ABKD: A MULTI-MEDIA MOBILE GAME FOR COLLABORATIVE LEARNING OF CHINESE HANZI CHARACTERS

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ABSTRACT

This paper discusses the use of ABKD, a multimodal mobile learning game that aims to help Filipino children and young adults remember and increase their Chinese Hanzi and Japanese Kanji vocabularies by engaging them in a collaborative game-like group activity and challenging their creativity and imagination through drawing, taking pictures, and audio recording. Feedback from language learners after playing the game reveals that ABKD has the potential to make learning and remembering Hanzi characters easier, more fun, and more interesting.

Keywords: *Learning, multimodal, collaborative learning, Chinese Hanzi, Japanese Kanji*

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Two of the three largest economies in the world include China and Japan so it is not uncommon to see a growing number of foreign students studying Mandarin and/or Nihongo. While there is interest in these two languages, one of the challenges faced by students in learning them is the presence of a complex writing system, which uses logographic characters called Hanzi (汉字) in Mandarin and Kanji (漢字) in Nihongo. Both of these contain thousands of characters that make studying quite a daunting task for someone who is accustomed to using the Roman alphabet.

In this paper, we discuss the design and use of a multimodal mobile learning game called ABKD to make learning and remembering Hanzi and Kanji characters easier, more fun, and more interesting.

Related Work

There have been several prior research work related to the use of digital technology to help facilitate learning of languages. More so, the proliferation of higher quality and cheaper mobile phones has opened avenues for the design and development of applications in learning. This section discusses the literature on the design, development and use of mobile learning applications in the study of Hanzi and Kanji.

Learning Hanzi

Learning Chinese Hanzi characters through culturally inspired group games using mobile technology has already been explored (Tian, et al., 2010). Two culturally inspired mobile group learning games: Drumming Strokes and Multimedia Word, were created after analyzing 25 traditional Chinese games.

Drumming Strokes was based on a famous traditional game where the children form a circle and pass a flower to each other as the drum beats. When the drum beat stops, the person holding the flower is chosen. In the mobile game adaptation, instead of using a flower, a mobile device is used and is passed around. However, before passing the device, the player has to correctly write one stroke of a given Chinese character. The stroke order also has to be correct; otherwise, the drum sound stops and the person is asked to correct the stroke and must receive a penalty. For the penalty, the player has to again write another character in the correct stroke order. This is done until the child writes the correct answer. In the case where the child has difficulty providing the correct answer, the game offers a highlighted clue of the stroke. After successful completion, the drum sound restarts and everyone passes the device again.

In Multimedia Word, the players write the correct Chinese character based on hints such as a sketch, a photo, or an audio recording of the pronunciation. The game is said to have been primarily inspired by two popular Chinese games, specifically the String game (n.d.) and Pictionary (n.d.).

Results from this study showed that it is possible for children to learn essential Chinese language skills by playing the game in groups. Additionally, they found that digital games do have the potential to enhance the intuitiveness and engagement of traditional games.

Learning Kanji

In a similar study, Lin, Kojita, & Mase (2007) discuss the use of mnemonic stories augmented by a mobile device to help students

learn Kanji characters used in Nihongo. The student is encouraged to divide characters into smaller shapes and create an imaginative story based on it. This approach is based on the Heisig (1986) mnemonic method and was adopted for their study because of its popularity and the existence of academic research related to it. The complex Kanji character is broken down uniformly and hierarchically into simpler graphical shapes. These shapes are then assigned a unique English name or keyword, which allows the Kanji learner to use mnemonic stories as memory aid.

The mobile device is multimodal in the sense that the audio creation of the mnemonic stories are recorded onto the device, while a visual display of the Kanji shape and meaning are viewable on the screen.

Framework for ABKD

ABKD is similar to Multimedia Word in that we used the concept of Pictionary in designing the game, where hints are provided using features of the mobile device such as the camera, the audio recorder, and the canvas. These are then used to aid in correctly guessing the word or character. However, ABKD is different from Multimedia Word in three ways, namely: (a) ABKD uses the Android OS platform, instead of JavaME, (b) besides Chinese characters, Filipino, English, and Japanese words can be added to the vocabulary list, and (c) ABKD connects to the social networking site, Facebook, to upload game results, drawings, and pictures. Posting results motivates students to do their best in the different components because parents, teachers, and fellow classmates can view what they have done and evaluate their skills.

Additionally, following the mnemonic method by Heisig (1986) and the techniques from Banno, Ikeda, Shinagawa, Tokashiki, and Tajima (2009), students can use mnemonic stories about the logographic character as hints to help the other group guess. Therefore, if the word is the Kanji, 金, which means "gold", it may further be broken down into several parts such as "roof", the "tunnel", and the "mine shaft" in order to give the other group hints that the correct character is related to a gold mine. This then would serve as visual ingredients to a mnemonic story, which can then be recorded as an audio clip.

The challenge then is for the student to look at a Kanji or Hanzi character provided and come up with some form of imaginative story limited only by one's creativity and ingenuity.

Introducing ABKD

ABKD is a mobile learning game that aims to help Filipino children and young adults remember and increase their Chinese Hanzi and Japanese Kanji vocabularies by engaging them in collaborative game-like group activities and challenging their creativity and imagination through drawing, taking pictures, and audio recording.

Technical Overview

ABKD runs on, ideally, any device, whether smartphone or tablet, that has at least an Android 1.5 version Operating System (OS). A Samsung P1000 Galaxy Tab was used for the actual test. Only one SD Card per Android device is required to be able to play the game.

The SD card is used to store the vocabulary lists, which the players can modify. Additionally, it can act as storage for the drawing canvas used, the picture taken, and the audio recorded. The

reason why the team opted to store these data instead of deleting them once they have been uploaded to Facebook (at least for the game results, the drawing and the picture) is because doing so would allow the players who currently do not have access to an internet connection to review their work at a later time. If they do not want to keep the data anymore, they can still, however, delete the data on their SD card using the file manager on the device or connect it to a computer and do the deletions there.

To be able to write Chinese Hanzi and Japanese Kanji characters, the DioPen Chinese IME was installed and used. Additionally, it is possible to switch the setting from handwriting recognition to QWERTY keyboard input of pinyin. For both of these settings, the application shows possible characters that match the character or pinyin entered, and the player has to select the correct one. Therefore, the student also has to be able to recognize the Hanzi or the Kanji. Since DioPen Chinese IME uses Simplified Chinese, not all characters from Japanese Kanji can be used. Nevertheless, other character input applications such as the Google Japanese Input (Beta) can be installed from Android's Google Play.

Cultural Inspiration

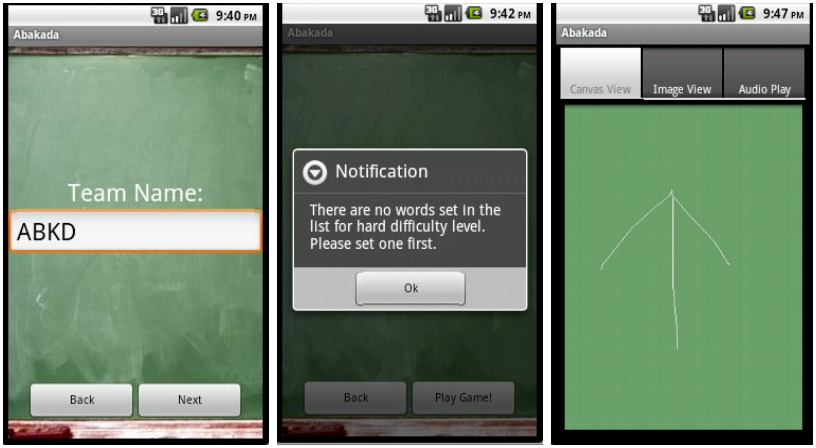
The underlying reason why the device is shared and passed from the first group to the next is to promote collective learning and to encourage face-to-face interaction typical of traditional Filipino games (*Traditional Filipino Games,* n. d.).

Although we included a feature that would allow players to upload data to a virtual social networking site, like Facebook, we wanted to include a face-to-face social networking component as well where players would meet and exchange tablets (and ideas) as the game progresses.

Game Mechanics

The first time the ABKD application is installed on the Android device, a default vocabulary list for the three difficulty levels, namely "Easy", "Medium", and "Hard", will be created. This list can be modified by pressing the "Vocab List" button in the Main Menu. Thus, words can be deleted and new words can be added. If all the words in a particular list have been deleted, when a new game is played and that difficulty setting is set, the ABKD application will output an alert notification once the "Play Game!" button is pressed on the "Divide your team..." screen. See Figure 1 for screenshots of the game.

Figure 1. In-game screenshots of ABKD. LEFT shows team name input screen. CENTER shows a notification requesting the team to add words to an empty vocabulary list. RIGHT shows a sketch hint for the character "上 (up)". The tabs on top show the three hints that are accessible.



The following are the steps to play ABKD.

- Form a team (with at least 2 members).
- Divide your team into two groups: Group A and Group B.
- These two groups must collaborate so that Group B can correctly identify and spell as fast as possible the randomly selected word given to Group A.
- Group A gives clues or hints about the word (which may be in Fiipino, English, Mandarin, or Nihongo) by drawing the object, taking a picture of it, or recording audio sounds.
- Group B then guesses the word based on the hints that Group A provides.
- At the end of the game, the team can upload the time it took them to solve the word, and the drawing as well as the picture taken onto the social networking site, Facebook.

Correctness of characters entered is based on a comparison of the current character stored in memory to the character entered by the player.

Usability Testing

A preliminary study was conducted to determine how ABKD is used in actuality, as well as to gather feedback on how the program may be improved. Moreover, a User-Centered Design (UCD) approach, where the end-users are included and are allowed to participate in the design and the development process, was done to improve the usability of ABKD and increase its technology acceptance.

Vocabulary List

Two main vocabulary lists were made: one for Chinese Hanzi, and another one for Japanese Kanji. The Chinese language students who participated in the study were learning Intermediate Chinese Mandarin, while the Japanese language students took up basic Nihongo. The characters in the Chinese Hanzi are the 50 characters out of the 1000 characters that they were supposed to study. For the Japanese Kanji characters, the words came from the Genki I workbook (Lin, Kojita & Mase; 2007), specifically lessons three to five, which were all included in the list of Kanji characters required in the class.

The following are the two lists of vocabularies used.

Chinese Hanzi. 麽,多,所,们,天,请,下,过,生, 问, 交, 学, 就, 来, 上, 为, 好, 会, 你, 个, 这, 以, 可, 要, 资, 到, 中, 了, 人, 在, 大, 有, 一, 我, 不, 是, 的, 也, 用, 能, 如, 文, 时, 没, 说, 他, 看, 提, 那

Japanese Kanji.

- Easy. 十二, 六百, 百万, 十二万八千, 四十一, 三百, 千五百, 二千八百九十, 六万七千,
- Medium. 半, 水, 下, 上, 人, 日本人, 月曜日, 火曜日, 水曜日, 木曜日, 金曜日, 土曜日, 日曜日
- Hard. 食,行,私,山川,女,山田,人,男,今

Participants

A total of 58 students, all college students from the Ateneo de Manila University, participated. Twenty one of those students used ABKD to study Chinese Hanzi, while 37 of those used the application to study Japanese Kanji.

The study was done on two separate days. One day was for the Japanese language students, while another day for the Chinese language students.

Procedure

Demonstration. All the students were given a brief run-through of how ABKD works. They were told that they had to form a team, and divide it into two groups. One gives hints, while the other guesses. At any time during the game, they can swap roles. They can use the camera, the canvas, or the audio recorder to give clues to the other group. Their goal is to learn as many words as they can by correctly guessing as many words within the given time limit. After every successful guess, they should inform the facilitator so that he or she can write down the elapsed time and the word guessed. After this, the class broke down into their respective teams and groups.

Figure 2. Students playing ABKD. They are taking a photo to give a hint for the other group

Game-test. Due to time constraints, the students who were studying Mandarin were given only 30 minutes to play ABKD, while the students who were learning Nihongo had 45 minutes. While they were playing, the facilitator also observed and took pictures of the students for documentation.

Informal interview and survey. After playing, the students were asked what they thought about ABKD, and how it can be improved. A link to a survey sheet online was also sent to the class beadle (for the Nihongo class) and the teacher (for the Mandarin class), so that it can be forwarded to the participants. The survey sheet contained the following questions:

- Do you own a mobile phone?
- If yes, what model?
- Do you own a tablet computer?
- If yes, what model?
- Do you find learning Hanzi/Kanji difficult?
- What do you think is the best way to learn Hanzi/Kanji?
- Please rate ABKD (from 1-5, where 5 is the highest)
- Why did you rate ABKD as such?
- Please give comments/suggestions on how to improve ABKD.

Results

Table 1 shows the characters that were correctly guessed by the Mandarin learners and the time it took them to guess the word. A total of 30 minutes was given to them to play the game. For team 1, an average time of 01:53 (mm:ss) was spent to guess a Hanzi character, while for team 2 it was 02:53. Furthermore, for characters that appeared multiple times, there was a noticeable decrease in the elapsed time for the students to correctly guess the word. Note that

the team had to redraw, retake a photo, or redo the audio recording again even though the character to be guessed is the same. Team 1 was able to guess nine characters, while team 2 was one character behind with eight total characters guessed.

Table 1. Game Results from Mandarin Learners

Team 1			Team 2		
No.	Character guessed	Time Elapsed (mm:ss)	No.	Character Guessed	Time Elapsed (mm:ss)
1	好	02:30	1	上	04:02
2	他	03:03	2	不	02:05
3	这	02:45	3	没	02:48
4	天	02:01	4	过	03:37
5	的	02:30	5	请	06:50
6	大	00:59	6	有	01:54
7	们	01:17	7	可	01:09
8	那	00:58	8	不	00:40
9	这	00:56			
Average Time		01:53	Average Time		02:53

Table 2 and Table 3 show the characters that were correctly guessed by the Nihongo learners and the time it took them to guess the word. A total of 45 minutes was given to them to play the game. Based on Table 2, for team 1, an average time of 01:16 (mm:ss) was spent to guess a Kanji character, while for team 2 it was 01:49. For Table 3, team 1 achieved an average time of 01:27, while for team 2, it is 02:08. Further, similar to the Mandarin learners, and except for the character 行, there is a marked decrease in the elapsed time for the students to correctly guess the word for the characters that appeared multiple times.

Table 2. Game Results from Nihongo Learners (First Group: Section H)

Team 1			Team 2		
No.	Character guessed	Time Elapsed (mm:ss)	No.	Character guessed	Time Elapsed (mm:ss)
1	十二万八千	02:39	1	十二	02:23
2	半	00:33	2	六百	01:09
3	行	00:43	3	四十一	01:05
4	千五百	02:52	4	百万	03:29
5	日本人	01:14	5	百万	03:09
6	男	02:35	6	六万七千	01:32
7	二千八百九十	01:15	7	下	01:17
8	火曜日	01:50	8	日曜日	04:55
9	食	01:17	9	人	00:39
10	四十一	01:36	10	上	00:42
11	火曜日	02:26	11	金曜日	02:10
12	行	00:28	12	半	01:02
13	十二万八千	00:49	13	火曜日	01: 50
14	日本人	00:56	14	女	00:38
15	人	00:36	15	私	01:15
16	十二	01:02			
17	水	00:44			
18	山田	01:07			
19	三百	01:03			
20	金曜日	01:08			
21	山川	00:58			
22	三百	00:46			
23	月曜日	01:08			
24	行	00:40			
Average Time		01:16	Average Time		01:49

Table 3. Game Results from Nihongo Learners (Second Group: Section G)

Team 1			Team 2		
No.	Character guessed	Time Elapsed (mm:ss)	No.	Character guessed	Time Elapsed (mm:ss)
1	下	02:19	1	木曜日	05:48
2	半	01:43	2	六百	01:29
3	下	01:22	3	四十一	00:58
4	人	01:03	4	八千八百九十	02:28
5	男	02:16	5	百万	01:40
6	女	00:54	6	百万	00:55
7	行	01:10	7	金曜日	01:40
8	山川	01:38			
9	私	00:42			
10	食	01:26			
Average Time		01:27	Average Time		02:08

Feedback

Feedback from the informal interview and the online survey shows a generally positive response towards the use of ABKD in learning Chinese Hanzi and Japanese Kanji. Out of the 10 respondents who rated ABKD from one to five, where five is the highest, ABKD received a mean score of 4.2, with a standard deviation of 0.42.

Comments from students include "Interesting and very interactive. I like how it challenges students to come up with creative ways and contexts to remember their Kanji." Other comments include "It is fun and very creative. You will be able to learn Kanji better in this app because you just don't memorize and study it in

paper but you study it while playing. Because of that, the Kanji characters will stay longer in your mind." One student even noted that "It can strengthen the bonds between the people who are giving hints and who are guessing the answer." Additionally, regarding the graphics of the game, one student commented that it was "cute."

To help improve ABKD, the following suggestions were given by the students.

- Seamless transition from the game results to a new vocabulary word. At the moment, every correct guess ends the game.
- More vocabulary words (Kanji learners)
- "...some "hints" just in case the student may not know what the word is yet." (It seems that the hints provided by the other group weren't enough for them to figure out the correct word.)
- Include both Traditional and Simplified Chinese characters
- Thicker pen marks and more colors in the drawing component. (At the moment, only white can be used.)
- Add a video recorder component
- Create an iOS version

Conclusion and Recommendations

This paper discussed the design, development and use of a multimodal mobile application, called ABKD, to learn Chinese Hanzi and Japanese Kanji characters. Results from the preliminary user study as well as the feedback from the students showed that by challenging students' creativity in taking pictures, drawing sketches, and recording audio, digital technologies have the potential to make learning more fun and interesting.

Moreover, while students are rapidly becoming used to online virtual social networks, common aspects of traditional Filipino games, where players meet and play face-to-face, and enhanced by mobile learning games like ABKD still can help foster camaraderie and establish, "bonds" as evidenced by actual comments from the users. Recommendations on the improvement of the application which include seamless screen transitions, flexibility to add words, inclusion of hints and inclusion of features such as selection of pen color and size and video recording can be generalized to mobile learning applications. In addition, future improvements can still be made by conducting experiments in gauging the effectiveness of the tool in learning languages.

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About the Speaker: Mr. Michael Syson is a faculty member of the Ateneo de Manila University Japanese Studies Program.

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