Sharing the Knowledge

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Abstract

Sharing the Knowledge is a community literacy learning system for implementation in the isolated regions of a developing nation. The project is a set of designed interactions that enables a collaborative social effort in creating and understanding educational materials, as means of compensation for the general lack of access to formal education and trained educators. The user-generated media is used for mobile learning applications and for creating social gaming incentives.

Keywords

mobile learning, game incentives, user-generated content, ICT for education, literacy education, picture messaging

General Terms

design, prototype, human factors

ACM Classification Keywords

H.5.2 [User Interfaces]: User-centered design
H.5.3 [Group and Organization Interfaces]: Computer-supported cooperative work, Theory and models

Introduction

A population that is impoverished and geographically isolated has an education system at a disadvantage, and governments are often less able or less motivated

to improve the living standards of the powerless. Teacher absences and shortages are most acute in these regions [1], and educational materials are substandard that of wealthier, more accessible communities. Sharing the Knowledge describes a unique approach to mobile and social learning in the cause of improving literacy, through the utilization of different viewpoints and skill levels to build a community learning consensus that is more valuable than its individual parts. Sharing the Knowledge is also about extending existing abilities by practicing and seeking out answers as a group. This system seeks to enable meaningful knowledge transfer using the communication power of multimedia messaging service (MMS) messages and face-to-face collaborative interfaces. This project brief illustrates specifically English literacy, though many solutions could be applied to learning other languages. Our program utilizes a basic mobile phone (with camera) for every participant and a single shared personal computer, and explains how individuals can use these tools as a resource for education.

Communication as a Resource

A real-life example of how a disadvantaged population can learn with scant educational resources is illustrated by the story of a young girl named Bharti Kumari [2]. At the age of twelve, Bharti is the head teacher for her impoverished village located in the Bihar province of India, teaching Hindi, English, and math to some 50 children. She learned the subjects she teaches by also finding the time to attend a state school two miles away. The children she teaches would have no other access to education.

If viewing India as a use case on reducing illiteracy, the nation is home to 35% of the world's total illiterate population [3]. When factoring in technology for possible solutions, the number of internet users in India is only 7% of the population (actually falling slightly from the year before) [4]. However, India is home to one of the fastest growing mobile markets, and is predicted to surpass the one billion user mark within five years [5]. The presence of inadequate literacy rates, and yet a continual rise of mobile phone ownership is common in many other developing countries worldwide. For instance, 2010 saw the total number of mobile phones eclipse the five billion mark [6]. Sharing the Knowledge views these conversant communities as a profound and expedient resource for improving aptitude.

Mobile Learning Pedagogies

Prior research in mobile learning has demonstrated proven active learning methodologies that our project seeks to capitalize upon as well. One such method is socio-cognitive learning, characterized by developing knowledge through personally or collaboratively forming and re-forming concepts. Researchers user-testing m-learning games for the MOBIlearn project observed that socio-cognitive tactics built confidence and expressiveness in learners, which in turn fed a desire to learn more [7]. Likewise, Kumar et al demonstrated in their word recognition experiments that participants were able to retain significantly more new words if using productive training (prompting users to verbalize the correct answer) over receptive training (selecting from multiple choice) [8].

Adapting What Works

In the course of our research we spoke with Kristen Aguirre-Ford, an educator with over twenty years of experience teaching people how to read and write.

Figure 1. Tagging the Village. Capturing an image, labeling it to send, and then replying.

Having taught both children and adults, Ms. Aguirre-Ford informed us that the methods are the same, one just needs to tailor the learning content to make the learner feel it is appropriate to them. This is important because the project does not target any specific age range, anyone seeking to improve their aptitude is a member of Sharing the Knowledge. We learned from her that at the very root of learning, having support from others is integral in driving an interest in literacy, which is why every aspect of our project is about encouraging cooperation.

Tagging the Village

The most fundamental element of our project is called Tagging the Village. Participants use their mobile phones to take a picture of something they see in the course of their daily life. The individual can then use a pre-installed program in order to 'tag' that photo with an appropriate label, and automatically send the photo to everyone in their group (Figure 1). It is up to other members of the group to correct the sender's spelling by replying to the original message. In order to make forming words more intuitive than using the standard numeric keyboard interface, we have designed an alternative keyboard with the alphabetic options

viewable on screen. Participants use their directional keys to select the appropriate letters to the word being spelled. Letters are ordered by their frequency of use (demonstrated for the English language) from the center outward, because the cursor is repositioned centrally over the 'X' (delete letter) key after each letter selection. Those users already comfortable with text messaging would be free to use the standard messaging method to send tagged images as well.

Influences on the Design
Kumar et al [9] has performed field research studying the behaviors of rural Indian children playing mobile learning games. Their work recorded instances of kids sharing a single phone and helping one another with the games, and that interaction also forged a bond in their greater daily life—in some instances across caste and gender differences. From that observation we endeavored to take advantage of the social aspect of Tagging the Village to reduce gender and caste barriers and facilitate responsive interactions, with every member having an opportunity for equal contribution and equal access. It is possible to respond to an original tagged message with another tagged picture. This is intended to evolve into grouped
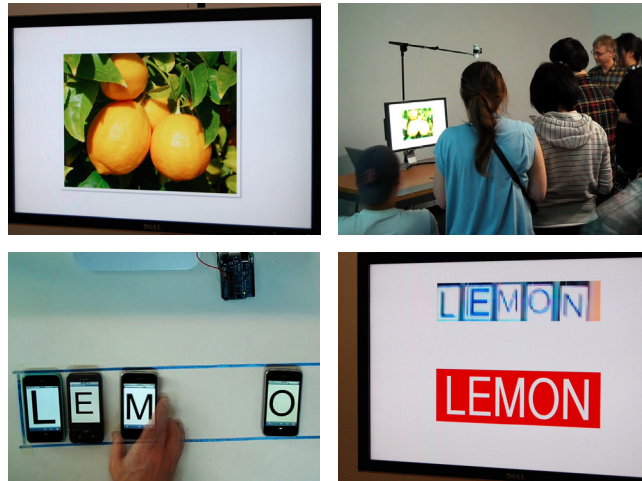
Figure 2. Community Learning demo prototype. (Smartphones used for the ease of testing purposes only.)

conversation-like threads of pictures attached to words, prompting compelling and influential connections between the described objects and the participants [10]. Ultimately, Sharing the Knowledge's viability as a learning tool relies heavily on the accumulation of material that carries personal and social significance to the participants.

Developing Beyond the Mobile Phone
Tagging the Village with a mobile phone is useful for collecting educational material, and it is convenient to use. However, one practical limitation is that there are a finite number of pictures that can fit in the memory of a basic mobile phone. A mobile phone is also not very useful for going back and reviewing what you've learned, nor is it very useful for group cooperation. An additional aspect that picture messages themselves

are not flexible enough to accommodate is the fact that some people are auditory learners, while some are more geared to visual or kinesthetic learning. That is why Tagging the Village is suitable for collecting educational material for use in the part of our project that we call Community Learning. Community Learning is the process of saving and displaying that material in a communal space and interacting with it as a group.

Community Learning
The scenario we are envisioning in every village is that there will necessarily be participants of all ages and differing reading and writing abilities. We wanted to create a quiz game where the group is collaboratively working together to divine the correct answers. The hardware that the Community Learning game requires is a personal computer, an external webcam, and a GPRS [11] (general packet radio service) modem to send and receive messages. The game involves the computer displaying a member-provided tagged image without the label shown, while the computer speaks the corresponding word (Figure 2). The computer then automatically messages every mobile phone in the room a single, large letter, which may or may not belong to the term in question. As the letters are sent, so begins the clock, and the group then has a defined amount of time to work together to lay out the phones displaying the correct letters in the correct order. The game software uses the webcam to determine if the word is spelled correctly via optical character recognition (OCR) [12]. If correct, then the game moves on to another word. If not, then the game quizzes participants on words with similar structures. For instance, if game players mistakenly spell the vegetable 'beet' like 'beat', then the game looks for

Figure 3. Family Anecdotes. Recording a story, playing it to the group, and illustrating the tale with the tagged photos.

other words with a double 'e' and then asks the players to spell those.

The expectation is that the collective effort produces more correct answers and builds the knowledge base for the whole community, it is envisioned to be a multimedia interactive wiki formed in the cause of literacy. Furthermore, the action of the game adds an element of both auditory and kinesthetic stimulation, intended to help achieve a greater retention of the learning material.

Extending Further: Family Anecdotes

Looking forward, the logical progression of Sharing the Knowledge is to go from spelling words to reading stories. This extension of our project we named Family Anecdotes. Users can take their phones and audibly record a story by calling the SIM card in the system's GPRS modem, that would then be transcribed by the computer's software. Our educator mentor Ms. Aguirre-Ford told us that in the early stages of learning to read, students shouldn't be constrained by the words they know, but should be inspired by the imaginations they possess. Family Anecdotes is where the storyteller becomes the de facto teacher, in the same space as

where our Community Learning game takes place. As the story is replayed aloud to the group the computer displays the words, and if the reader says a word that is also a tag—like 'flower' or 'beet'—the computer automatically displays other group member's photos with that tag. This is a good way to involve the listeners by integrating the audience's own diverse content, and readily demonstrates how one can place words they know within a greater story, thereby empowering participants to fill in the words they don't yet know. Participants could further look to a story as creative inspiration, and so endeavor to add tagged images that consciously illustrates the story further.

Conclusion

The creation of a system for augmenting the standard usage of available communication tools is the essence of our project. This tactic is given credence by the ubiquity of SMS communication in developing regions already being shown to act as a community sounding board [13]. It is important to note that even well-designed and sophisticated learning technology can fail to achieve measurable results without the presence of well-guided applications, simply putting a new device in people's hands is not adequate [14]. Facilitating access

and supporting positive interactions is of paramount importance, because illiterate individuals struggle with performing daily tasks that others take for granted [15]. This living constraint can be a source of profound shame, a roadblock that is as much of a barrier as the process of learning itself. Sharing the Knowledge is about communicating, playing, sharing, helping, creating — and when it is enjoyable, learning is easier.

Acknowledgments

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