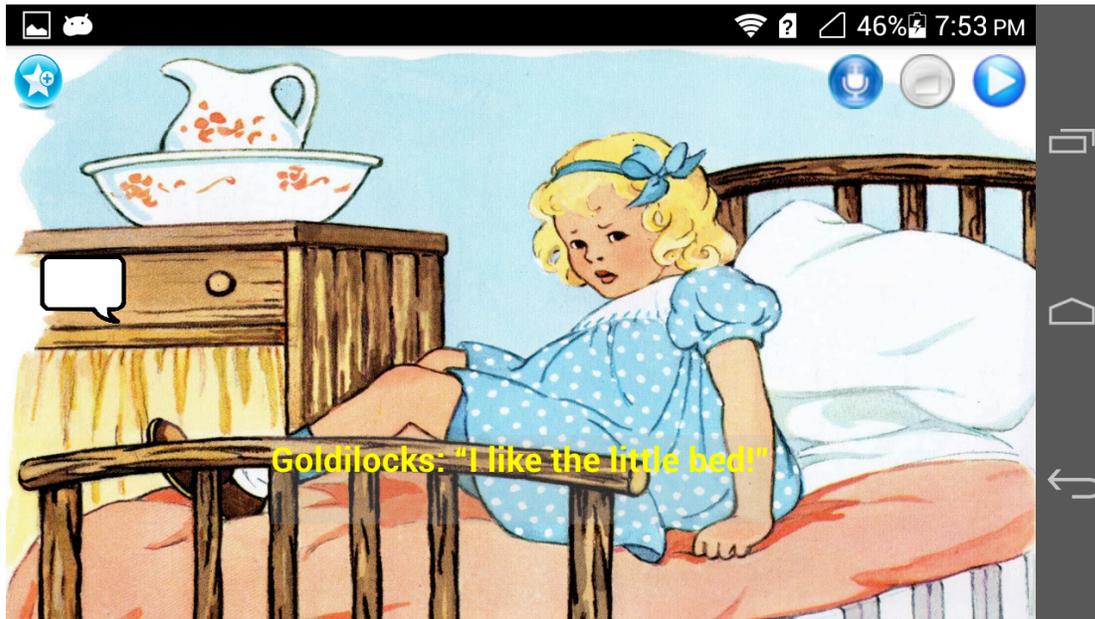


Figure 7. Screen after selection of speech icon

## Bookmark

The Bookmark allows the child to bookmark a specific page and come back to this page in the future without the need to going through the whole story again. As shown in Figure 8, a child can click on the bookmark button at the top left corner to mark a specific page. The child can later use the Bookmark button on the main page (shown in Figure 9) to come back to this specific page later on.

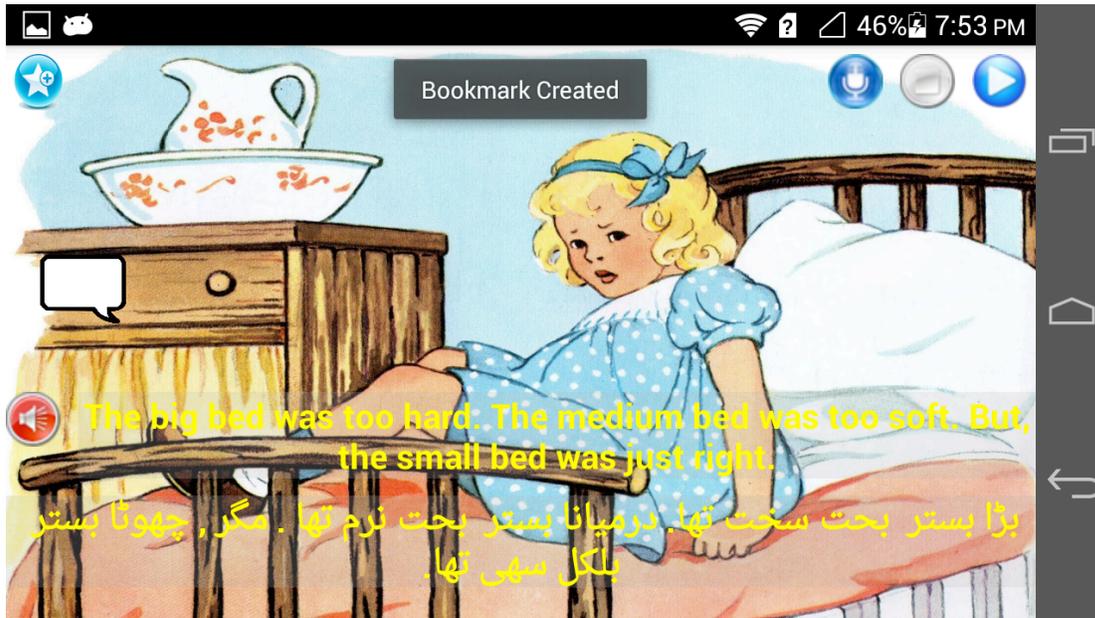


Figure 8. Creating the Bookmark

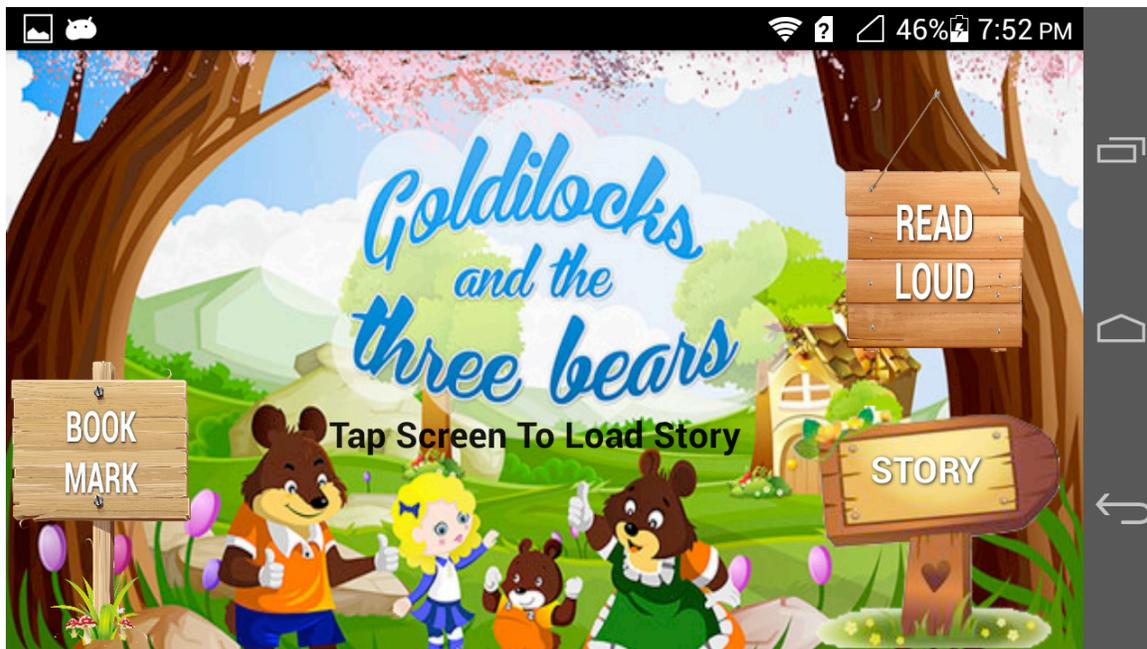


Figure 9. Accessing a Bookmark from Main Page

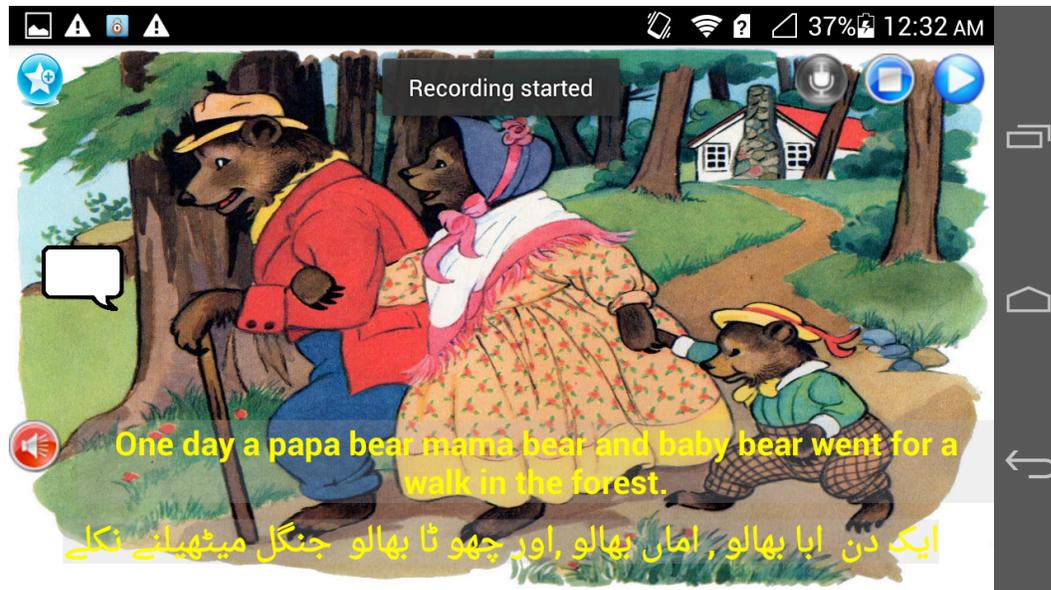
## Media Recording

The child can own create their own recordings on each page by tapping the Mic and Stop buttons at the top right of the screen. Upon entering a new page, the Mic button is enabled and the Stop button is disabled so that the child must tap on the Mic button to start a recording. (Figure 10 shows the initial status of each button.)



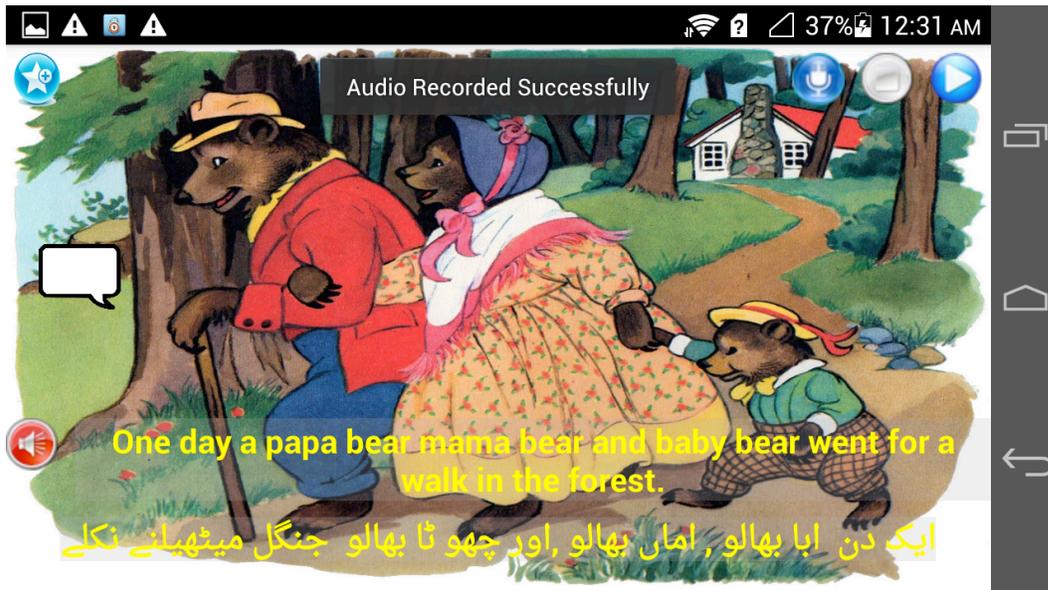
**Figure 10.** Initial status of three buttons

Once the Mic button is pressed, and students begin to record, the Mic button itself becomes disabled and the Stop button is enabled, so that the child's only option is to press Stop to finish the recording.



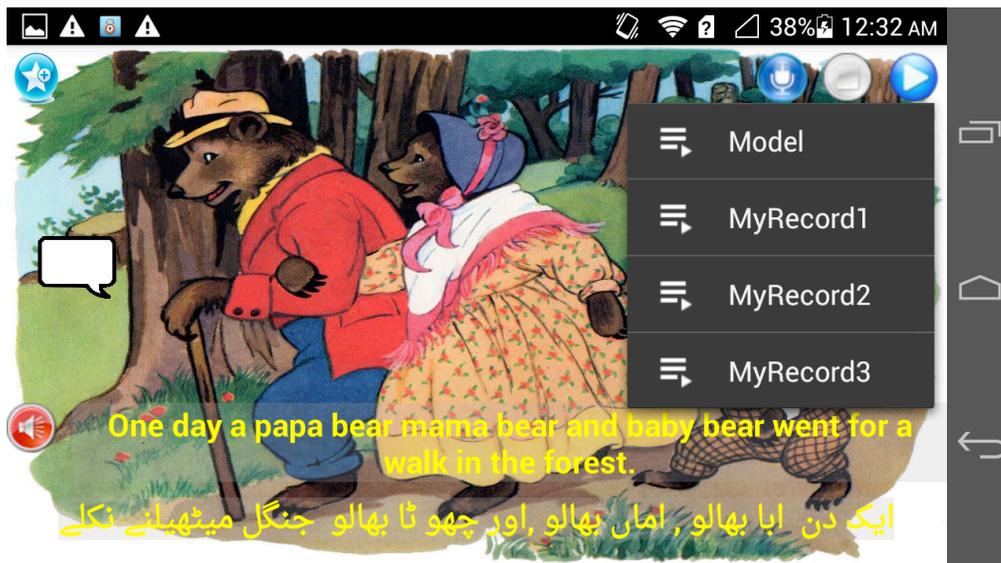
**Figure 11.** Recording started, Stop button enabled

Once the child presses stop, the recording is stored the file on the phone's disk and both the Mic and Stop buttons are reset to their initial status. (see Figure 12)



**Figure 12.** Recording complete, stored on phone disk, and buttons reset

If a child would like would like to listen to the model recording to practice pronunciation and cadence, or listen to their own recordings in order to practice or self-assess, they can tap on the play button. A file list will pop up containing all files for that page. (Figure 13)



**Figure 13.** File list pops up

Model sound files (used for read-aloud) are protected so that the child cannot delete them, however, their own recordings can be either played or deleted. (Figure 14)

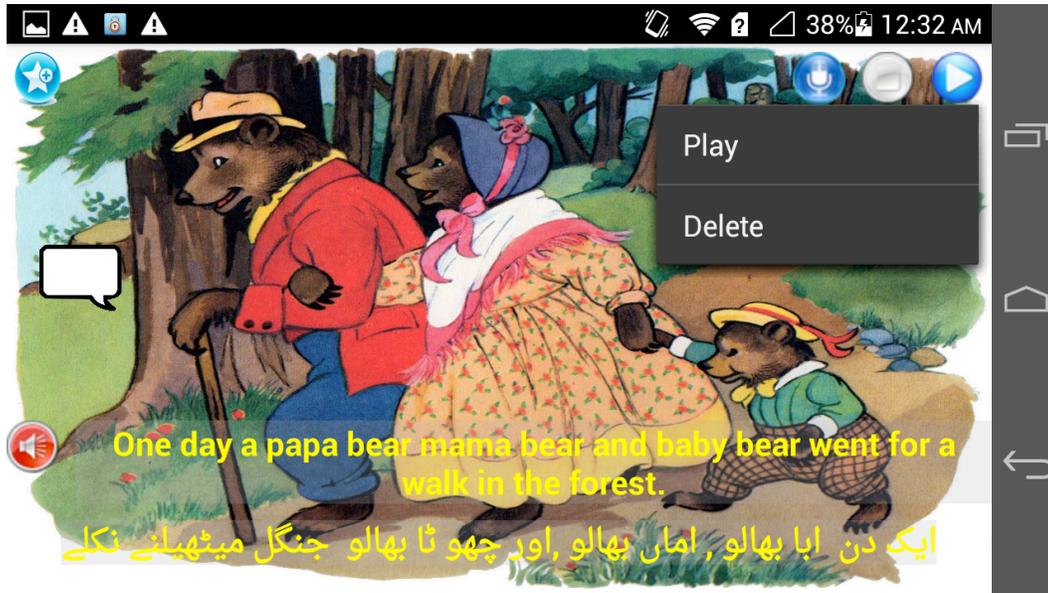


Figure 14. Second option pop-up

An alert message will pop up to check if the child actually wants to delete one of their voice recordings. (Figure 15)

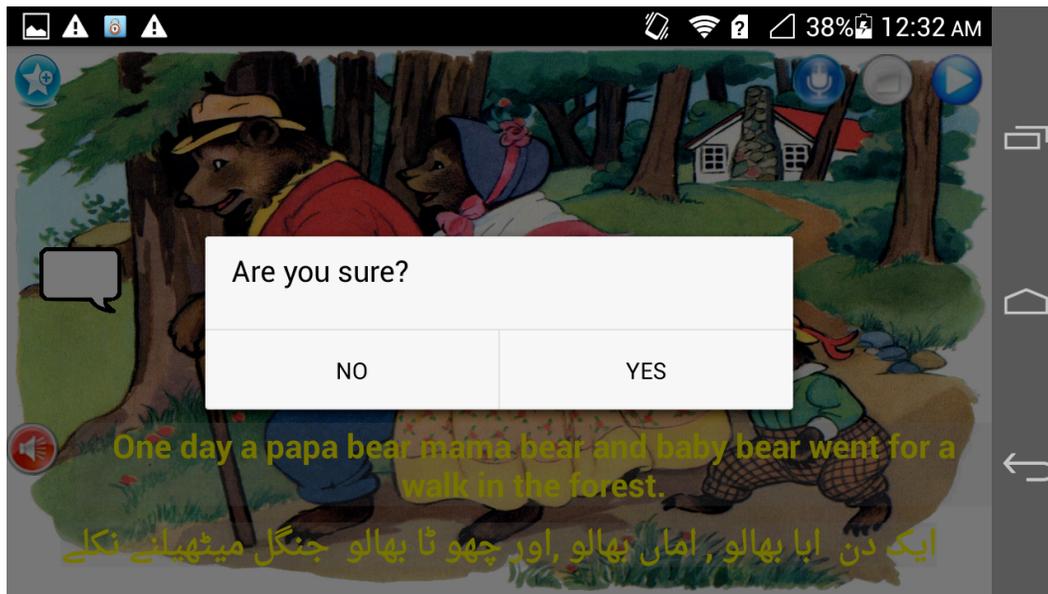
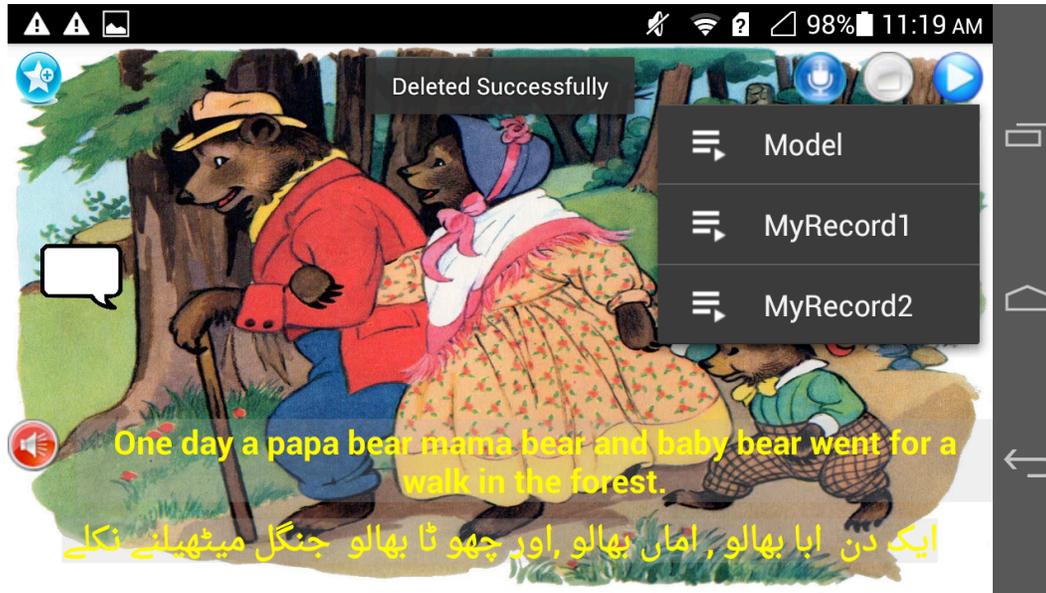


Figure 15. An alert message

If the child selects “yes” then the file is deleted and the pop-up list is modified. In Figure 16, “MyRecord3” has been deleted successfully and now there are only three files in the popup file list.



**Figure 16.** Successful delete of MyRecord3

After selecting to play a sound file, the Play button is replaced with the Pause button. The child can now pause the recorded sound file, as they need. Once the child taps on the Pause button, it changes back to Play button and the Stop button is enabled to completely stop playing the current sound file. Once the sound file has finished playing all buttons will be reset to their initial status. (Figure 17 and 18)



**Figure 17.** Pause button enabled



Figure 18. Sound file paused, play button enabled

### Key Learning

As a group, we kept a consistent dialogue throughout the project by using Skype and email when we are unable to meet in person. As the project went on, we took more and more opportunities to meet in person. This allowed us to work out the problems we were facing in the development of the app as a team.

If we were to engage in a project like this in the future, we would reach out and ask for more feedback or guidance throughout the project. We would pay special attention to thinking about how to construct an effective narrative to describe and introduce our app to an audience who is completely unfamiliar to language learning in elementary education.

### **Contribution by Group Members**

Yuxin worked on the design and implementation of the backend of our application. He created the database to allow data storage (which included story scripts and pictures).

He implemented swipe view to move from page to page, text highlight, bookmark and character dialogue features created the Read Aloud synchronization algorithm. In addition, Yuxin worked with Sameen on accurate sentence segmentation and translation alignment.

Maosen worked on the design of the user interface and the media recording functions of our application. He customized the buttons on each page, the start-up page and cover page, implemented the page swipe animation based on source code, and finalized text colour and highlight based on source code. Maosen created the function to record, save, delete and listen to files on each page. He linked the model sound file with Yuxin's synchronization algorithm to complete the Read Aloud function.

Sameen wrote an abridged version of the story "Goldilocks and the Three Bears" and a matching translation in Urdu. She wrote dialogue and questions to mimic classroom read-alouds, and found pictures appropriate for the story at the elementary level. She collaborated to give input on what kind of UI would be most accessible for students. Additionally, Sameen worked with Yuxin to explain translation between Urdu and English to ensure that translation highlight on each page was accurate.

## **Impact of *Flip the Script* on language learning**

**Sameen Ahmad, BEd primary/junior, MEd student**

In my three years working with English language learners at the elementary level in Seoul, Korea I observed that language learning was most successful when I included my students' mother tongue into the classroom environment. Oftentimes, language learning operates in isolation, for example English language learners are expected to immediately speak, read and write *only* in English. Through eliminating the learner's heritage language from the language learning equation, we also eliminate the learner's sense of ownership. This proves detrimental to the learner's progress in a new language, because they must study everything outside of any relatable context. I believe that *Flip the Script* is relevant in addressing this issue in language learning because it allows students to contextualize English based on their own heritage language.

A large part of telling stories in the classroom, or the 'read-aloud' involves asking questions, making observations, and initiating dialogue with students. These techniques encourage a richer understanding of the text. *Flip the Script* includes this added piece so that children can mimic what they might do in the classroom at home.

Parent of new language learners are anxious to help their children, but they if they are unfamiliar with the new language as well, this presents a roadblock. *Flip the Script* is an example of parents and children can do at home together to encourage understanding and development. Oftentimes, parents who speak a language other than English are cut out of their child's education, simply because they are not able to access the material. *Flip the Script* could provide a bridge between the classroom and the home, between the child and the parent, and between the teacher and the parent. If we provide more links for parents to be involved and engaged in their child's learning, learning extends far beyond the classroom.

## **Future Work**

As we continue to develop this application, we would like to include multiple stories in multiple languages and allow children to choose their language after the start-up page. We would want to allow children to download new stories through a server, and make it provide model recordings (for the read-aloud) in all languages available in the application. This application began as an idea for helping students learn English as a second language, but upon reflection it could be an effective tool to also help children practice reading in their mother tongue.

Another idea that we would like to explore is the possibility to link the app to the classroom by creating a separate server to connect teachers with their students. We would want students to be able to send teachers questions that can be followed up directly or in class and also give teachers the opportunity to monitor student progress in the story.

Finally, we would like to improve the user interface by adding animation and sound effects in addition to the illustrations.