Designing Mobile-Phone Based Educational Games to Improve the English Literacy Skills of Limited English Proficient (LEP) Adults

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Abstract

English is one of the most commonly used languages in international business, and therefore, some level of fluency in English becomes a pre-requisite for many employment opportunities. Due to their limited English proficiency and a lack of opportunity to improve their English skills, a variety of adult populations are disadvantaged in many ways including career advancement and societal acceptance. For example, low-skilled immigrant laborers in countries such as Qatar and the USA have limited English proficiency, which is often a barrier to their career advancement and creates communication problems with their supervisors. Similarly, limited English skills make it harder for refugee populations to find jobs and adjust to the local culture in their host countries. Also, the average deaf adult in the USA reaches only a 4th grade English reading level. Our work aims to address the problems of limited English proficiency among adults by providing these groups with a low-cost, easily accessible, fun tool for enhancing their English skills.

Mobile phones are the most prevalent and accessible computing technology for people of all ages and incomes. Related research efforts by several groups have demonstrated the success of mobile phone-based educational games in improving English literacy skills among primary school students. The goal of our work is to investigate the effectiveness of mobile phone-based educational games on adult English literacy. Our literacy tool consists of two parts: a single player game accessible on a mobile phone, and an online content authoring system which enables teachers to add useful educational content to the games. We incorporate proven techniques from expert teachers into these educational games, along with graphics and game concepts that motivate adults to play these games. The combined result is an effective and ubiquitous tool for enhancing English literacy skills among adults with limited English proficiency.

Acknowledgements

I can't imagine having done this project with anyone else, and I would like to acknowledge the support and motivation provided by my advisor, M. Bernardine Dias, at every point over the last one year. Her belief in me has gotten me through tough times and I have learned so many valuable things through this project. ☺. Special thanks also for lending me a working space in the Robotics lab and for all the patience through the missed deadlines and excuses.☺.

There are a multitude of people who were involved in this project that deserve more than a mention on this page. Dr. Yonina Cooper, for her valuable support; the TechBridgeWorld team (Sarah Belousov, Ermine Teves, and Frederick Dias), for all the help with IRB's and field testing (and a very fun time in Pittsburgh!); Dr. Silvia Pessoa and her students, for support, encouragement and for all the help with conducting field testing at the RAEL program in Doha; John Roberston and Robert Monroe, for support and funding for the phones; the Senior Thesis committee (Mark Stehlik, Majd Sakr, Iliano Cervesato, Kemal Oflazer) for valuable comments during the presentations; Ray Corcoran and Enrique Isidro, for helping with the field testing with the service attendants in Doha; Hatem Alismail and Frederick Dias, for the technical help and support with this project (and bearing with my emails at all inappropriate times ☺ , sorry about that!).

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1. INTRODUCTION

Globalization has propelled the need for a common language that can be used for communicating across international boundaries. English has become one of the most important languages used in international business, technology, and everyday life. Therefore, some level of fluency in English becomes a pre-requisite for many employment opportunities around the world. In today's globalized world, the ability to communicate in English can outweigh experience and other skills in priority when considered for career advancement and employment opportunities, and can allow a person to acquire a variety of skills where the medium of instruction is often English (for example, computer and software instruction), thereby further enhancing opportunities for career advancement. A reasonable grasp of the English language therefore allows an individual better career opportunities and standard of living in many countries, and was demonstrated through the positive correlation between earnings and English language ability found in the US Census of Data of 2000 [**1**].

Limited English language skills, which are due to reasons ranging from lack of opportunities and resources in education to lack of access to qualified teachers and also difficulties of the nuances of the language, can disadvantage individuals in many populations. This senior thesis project seeks to improve this situation for low-skilled immigrant laborers and deaf youth; two very different populations that face constraints in enhancing their English literacy skills.

Low-skilled immigrant laborers are people who migrate looking for job opportunities to countries like Qatar and the United States of America, which are countries with strong economies and job opportunities that exceed their human resources. The immigrant laborers' population is typically characterized by a limited educational background, low wages and low-skilled jobs in the construction, household, and service sectors. Their limited English skills cause them to face barriers in career advancement, perform poorly when communicating with supervisors and other authorities, and feel helpless in matters of negotiating their pay, vacation, and accommodation. These problems lower their standard of living and make it hard for them to assimilate and adjust into the foreign culture. The lack of societal acceptance or assimilation of the immigrant laborers into the host country's society is a serious concern as they make up a significant proportion of the country's population, 79.5% of Qatar's population [**2**] and 12.5% of the US population [**3**].

This senior thesis project explores the use of ubiquitous computing technology to provide the immigrant labor population with means to improve their English skills in a very affordable, engaging, and practical manner. Today, mobile phones contain the most accessible and ubiquitous computers. Almost everyone, in both developed and developing communities, has frequent access to a mobile phone. People use their mobile phones for many tasks beyond communication, including storing and accessing videos, music, and pictures, and playing games. Mobile phone games are popular among adults and children alike. This senior thesis will therefore explore the use of mobile phone-based games to improve the English literacy skills of immigrant laborers and other adults with limited

English proficiency. The approach taken will be to first understand how English is taught to non-native English speakers and/or to deaf populations, study what technology solutions already exist to help improve English literacy, and finally to incorporate both effective teaching techniques and lessons learned from previous projects into the implementation of an effective solution. The next section will describe the challenges faced by the above mentioned groups in learning English and some of the effective techniques used in English as a Second Language (ESL) instruction, the use of educational games to improve English literacy skills in children, and a brief literature review on the various technologies that try to help improve English literacy.

2. Literature Review

To make an effective tool for teaching English, we need to understand what are some of the challenges faced by adults in learning English as a second language and what are the most effective techniques used by professional ESL instructors.

2.1 English as a Second Language Instruction

There are four components of reading: Vocabulary, Alphabetic and Word Analysis, Fluency and Comprehension [4]. Some of the common techniques in teaching each of the components in reading will not work for adults who are not native English speakers. For example, some of common techniques used to teach vocabulary are teaching words in semantic sets and understanding vocabulary through context [4]. For non-native English speakers, this is difficult because when you present semantic set of words or similar set of words (for eg, days of the week or colors), the adult learner gets confused. Also, using context to understand vocabulary requires the adult learner to know about 98 % of the words in English which is not the case [4]. The adult learners could probably guess the meaning from context, but wouldn't gain any knowledge or understanding of the new vocabulary. Similarly, some of the common techniques used for teaching alphabetic and word analysis, which is the process of using letters to present meaningful spoken words, are to assess beginning reader's knowledge through pronunciation and to assess letter-sound knowledge [4]. The problem this presents for non-native English speakers is that they don't already have a vocabulary base in English and therefore, strategies relying on oral comprehension will not work [4]. For Fluency, one of the common techniques is to involve teachers to do repeated reading of texts. This presents problems for adult learners in that the native language might interfere in terms of stress, pause and intonation. Finally for comprehension, the common techniques are to give students cloze passage exercises and to require them to summarize short paragraphs. With non-native English speakers, there could be cultural differences in text that would make it hard for them to understand and summarize the text [4].

Keeping the difficulties faced by the non-native English speakers in mind, below are some suggestions and techniques, taken from the article "How should Adult ESL Reading

Instruction differ from ABE Reading Instruction?" by Miriam Burt [**4**], that could be used to make English learning easier for adults.

- Pre-teach vocabulary in a passage
- Avoid presenting synonyms or antonyms or words in the same semantic set
- Provide multiple exposure to specific words in multiple contexts
- Use of bilingual dictionaries, word cards, and regular tests
- Teach English letter-sound correspondences
- Identify parts of speech and their roles
- Make students listen to native speaker model of the reading to improve fluency in reading
- Build on learners culture and experiences whenever possible
- Pre-teach vocabulary and preview unfamiliar ideas and actions etc
- Use visual aids and physical objects in instruction
- Assess learner comprehension through short questions, summary writing after pre-teaching vocabulary, previewing cultural contexts and discussing the text

2.2 Educational Games for Literacy

In order to make ESL instruction more effective and engaging, teachers tend to use classroom activities and games. 'Games are highly motivating since they are amusing and at the same time challenging. Furthermore, they employ meaningful and useful language in real contexts' [**5**]. Games can be to used to introduce new concepts or to revise concepts learned in class, and should typically be used at all stages of the class. Games allow students to relax and have fun, therefore, helping them learn and retain words more easily [**6**]. Thus, games are really effective in motivating students to learn and decreasing their fear of a foreign language.

2.3 Use of Mobile Phones for Promoting Literacy

With the prevalence of technology in every sphere of life, it is only natural that technology will be used to try and improve literacy and education. In the recent past, a lot of projects have utilized mobile phones to promote literacy skills. Some examples are described below:

2.3.1 Mobile Immersive Learning for Literacy in Emerging Economies (MILLEE) [7]

FIGURE 1: STUDENT USING MILLEE GAMES

MILLE E is a project initiated at the University of California, Berkeley to promote English literacy among primary school students in rural India. Students in villages in rural India and slums cannot afford schooling and are not motivated to learn. Mobile phone games present a very engaging and motivating platform for primary school students to improve their English skills. The games focus on simple English language skills such as vocabulary, phonetics, sentence composition and spelling. Their field study in India showed that game play can produce significant learning benefits, and results for a set of 25 students show that the scores improved from 1.97/5 to 3.85/5 after playing the games for four months [**8**].

2.3.2 SMS-based literacy initiative

Pakistan has a high percentage of illiterate population and as a measure to increase the literacy levels, a pilot project that made use of mobile phone was started in 2009 where learners would receive informative text messages daily in Urdu. The learners will be evaluated every month to assess gain in knowledge and understanding. According to results, at the beginning of the program only 28% of the students managed an A and this number increased to a 60% at the end of the pilot program. This is an interesting use of SMS application and technology to promote literacy.

Literature review shows that mobile phones are an most ubiquitous technology that can be used in interesting ways to promote English literacy skills. In addition, educational games in class promote learning and keep the students motivated. The thesis looks to combine mobile phones and educational games and use the techniques provided by ESL instructors to come up with a viable solution to address the limited English literacy skills of immigrant laborers.

3. Thesis Goals

Most of the existing technology solutions that support English learning are targeted at primary or secondary school students in modern societies that have access to computers and resources that will support these technologies. For user groups like immigrant laborers, there are several constraints that make it hard to implement the same solutions. The immigrant labor group is characterized by long working hours, low wages and strict working conditions, which indicates that they do not have the time or resources to access many English classes. They also mostly do not have frequent access to high end technology like computers or smart phones or services like the Internet. Some workplaces have tried to address these issues by providing on the job training or ESL classes while others have tried to provide technology on the job (for example, Kelsa+ at Microsoft Research India [9]) where the laborers can access these technologies in their free time and seek to improve their skills. However, that is not the case in most places, especially in countries like Qatar and the USA. Therefore, there is a need to design a technology solution that is easily accessible and cost effective for these targeted users.

Moreover, many of the existing technology solutions for enhancing English literacy have user interfaces that are targeted towards primary and secondary school students. The same graphics and motivators will not be appropriate for the adult user groups, because of the difference in age, interests and cultural backgrounds. Hence, these user interface and graphics must be modified to better appeal to adults and be more relevant to their needs to encourage usage. Determining the various factors that motivate adults to use a tool to learn English in their own time will require some research as well.

The goal of this senior thesis is, therefore, **to design a low-cost and easily accessible educational and engaging tool that will enable guided practice of literacy skills for low-resourced adult users with limited English proficiency**.

Our approach to achieving the thesis goal is **to implement a mobile phone based educational game that is designed to improve the English literacy skills of the targeted adult user groups.**

The motivation for the "mobile phone" aspect of the solution comes from the fact that almost everyone, in developed and developing communities, owns a mobile phone. Various educational and income generation projects based on mobile phones, such as MILLEE [**7**] , Grameen Phone [**10**] and aAqua [**11**] , have also been successful in the past. Several of these projects have also been implemented using lower end phones and in societies with limited computing resources.

The "educational game" aspect is inspired by the fact that games are a fun way to practice English exercises, and educational games are employed by teachers in classrooms to motivate students. In addition, according to research conducted by the NPD Wireless Industry Market Research group in 2006, 29% percent of the mobile games were downloaded and played by adults aged between 25 and 34 [**12**]. Thus, there are indicators that show adults enjoy playing mobile phone games and our work seeks to leverage this fact to motivate adults to increase their practice time on guided exercises for improving English literacy.

All of the previous mobile phones for literacy projects have been aimed at primary school students, and therefore, modifications will be required to both the content and graphics of the games. Content should be presented at a level that is best suited for adult learners, and yet simple and effective at the same time so that it is accessible via a mobile phone. Also, the motivators for the game should appeal to an adult user.

The following sections will elaborate on the technical approach, user groups identified to participate with, needs assessment, implementation of the game and field testing results.

4. Needs Assessment

In order to make an effective tool that helps adult user groups learn English, it is important to understand their cultural and educational backgrounds, and customize the tool to meet their needs and interests. Needs assessment is a critical phase that will impact the technology development, and the researchers will need to identify and interview user groups to understand how this tool can be customized for their successful learning.

For this project, we identified several user groups that will benefit from this thesis work. As mentioned in the introduction, immigrant laborers who have limited English skills face barriers in career advancement and have problems in communicating with their supervisors.

Learning English will be beneficial for this group in order to advance their career ladders and to better seek and qualify for employment opportunities. In addition to immigrant laborers, we discovered that the project will also be beneficial for deaf youth, who have trouble grasping the English language due to the stark structural differences between English and American Sign Language. The average deaf adult in the USA reaches only a 4th grade English reading level, and only 10% (approximate) of 18 year olds can read at or above an 8th grade level [**13**]. Deaf individuals usually have "severely limited vocabulary and lack knowledge of the complex syntax of English that is critical for combining sentences together into cohesive text" [**14**] . Noun verbs, articles, noun-count nouns and verb tenses are some areas of English where deaf individuals have syntactical trouble. Their difficulties with communicating in English also add an extra layer of complexity for deaf employees at work places which are shared with both deaf and non-deaf individuals, in addition to limiting their opportunities for career advancement.

For our needs assessment phase we contacted several organizations that work with immigrant laborers and deaf youth. These groups are introduced next.

4.1 User Groups

The Literacy Tools Project titled "Mobile Phone Games to Improve the English Literacy Skills of Limited English Proficient (LEP) Adults" has received IRB approval with the IRB certificate number HS09-588. The groups ROTA Adult English Literacy Program, Service Attendants at CMU-Q, Western Pennsylvania School for the Deaf and Catholic Charities all belong under the same IRB Certificate.

Reach Out To Asia (ROTA) Adult English Literacy Program

FIGURE 2: ROTA LOGO

Reach Out To Asia (ROTA) [**15**], a non-governmental charity organization in Qatar, started an Adult English Literacy program where they teach English to immigrant laborers working with construction companies. In its second iteration, ROTA partnered with the Al Jaidah group to teach basic and intermediate English skills to some laborers. The laborers volunteer to join the classes and are awarded with certification at the end of the 8 week program. The interests of the user group are perfectly aligned with the goals of this thesis research, since they want to learn English and have taken initiative by enrolling in a structured classroom. Dr. Silvia Pessoa, an English Professor at Carnegie Mellon University in Qatar prepared the curriculum, pre and post tests for the basic and intermediate classes at the RAEL program. Dr. Pessoa has been extremely supportive of the research project and has agreed to allow the literacy tools project to be based on the curriculum she designed for the RAEL program. In addition, Dr. Pessoa is also teaching a class at Carnegie Mellon titled "Community Service Learning" where she teaches her students effective techniques to teach English to the migrant laborers. Her students, in turn, teach the laborers at the RAEL program.

Service Attendants at Carnegie Mellon Qatar Campus

The service attendants at the Carnegie Mellon Qatar campus are another user group that will benefit from this thesis work. They have to communicate with professors and students from different cultures where the common medium of communication is English, and therefore, learning English skills will be highly beneficial for this group. This user group was contacted and the project was explained to them with a request for voluntary participation in the project. The 100% positive response indicated high interest and willingness to learn English.

FIGURE 3: CMQ LOGO

This user group will not have a structured class environment where they are taught English concepts but they will be asked to play the games and will be tested for improvement in scores. This gives us the opportunity to test if the game itself has caused improvements in the English skills, as the learning happens only while playing the game and not in any class. We used the RAEL program content and tests for this group as well, with permission from Dr. Pessoa.

7th and 8th grade students at the Western Pennsylvania School for the Deaf (WPSD)

FIGURE 4: WPSD LOGO

The middle school students at the Western Pennsylvania School for the Deaf (WPSD) are another user group selected for this thesis project. Considering the difficulties faced by deaf individuals in learning English grammar concepts, this user group can potentially benefit from additional practice in English exercises through the mobile phone game. Since the individuals in this user group are teenagers, the game concept will be effective in motivating the students to participate in the project. The teacher, Ms. Joyce Maravich, provided the content for the game as well as administered the pre- and post-tests. This user group adds an interesting dimension to the group by adding another age range to the project.

Refugees at Catholic Charities, Pittbsurgh

FIGURE 5: CATHOLIC CHARITIES LOGO

The refugees at the Catholic Charities are another user group that will benefit from the Literacy Tools Project. The Catholic Charities in Pittsburgh hosts refugees from a lot of different countries who have limited English skills and face problems finding jobs and settling down in the United States. We are still communicating with the administrators at Catholic Charities to determine the content and curriculum for the

project; however, earlier discussions have determined that curriculum will deal with basic conversational and financial literacy.

4.2 Needs Assessment Outcomes

Before conducting needs assessment, we applied for and received IRB approval to work with each of the three user groups. The interviews conducted covered questions regarding their current English skills, their mobile phone usage and their hobbies and interests. This is so that the tool can be customized based on the needs and interests of the user groups. The interview questions used for the immigrant laborers are shown in **Appendix A** and those used for the deaf students are shown in **Appendix B**. Needs assessment with the Catholic Charities group has been delayed due to logistical complications on their part, however, needs assessment with that group will take place over the Summer 2010 through TechBridgeWorld as a continuation of this work.

ROTA Adult English Literacy Program (RAEL)

The needs assessment for this group was conducted in collaboration with Dr. Silvia Pessoa and her students who help teach the immigrant laborers. A majority of the immigrant laborers enrolled in the classes were from Egypt and Sri Lanka. All of the learners in the classes own mobile phones; some have multiple phones with different brands and different service providers. While many laborers in the basic class have very old models of Nokia phones, some in the Intermediate class had the latest Nokia phones and one or two owned Blackberry's and iPhone's.

Their hobbies and interests include talking about places in their home countries and sports. Soccer is a popular sport in all of the Middle East, and therefore, many Egyptians love soccer. The Sri Lankan and the Indian sub continent population enjoy cricket.

As part of the needs assessment process, sample questions for the basic and intermediate classes were also collected from Dr. Pessoa.

CMU-Q Service Attendants

We conducted the needs assessment for this group at the Carnegie Mellon building in Qatar. The service attendants, a total of 10, mainly came from three countries: Sri Lanka, Nepal and the Philippines. Since this is the only group that is not in a structured English class, they were asked what they would like to learn and the answers ranged from basic reading/writing, grammar, and questions to prepare for IELTS exam [**16**].

Most of them owned phones given to them by Carnegie Mellon, which is a Nokia 3000 series phone. Some of them owned a personal phone, usually later versions of Nokia that have graphics and more features. They use their phones to play games, mostly limited to the games already available on their phones, which include Sudoku, snake, and basketball.

Their hobbies and interests include playing sports. The service attendants from the Philippines often get together to play basketball, and those from Sri Lanka enjoy playing cricket.

7th and 8th grade students at Western Pennsylvania School for the Deaf

The needs assessment for this group was conducted at the Western Pennsylvania School for the Deaf in collaboration with TechBridgeWorld staff members Sarah Belousov and Ermine Teves. Interviews were conducted with two teachers and 15 students.

Teachers mentioned that some of the hardest English concepts faced by deaf students are articles, non-count verbs, verb tenses, conjugation, punctuation, wrong order of adjectives etc and they would like for the students to practice articles, non-count verbs and verb tenses using the literacy tools project. Sample questions were collected from Ms. Joyce Maravich as part of the needs assessment process.

Some of the students own phones but they are not allowed to use their phones in class. Students have a variety of hobbies which include reading, playing games, etc. and also enjoy playing word games. Students love challenges and wanted multiple levels and images in the game.

The purpose of the needs assessment was to make sure that the technology design is culturally relevant for the user groups. The next section will discuss the available technology and how the needs assessment conducted with user groups will lead to modifications necessary to make it an effective tool.

5. Technical Approach

The goal of the thesis is to develop mobile phone based games to help improve English literacy skills in adults. This senior thesis project builds on TechBridgeWorld's iSTEP 2009 Literacy Tools project [**17**], which is a tool that has been used to improve English literacy skills in children. This section will describe the Literacy Tools project in detail, and discuss the modifications that were necessary for deploying it with adult users.

5.1 iSTEP 2009 Literacy Tools Project

The Literacy Tools project was developed in Tanzania in the summer of 2009 during TechBridgeWorld's iSTEP [**18**] internship to give additional practice in English exercises to primary school students. Soccer is a popular game in Tanzania and the game, which is based on a penalty kick in soccer, is a motivator for the students in Tanzania to practice English exercises. A content authoring tool was also created to involve

teachers' input in the games and to motivate the teachers to be part of the project. The tool is meant to be used as a classroom activity. Therefore, the Literacy Tools project resulted in a two part tool which includes a single player game accessible on a mobile phone, and an online content authoring system which enables teachers to add useful educational content to the games.

5.1.1 Content Authoring Tool

The content authoring tool is available online for the teachers to add useful educational content to the games. The teacher can specify the question, answer, category of the question and the difficulty level. Once the teacher is done adding all the questions, an XML file is produced, which needs to be transferred to the mobile phone (via a USB or data cable) in order to be used in the game. A screenshot of the initial content authoring tool is shown below.

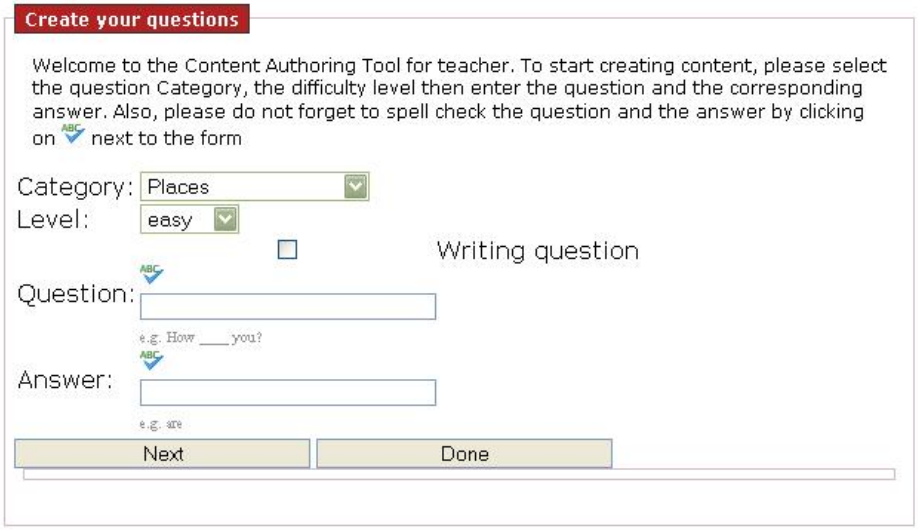

FIGURE 6: VERSION 1 OF CONTENT AUTHORING TOOL

5.1.2 Mobile Phone Game

The original mobile phone game was based on a soccer penalty kick concept, and has a quiz format where the screen shows a question and four options. If the user selects the right answer among the options, he/she scores a 'goal' and gets a point; else, he/she misses the goal and the phone scores a point. The user gets a maximum of three attempts at every question. If the user gets all three attempts wrong, the game displays the right answer on the screen. The number of wrong answers entered is measured by the phone's score. The goal and the missed goal are displayed as static animated gif images. Screenshots from the mobile phone game are shown below.

Figure 7: Question screen

Figure 8: Goal Animation

Figure 9: Miss animation

The game has an adaptive difficulty level feature, which automatically adjusts the difficulty level of the game based on the user's performance. 5 consecutive right answers will shift the game to a higher difficulty level, and 2 consecutive wrong answers will drop the game to a lower level. This scheme ensures that students get more practice before moving onto the difficult levels. The game uses the difficulty level specified by the teacher using the content authoring tool.

5.2 Technology Modification

This senior thesis focuses on modifying the Literacy Tools project for use with adult user groups. The modifications are based on the literature review and the needs assessment conducted with the user groups.

5.2.1 Content Authoring Tool

The content authoring tool has been modified to make it a more sophisticated tool for adding educational content onto the mobile phone games. Based on literature review and the needs assessment results of the different user groups, several modifications were made to the content authoring tool which are described below.

Categories

The iSTEP2009 design of the content authoring tool allows the teacher to specify a 'category' to each question. This will enable the mobile phone game to generate appropriate multiple choice answer options for the question. For example, if a question is categorized as "animals", the answer options displayed during the game for that question can contain options "cat, dog, cow, camel". This makes the question more challenging for the student with options belonging to the same category. This also removes the need for the teacher to re-enter the same answer options for each question.

In this initial version of the content authoring tool, the categories were hard coded and the teachers could not add new categories to the list. Our version of the content authoring tool enables the option to add, edit and delete categories. To add a category, the user specifies the name of the category and the answer options within that category. The user must enter a minimum of two answer options and a maximum of six answer options per category. Below is a screenshot from the content authoring tool that allows a user to view all categories and add, edit, or delete categories.

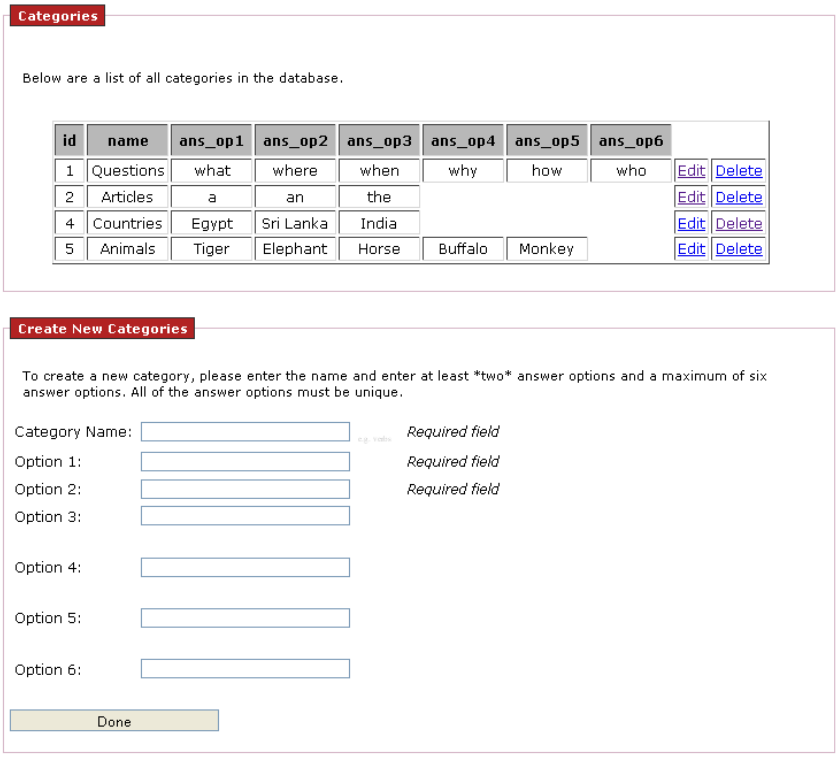

FIGURE 10: CATEGORIES IN CAT

However, there are examples of questions where having answers from a pre-defined category does not make sense. For example,

Q. Frogs _____ to croak. (likes to/like to)

In the above example, the answer does not really belong to a category as it does not make much sense to include answer options just to fill up the answer choices. Therefore, it was decided to allow the teacher with the option of not specifying a category and manually entering the multiple choice answer options. This is for cases where the answers are not easily re-usable. Note that in our example above, if the same answer option "likes to/ like to" is to be used for other questions as well, the teacher has the option to create a category that allows several questions to be entered without having to re-enter the answer choices.

Question Formats

As mentioned in the literature review, the most effective ESL teaching techniques include evaluating the students through regular tests, giving them classroom and homework activities that have sentence construction and cloze passage exercises, and the use of visual images. Also, the sample questions collected from the teachers during needs assessment included sentence construction and cloze passage exercises along with image questions. Some examples of image question and cloze passage exercises are illustrated below.

Q: Which of the images below describe the emotion 'sad'?

a)  b)  c) 

Q: Hi! _____ are you?

a) What b) How c) Where d) When

Thus, we further enhanced the content authoring tool to support the use of images in questions. The goal of the literacy tool is to teach English, and therefore, either the question or the answer needs to be in English. Following this model, two new question formats have been added to the content authoring tool: image question with text answer, and text question with image answer.

Based on the literature review and sample questions from teachers, the content authoring tool has been modified to include five different types of questions:

1) **Writing question**

   The teacher should specify the question, answer, and the difficulty level for the question.

   Example:

   Q: What __ your name?

   A: is

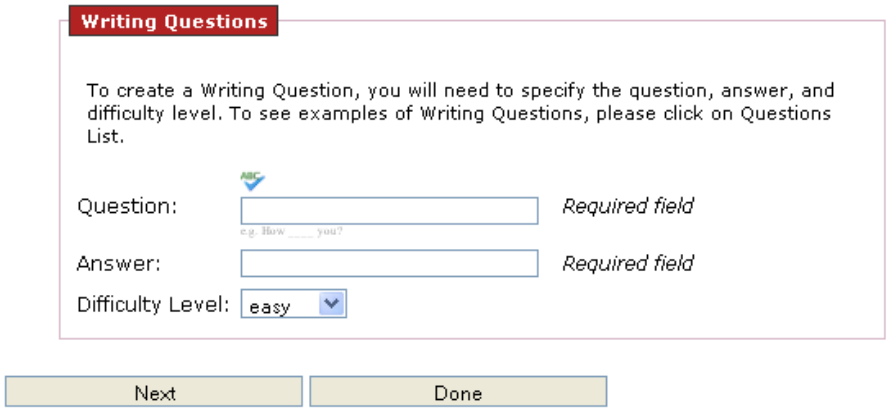

FIGURE 11: WRITING QS IN CAT

2) **Multiple choice question with categories**

The user should specify the question, answer, category and the difficulty level of the question.

Example:

Q: How old __ Beatrice?

A: is

Category: being verbs

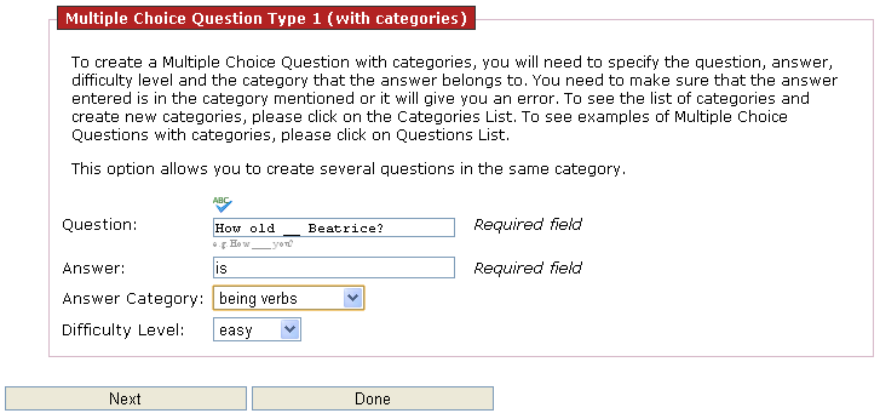

FIGURE 12: MULTIPLE CHOICE TYPE 1 IN CAT

3) **Multiple choice question with user defined options**

The user should specify the question, answer, the multiple choice options for the question and the difficulty level

Example:

Q: ____ you speak English?

A: can

Op 1: are

Op 2: can

Op 3: does

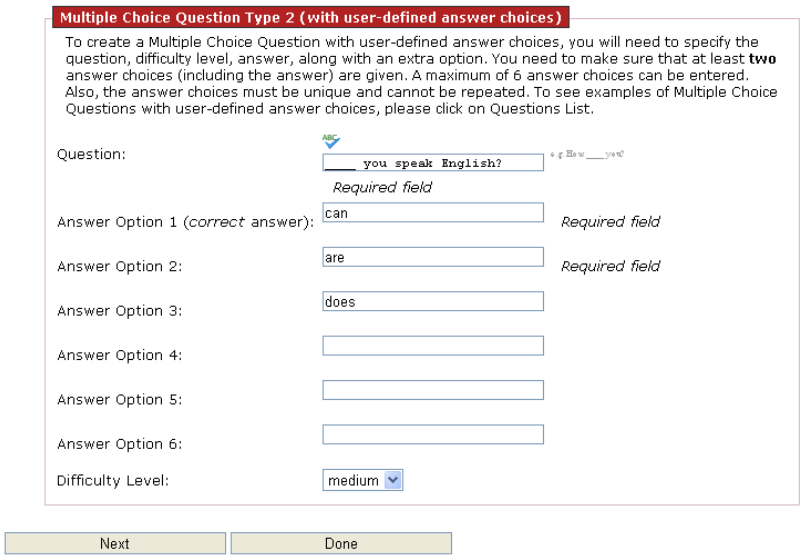

FIGURE 13: MULTIPLE CHOICE QS TYPE 2 IN CAT

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4) Image question with text answer

The user should specify the question, the image related to the question and the difficulty level of the question. For the answer, the user can choose any answer type from the options of writing, multiple choices with categories, or multiple choices with user defined options.

Example:

Q: What emotion does the picture below describe?

Qs image: 

A: sad

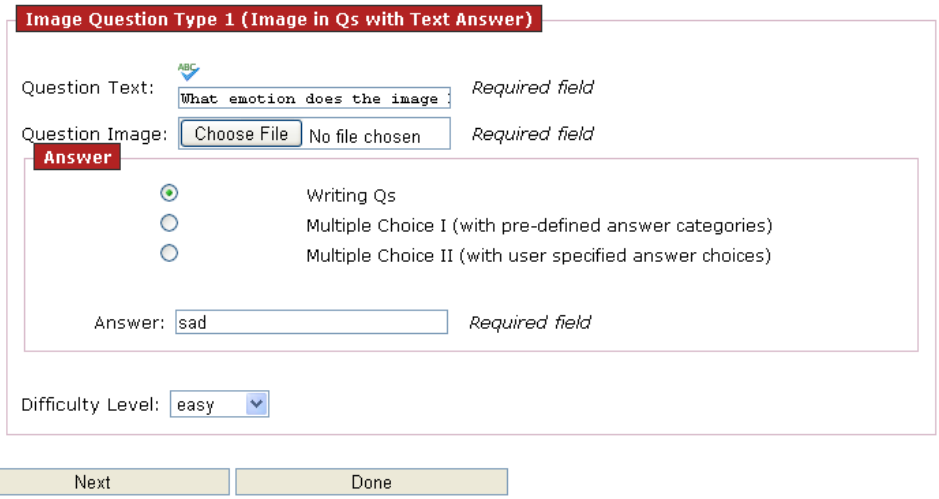

FIGURE 14: IMAGE QS TYPE 1

5) **Text question with image multiple choice answer**

The user should specify the question, difficulty level, the image answer, and the image answer options for the question.

Example:

Q: Which of these images describe the emotion sad?

A: 

Options:   

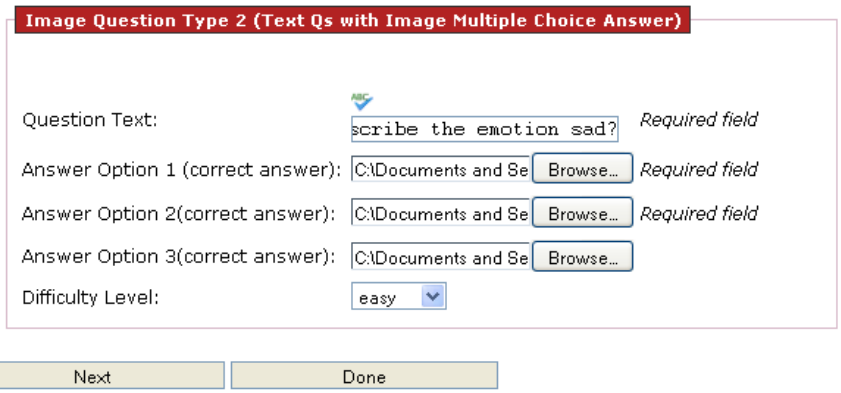

Figure 15: image qs type 2

Database Backend

In the previous version of the Content Authoring Tool (CAT), questions entered in the tool were not saved. At the end of a session, the questions are re-produced to the user via a XML file, which has to be manually saved. In order to add a question to the list of questions, the teacher would have to re-type the entire list of current questions in addition to the new ones. Moreover, the teachers were not provided with an option for editing questions that has been entered incorrectly. In order to address this inconvenience, a mySQL backend was added to the CAT. The questions entered into the database will get saved in appropriate tables, and they can be edited or deleted at any time. The XML file reproduces the list of all questions saved in the database.

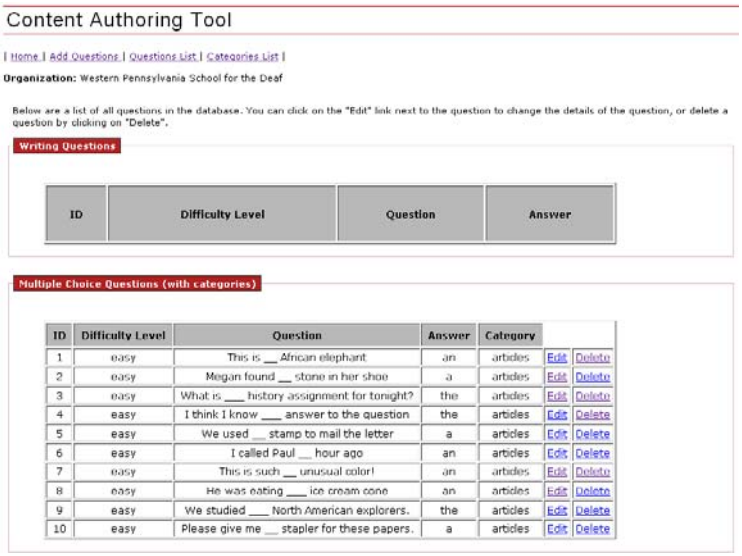

FIGURE 16: LIST OF QS IN CAT

Adding/Editing questions to the database

HTTP *POST* variables from the forms are processed by a PHP script and entered into the appropriate database based on the type of question. There are 6 tables in the database.

Table name: *answer_ops*

This table maintains the categories and the answer options in each category.

Field	Type	Value
Id	INT	Id of the category
name	VARCHAR	Name of the category
ans_op1	VARCHAR	Answer option 1
ans_op2	VARCHAR	Answer option 2
ans_op3	VARCHAR	Answer option 3
ans_op4	VARCHAR	Answer option 4
ans_op5	VARCHAR	Answer option 5
ans_op6	VARCHAR	Answer option 6

TABLE 1: TABLE FOR CATEGORIES

Table name: *writingqs*

This table maintains the list of writing questions in the database.

Field	Type	Value
Id	INT	ID of the question
w_level	VARCHAR	Difficulty level of the question
w_qs	VARCHAR	Question
w_ans	VARCHAR	Answer

TABLE 2: TABLE FOR WRITING QS

Table: *multiqs*

This table maintains the list of all multiple choice categories (with and without categories)

Field	Type	Value
Id	INT	ID of the question
multi_level	VARCHAR	Difficulty Level
multi_qs	VARCHAR	Question
multi_ans	VARCHAR	Answer (Right)
multi_op1	VARCHAR	Option 1
multi_op2	VARCHAR	Option 2
multi_op3	VARCHAR	Option 3
multi_op4	VARCHAR	Option 4
multi_op5	VARCHAR	Option 5
mutli_op6	VARCHAR	Option 6
multi_cat	VARCHAR	Category name, if applicable
isCat	INT	1 if category is specified, 0 if not

TABLE 3: TABLE FOR MULTIPLE CHOICE QS

There are two types of multiple choice questions, one with categories and one with user-defined answer choices. The *isCat* field specifies if the question has a category or not. The question, answer and difficulty level are specified by the user. If the user selects a category, then the *multi_cat* field name is set and the answer options are pulled from *answer_ops* table for the matching category name. If the user does not specify a category, then the category name is set to null and the table is filled with the answer options entered by the user.

Table name: *img_writqs*

This table maintains the list of image questions with writing answers.

Field	Type	Value
Id	INT	ID of the question
level	VARCHAR	Difficulty level of the question
qs_text	VARCHAR	Question
qs_img	VARCHAR	Filename of the Image related to the question
ans	VARCHAR	Answer

TABLE 4: TABLE FOR IMAGE WRITING QS

The uploaded image, which is initially stored in HTTP $_FILES variable, is given a randomly generated 13 character name and then moved to the data folder on the server. The filename of the image is then saved in the qs_img field.

Table name: *img_multiqs*

This table maintains the list of image multiple choice questions.

Field	Type	Value
Id	INT	ID of the question
level	VARCHAR	Difficulty Level
Qs_text	VARCHAR	Question
Qs_img	VARCHAR	Filenameof the image related to the question
Ans	VARCHAR	Answer (Right)
Ans_op1	VARCHAR	Option 1
Ans_op2	VARCHAR	Option 2
Ans_op3	VARCHAR	Option 3
Ans_op4	VARCHAR	Option 4
Ans_op5	VARCHAR	Option 5
Ans_op6	VARCHAR	Option 6
Cat	VARCHAR	Category name, if applicable
isCat	INT	1 if category is specified, 0 if not

TABLE 5: TABLE FOR IMAGE MULTIPLE CHOICE QS

Table name: *img2*

This table maintains the list of questions with image multiple choice answers.

Field	Type	Value
Id	INT	ID of the question
level	VARCHAR	Difficulty level of the question
qs	VARCHAR	Question
ans	VARCHAR	Filename of the image answer
ans_op1	VARCHAR	Filename of the answer option 1 image
ans_op2	VARCHAR	Filename of the answer option 2 image
ans_op3	VARCHAR	Filename of the answer option 3 image

TABLE 6: TABLE FOR IMAGE QS TYPE 2

Viewing questions in the database

All the questions in the database can be viewed under the "Questions List" link on the content authoring tool. It is done by executing a simple "*SELECT * FROM table*" query on the database.

Deleting questions from the database

The questions in the database can be deleted by clicking the "Delete" link next to a question . It passes the ID of the question to the PHP script which then executes a "*DELETE FROM table WHERE ID = 4*".

New XML file format

All of the new question formats are entered into the Text Questions XML format, which required the addition of many new tags.

Categories:

<catlist> - Indicates the beginning of the category list
<cat> - Indicates a new category
    <name> - Name of the category
    <opt> - Answer option in the category
</catlist>

Writing Questions:

<wqslist>- Indicates the beginning of the writing questions list
<wqs> - Indicates a new writing question
    <w-level> - Difficulty level
    <w-qs> - Question
    <w-ans> - Answer

Multiple Choice Questions with Categories

<m1qslist>- Indicates the beginning of the multiple choice with categories questions list
<m1qs> - Indicates a new multiple choice question with categories
    <m1-level> - Difficulty level
    <m1-qs> - Question
    <m1-ans> - Answer
    <m1-cat> Category

Multiple Choice Questions with User Defined Options

<m2qslist>- Indicates the beginning of the multiple choice (with user defined answer options) questions list
<m2qs> - Indicates a new multiple choice question with user defined answer options
    <m2-level> - Difficulty level
    <m2-qs> - Question
    <m2-ans> - Answer
    <m2-opt> - Answer option

This XML file can be downloaded by the users and used in the phone to add new questions.

There is also the ***Image questions XML*** file which cannot be used on the phone. The image questions are parsed in the following way:

Image question with Multiple Choice text answer (with category)

<i1_m1list> - Indicates the beginning of the image question with multiple choice (with categories) text answer

<i1_m1level> - Difficulty level
<i1_m1qs_text> - Question
<i1_m1qs_img> - Question image
<i1_m1ans> - Answer
<i1_m1cat> - Category

Image Question with Multiple Choice text answer (with user defined options)

<i1_m2list> - Indicates the beginning of the image question with multiple choice (with user defined options) text answer

<i1_m2level> - Difficulty level
<i1_m2qs_text> - Question
<i1_m2qs_img> - Question image
<i1_m2ans> - Answer
<i1_m2opt> - Answer option

Text Question with Image Answer

<i2_list> - Indicates the beginning of the text question with image answer

<i2_level> - Difficulty level
<i2_qs> - Question
<i2_ans> - Filename of answer image
<i2_opt> - Filename of answer option image

The content authoring tool provides a way for the teachers and/or administrators to provide content to be used on the games. The XML files serve the purpose of transferring the questions from the tool to the mobile phone game. The next section will look at the mobile phone game aspect of the Literacy Tools and the modifications necessary there to support the new question formats.

5.2.2 Mobile Phone Game

The original iSTEP2009 game was developed in Java Mobile Edition (JavaME) using the Light Weight User Interface Toolkit (LWUIT) according to the MIDP 2.0 and CLDC 1.1 specifications [**19**]. In this thesis work we modified this original mobile phone game to support the new format of questions and additional challenge modes. Both of these components are discussed below.

Support for new format of questions

The new XML file formats described above have to be parsed in the mobile phone game and new questions have to be created from it.

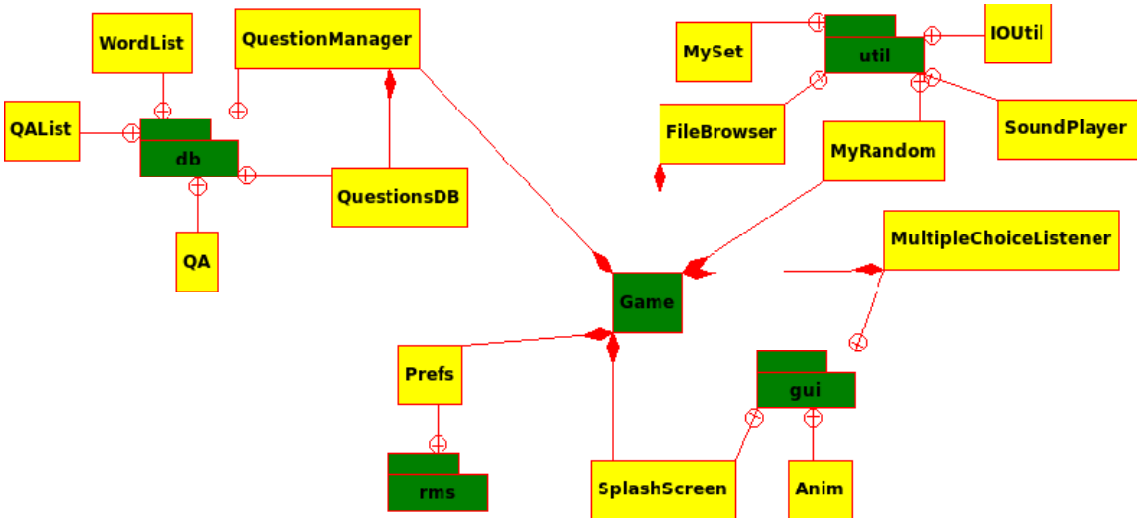

FIGURE 17:IMAGE SHOWING THE VARIOUS COMPONENTS OF THE MOBILE PHONE GAME

The above image, taken from the iSTEP 2009 Final Report [**19**], illustrates the various modules and components that form the literacy game. The part that deals with question formation and selection is the "db" module, and that has been modified to match the new XML file format to support the new format of questions.

The description for the modified components in DB, as adapted from the iSTEP 2009 Final Report [**19**], is shown below.

Name	Description
QuestionManager	Handles parsing and loading all the questions from the DB (This used to be done in QuestionsDB before). This class also constructs the actual question that is eventually posed to the user.
QuestionDB	Acts as the provider of questions based on the difficulty level.
QAList	This keeps track of the basic details as in the QA class as well as all the possible answers to the question, and also the index of the right answer. The QAList objects are constructed by the QuestionManager
QA	A class that logically represents a question. It holds the question and answer text, the category, as well as the difficulty level of the question, and specifies if it is a writing question and/or an image (type 1 or 2) question. QA objects are created by QuestionsManager.
WordList	A data class that merely holds list of words that belong in a particular category. WordLists are used by the QuestionManager while reading the XML files.

FIGURE 18: DESCRIPTION OF THE MODIFIED COMPONENTS IN DB

The *QuestionManager* class now handles the parsing of the XML file and the creation of questions. For creating a question, it has a *parseQs* method that assigns the question, level of difficulty and answer for each question.

- For writing questions, it sets the category and word list to be null, *isWriting* = true, *isImage1* = false and *isImage2* = false, where *isWriting* indicates if the question is a writing question or not, *isImage1* indicates if it is a type 1 image question (i.e. image question with text answer) or not and *isImage2* indicates if it is a type2 image question (i.e. text question with image answer) or not.
- For multiple choice questions with categories, it sets the category name and loads the word list from the *wordCat* hashtable based on the key "category". It also sets *isWriting*, *isImage1* and *isImage2* to false.
- For multiple choice questions with user defined answer options, it creates a word list from the given answer options, sets *category* to null, and *isWriting*, *isImage1* and *isImage2* to false.
- For image questions with written answers, it follows the same procedure as for writing question and sets *imgQs* and *isImage1* to true. It does the same for multiple choice questions with categories and with user defined answer choices.
- For text question with image answers, it creates a word list of the image file names, and sets *category* to null, and *isImage2* to true.

For writing and multiple choice questions, the game already has forms that will display the question on screen, like in the image below.

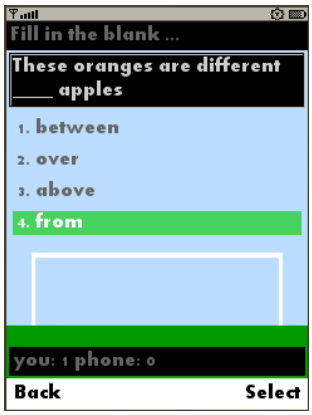

FIGURE 19: MULTIPLE CHOICE QS SCREEN

For image questions, new forms were created that would display the image question.

For image question type 1 (i.e. image question with text answer), the form displays the question along with the question image and the list of answer options. This is done with the help of a LWUIT Container component inside of the Form. The image is displayed in terms of a disabled button, which means that nothing happens if you hit the button.

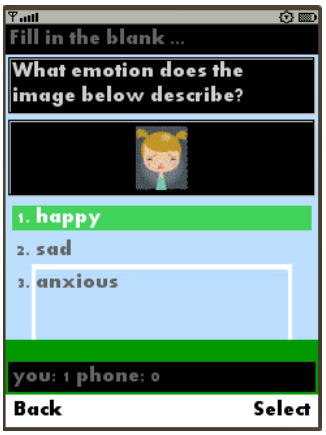

FIGURE 20: IMAGE QS 1 SCREEN

For image question type 2 (i.e. text question with image answer), the form displays a question and then a list of images that act as the answer options. This is also done with the help of LWUIT Button and Container components, with the Box Layout along the y-axis. As you can see in the picture below, the form is missing the 'Select' command. This is because the answer images are displayed as buttons, and to select the correct answer, the user would have to click on the button.

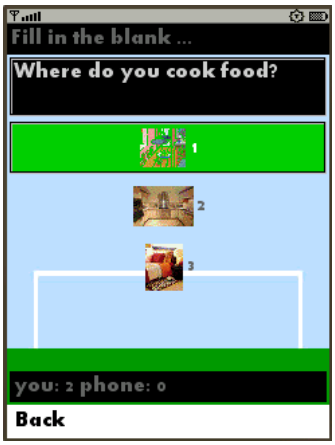

FIGURE 21: IMAGE QS TYPE 2 SCREEN

Challenge Component

Based on needs assessment, we learned that teenagers and adults want a challenge component in their games that motivate them to play the game for longer durations. For the literacy tools game, we decided to add a "challenge mode" to the game. In the challenge mode, the user is asked to attempt to reach a target score, which is a random number between 5 and the total number of questions loaded in the game. When the user has answered the target number of questions correctly, he/she wins the game.

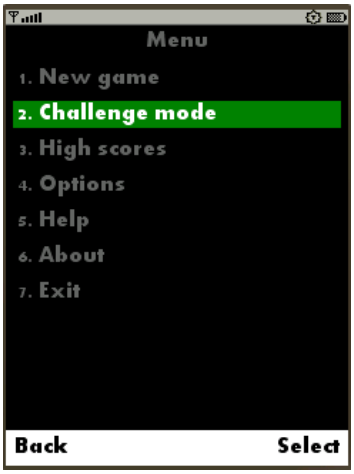

FIGURE 22: CHALLENGE MODE IN THE MENU

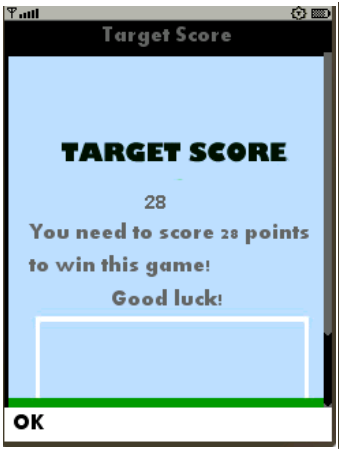

FIGURE 23: TARGET SCORE

FIGURE 24: CONGRATULATIONS SCREEN

Recommendations

Our needs assessment also revealed that adults like to see the progress they have made and feel a sense of accomplishment when they have completed specific levels of a challenge. Therefore, a suggestion would be to include graphical recognition of levels crossed. Currently, the game has an adaptive difficulty level that promotes or demotes the users to different levels based on their performance. However, it happens discretely without any appearance of level change. This modification can happen in two ways:

- Each time the game shifts between levels, the user is shown a screen that says "Good! Onto the difficult questions now!" or "Uh-oh, let's get some practice in the easy levels".
- Once the user has completed and gotten all the questions in the "easy" set right, the user is taken to the next level "Medium", and shown the screen "Easy Level Completed". In this method, the questions come only from that level of

difficulty. The user needs to complete all the questions in a certain level to proceed to the next level and the game ends when the user has completed the "Difficult" level.

In the future, the game can also have multiple levels and the game can go on until the highest level is completed.

Needs assessment conducted with the young adults from WPSD indicates that they like games with more interaction and that have images, videos and challenging levels. Also, most adults have various sports as their hobbies and interests and would be a good theme for future games. In order to meet the interests of the various user groups, it would be recommended to create additional games based on user demographics.

Game Ideas

1) **Soccer:**

   This comes from the needs assessment interviews of the RAEL students from Egypt. We can extend the existing soccer game to be more interactive.

   The player gets to choose his own team and the opposing team (For eg, Egypt vs. Algeria). The top three players from his team are on the soccer field. For each right answer, the first person scores the goal. For every attempt at a wrong answer, the ball gets passed behind to the next player. If all three attempts have been used, the opposing team scores a goal.

   This way, the scores are displayed as "Egypt vs. Algeria". The motivation in this game is for the person to do his best to make his team win! The game can be extended and made more interactive using J2ME tiled layers and sprites. The tiled layer would be the soccer field, and the various sprites would be the three players, soccer ball and the goalie.

2) **Cricket:**

   This comes from the needs assessment interviews of the RAEL students from the Indian sub-continent who enjoy cricket.

   Similar to the previous game, the player gets to choose his own team and the opposing team (For eg, SriLanka vs. India). The team is given a target score to achieve, for example 214/3. This means that they should score 214 right answers before losing all of their players. There are 11 players in each team. Each player is out on the field to bat. For every right answer, the player scores points based on the difficulty of the question. For example, for a hard question, the player scores 6 runs, 4 runs for a medium question and 2 runs for an easy question. If a player gets a question right after a wrong attempt, he scores only 1 run. If he gets all the attempts wrong, he is out of the game. The game goes on until all 11 players are out or until the target score is met.

Again, the motivation in this game is for the person to do his best and make his team win! The game can be made interactive be using a cricket pitch as a tiled layer and sprites with a batsman, bowler and the cricket ball.

3) **Navigation:**

The third idea for the game comes from the fact that the RAEL students love to talk about places in their home countries. This could also be an interesting international travel game for the WPSD students.

The idea of the game is that there are several local or international destinations stored in the game. Each destination has a score attached to it; the more famous or desirable places are worth more points. You need to navigate through the game and answer questions to score points. Depending on the points you score, you can choose certain locations or destinations, which will then display details about the new location. For example, if the location was Paris, it would show pictures of the Eiffel Tower etc. The navigation game will continue in Paris until the player chooses another location.

The motivation behind the game is to be able to visit all the destinations, more like "collect all the beans" and maximize the number of right answers. This game would involve more extensive images and graphics for the various locations.

The following section will outline the field testing details and results of the existing soccer game with the RAEL students.

6. Experiments & Results

The Phase 1 of the field testing consists of testing the modified soccer game with the user groups. Field testing started rather late and the researchers got only 2 weeks of testing data from the user groups. Out of the three user groups, it was possible to conduct field testing with two of them: RAEL program and the service attendants at Carnegie Mellon Qatar campus.

IRB Consent:

The research requires voluntary participation from all of the users. The purpose of the research, its potential benefits and expectations of participant involvement (interviews, tests, and field testing) were explained to the user groups. Their voluntary participation was requested and it was also explained to them that they could quit during any point in the research. Field testing was carried forward with those that gave their verbal consent to participate in the research.

Pre-tests:

Each of the groups was given a pre-test to fill out and the scores were collected by the instructors or administrators. During the pre-test, the users' phones were collected, studied and tested to see if it would support the literacy tools game. It turned out that most phones do not support the literacy tools game for a variety of reasons:

- Users had old Nokia models don't have the necessary requirements on the phone for the game
- Users had a lot of pictures, videos and music on their phones that took up a lot of memory and hence, the game wouldn't work.
- Users had phones from different brands for which data cables weren't accessible at that point.

Testing Period:

The original plan for testing was to install the game onto the users' phones and have them play the game in their own time or do homework through the games. However, considering the fact that the game doesn't work on most of the user's phones, it was decided that we would conduct testing with the TechBridgeWorld phones. The users will be given the phones for testing for the testing period and field testing will take place in class.

- **RAEL**

FIGURE 25: RAEL STUDENTS

RAEL classes happen every Monday and Wednesday. The last 5 or 10 minutes of the RAEL basic and intermediate classes were reserved for field testing the literacy tools mobile phone game. The users were asked to participate if they are interested and almost 90% of the users stayed back to check out the game. Almost all of them wanted to have the game installed on their phones.

Basic Class:

The basic class takes place every Wednesday. The basic class students enjoyed the game and expressed interest to play the game. They found the questions hard, and this was indicated also by their scores.

Average score for the first week: In a period of 15 minutes, they got an average of 17 questions right, and 9 questions wrong.

Average score for the second week: In a period of 10 minutes, they got an average of 14 questions right and 6 questions wrong.

Note: The questions used in both weeks were different; the questions were added onto the content authoring tool by Dr. Pessoa's students and these questions were used to test the students in the second week. The first week used standardized sample questions to test them. Also, not the same set of people played the game

both weeks. Therefore, the improvement or lack of, of the scores cannot be attributed to the class or the questions.

Intermediate Class:

The intermediate class takes place in two different locations on Monday and Wednesday respectively. The class enjoyed playing the game, however, found the boo's and yay's (audio feedback) annoying after a while. They also hated the writing question, as they would spend time typing in long questions and would be annoyed if they got the wrong answer because of missing the apostrophe or full stop etc.

Average scores for the first week: In a period of 15 minutes, they got an average of 11 questions right and 6 questions wrong.

Average scores for the second week: In a period of 10 minutes, they got an average of 26 questions right and 12 questions wrong.

Note: The questions used in both weeks were different; also, the game for the intermediate class also included questions from the basic class that the class was able to answer very easily. Also, whenever they would get an intermediate level question wrong, the game automatically adjusts the game to be of an easy level, at which point they get basic level questions that increases their scores.

- **Service Attendants**

Testing with the service attendants took place thrice a week for 30 minutes each. Interested participants showed up with 90% probability for the next class. Here again, the service attendants were provided with phones for testing and they would play for the entire duration of 30 minutes.

Average scores for the first week: In a period of 15 minutes, they got an average of 17 questions right and 11 questions wrong.

Average scores for the second week: In a period of 10 minutes, they got an average of 35 questions right and 14 questions wrong.

Note: The service attendants have varying levels of English skills, and so the average scores reported are not exactly accurate. Some service attendants got real good scores like 47 questions right and 7 questions wrong, while some others got scores like 12 questions right and 19 questions wrong. The average therefore does not represent the whole group.

- **Western Pennsylvania School for the Deaf**

Field Testing could not be conducted with WPSD as they had some policy changes and the school is going through standardized testing which forced us to put off testing until the summer.

Challenges faced:

Among the biggest challenges faced during testing is the lack of time. The RAEL classes have a packed schedule and trying to reserve the last 10 minutes for testing turned out to be harder than expected. Some time would also be gone in answering questions, or quitting the game by mistake, etc.

The other challenge obviously is that the game does not work on most of the users' phones. There is a text based version of the game; however, there is no standalone version which we can install on phones directly. However, having the 10 research phones for testing helped solve the matter and bring consistency into the testing environment.

7. Discussion & Analysis

The user groups were all really excited about the opportunities presented in playing this game. This was more so among the service attendants, who weren't enrolled in a structured English class and were excited to use a tool that would help them improve their English skills.

One of the important things observed during the field testing is that the adult learners gave more emphasis to the learning rather than the game component. For example, at the RAEL Intermediate class, if a student got the answer wrong repeatedly, they made it a point to stop and ask their instructors about the right answer and a short clarification about similar questions. Similarly, we observed the same case with the service attendants; if they got a wrong answer, they would make sure to stop by and understand why they got it wrong before proceeding to the next question. The challenge component of the game for the adult learners came from comparing their scores with that of their peers. In both the RAEL and the service attendants groups, the students were motivated to get the best score, and would frequently keep comparing between peers.

The challenge component in terms of target scores and levels were a result of the needs assessment conducted with the 7^{th} and 8^{th} grade students at the WPSD. They are teenagers who enjoy serious gaming and the challenge component is probably more important as a motivator for this age group. This age group will also require more graphics and interactive games to enjoy the games.

Initially, we intended this tool to be designed for self-learning, i.e. to be used in your free time to practice English exercises on your mobile phone. However, it seems that the literacy tools project is better designed for a structured classroom environment where English concepts are taught formally, and the mobile phone game can be treated as a non-traditional and engaging platform to practice the concepts. The teacher can regulate the questions that the students are practicing with new and more challenging questions every week, thus making the literacy tools project more sustainable in the long run.

The evaluation of the mobile phone game as a learning tool is to be conducted via pre and post tests. However, we haven't yet received post test results for the RAEL group. Also,

considering the fact that we got a total of 1.5 hours of field testing in two weeks, the pre and post test evaluation probably won't be an accurate measure of the effectiveness of the mobile phone games for learning English.

Statistically significant results cannot be derived from the field testing as the user groups practiced on the mobile phone game for a rough period of 1.5 hours over two weeks. Also, the pre and post tests were conducted with a long gap in between, and the students who are in the RAEL class have accumulated additional skills through the class, and therefore, improvement in scores cannot be attributed to the literacy tools mobile phone game.

The most significant observation from the field testing, however, is that the user groups enjoyed playing the game, did not get bored of it in less than 10 minutes and expressed interest to continually use it to learn English. They understood the benefits and opportunities of using the tool to learn and improve their English skills. This positive interest in the tool indicates that the user groups will continue to play the game leading to increased practice which should result in improved skills.

8. Conclusion & Future Work

The field testing could not yield statistically significant results as the user groups did not get enough time to play the game on the mobile phone, however, the users enjoyed playing the game and expressed interest to continually use it to learn English. This positive interest in the project indicates that there will be increased practice and therefore, improvement in their English skills.

If successful, the literacy tools project presents significant opportunities to the immigrant adult population to improve their English skills. They can use this tool in their free time to practice English exercises and improve their skills at their own pace. The ultimate goal of the tool is to motivate the user groups to want to learn English and minimize the barriers to it.

For future work, the recommendations for the mobile phone game regarding the more interactive games and challenging levels should be implemented and tested with user groups. More thorough and organized testing should be conducted with user groups with longer duration set aside for testing.

Over the summer, TechBridgeWorld will conduct field testing with WPSD and Catholic Charities in Pittsburgh, while in Qatar, a group at Vodafone that teaches English to Nepali workers are interested in deploying the tool in their class. Additionally, the literacy tools project will be continued via the iSTEP 2010 internship in Chittagong, Bangladesh.

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Appendix

Appendix A: Interview Questions for Immigrant Laborers

Senior Thesis: Mobile Phone Based Educational Games for Improving English Literacy Skills of Limited English Proficient (LEP) Adults

Needs Assessment Questions

General:

a. Name:
b. Age:
c. Nationality:

Mobile Phone Usage

1. What phone do you currently use? Please note down the brand and model number. (Nokia, Sony Ericsson, Samsung etc)
    a. What do you use your phone for?

        [ ] Local calls

        [ ] International calls

        [ ] Text-Messaging (SMS, MMS)

        [ ] Bluetooth

        [ ] Games

    a. Do you play any games on your phone?
        i. If yes, what kind of games?
        ii. Could you please show us your favorite game? (Take observation notes)
        iii. What do you enjoy about those games?

Hobbies/Personal Interests

1. What do you do during your free time?
2. Do you play sports? What kind of sports?
3. Do you watch TV? What kind of shows would you prefer watching?

Appendix B – Interview Questions for Deaf Individuals

Mobile Phone Based Educational Games for Improving English Literacy Skills of Limited English Proficient (LEP) Adults

Needs Assessment Questions – WPSD TEACHERS

General:

1. How many students does your class have?
2. What subjects do you teach?
3. What age-group of students does your class have?

English related:

4. What are the challenges faced by hard of hearing students in learning English?
5. What concepts do you think they would require additional practice in?
6. What, in your experience, motivates the students to learn English?

Technology related:

7. Do you use technology to support your teaching? If so, what do you use and how?
8. Are the students allowed to use computers in class?
9. How many students have mobile phones?
10. Are the students allowed to use their phones in class?

Teaching through games:

11. Have you experimented teaching exercises through games? If yes, please explain.
12. What are the challenges faced by hard of hearing students in learning?
13. What do you think about using educational games on mobile phones to improve their English skills?
14. Do you think the students would like to practice exercises via playing games on mobile phones?

Needs Assessment Questions – WPSD STUDENTS

General:

1. Name:
2. Age:
3. Grade:

English Proficiency Level:

1. Do you enjoy studying English?
    i. If no, why not?
    ii. If yes, why?
2. What do you find difficult about learning English?
3. What kind of English lessons do you like?
4. Do you read English story books?
    i. If yes, what kind of books do you like?
    ii. Please mention a few books that you have read.

Mobile Phone Usage:

1. Do you have a phone?
2. If yes, what phone do you have? (Nokia, Sony Ericsson, Samsung) What model number and brand?
    a. What features do you like about this phone? (camera etc)
    b. How do you mainly use your phone?
    c. Do you use text-messaging service?
    d. Do you use Bluetooth services on your phone?
    e. Do you play any games on your phone?
        i. If yes, what kind of games?
        ii. What do you enjoy about those games?

Hobbies/Personal Interests:

1. What do you do during your free time?
2. Do you play sports? What kind of sports?
3. Do you watch TV? What kind of shows would you prefer watching?
4. Is there anything else you would like to tell us?