So, H. J. et al. (Eds.) (2020). Proceedings of the 28th International Conference on Computers in Education.
Asia-Pacific Society for Computers in Education

Development and Field Testing of a Narrative-Centered Digital Game for English Comprehension

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Abstract: This paper describes the development and field testing of *Learning Likha: Rangers to the Rescue*, a narrative-centered, mobile-based digital game for practicing English comprehension. Twenty-seven (27) student participants from Grades 4, 5, and 6 were invited to play the game and answer a comprehension test to determine their level of understanding of the game's contents. Self-report questionnaires were also used to assess the extent to which they enjoyed playing the game. Three (3) teachers were likewise invited for a focus group discussion (FGD) to gather their insights about the game and how they may use it in their classes. Student's self-reported feedback indicated they found the game fun, interesting, and sufficiently challenging. Post-test comprehension scores were generally good. Younger participants scored lower than their older peers but the differences were found to be not significant. Teachers indicated the game has the potential to be used as a supplement for their classes and that their students would enjoy playing it.

Keywords: game-based learning, English comprehension, Philippines, mobile-assisted language learning

1. Context and Motivation

The Philippines is a country in Southeast Asia with a population of 109 million, 51% of whom are under the age of 26 (CIA, 2020). A former US colony, English proficiency is one of the country's strengths (Valderama, 2019 November 18). The availability of young, educated Filipinos with good spoken English has secured the Philippines' place among the world's top 10 business process outsourcing (BPO) destinations (Shead, 2017 April 17).

Unfortunately, results from recent international tests have suggested that the country may be losing its English proficiency edge. In an annual ranking of 100 countries' English proficiency skills, the Philippines dropped from 14th in 2018 (Education First, 2018) to 20th in 2019 (Education First, 2019). The Programme for International Student Assessment (PISA) results published in of 2019 showed that the Philippines obtained an average of 340 points in Overall Reading Literacy and was classified at Proficiency Level 1a (Philippines Department of Education, 2019). By comparison, the average of the Organization for Economic Cooperation and Development (OECD) countries was 487, ranked at Proficiency Level 3, two levels higher than the Philippines' country average. In the Test of English for International Communication (TOEIC) conducted by Hopkins International Partners, 10,000 Filipino test takers average 631 out of 990, equivalent to the intermediate or B1 level of the Common European Framework of Reference for Languages. This is the level expected from taxi drivers for the 2020 Tokyo Olympics.

Even within-country tests echo the same deficiencies. The Philippines Department of Education (DepEd) National Achievement Test (NAT) scores of Grade 6 students have been declining over the last three years (Albano Jr., 2019). The 2018 Grade 6 NAT results showed the national average Mean Percentage Score (MPS) to be at 37.44, the weakest performance in the history of the standardized

exam (Albano Jr., 2019). The DepEd Regional Office 02 (Cagayan Valley) reported that their 2018 NAT results for Grade 6 show that the mean performance by subject area were far below the 75% acceptable MPS with scores for English averaging 33.52% (DepED RO2, 2019).

These deficiencies are not uniformly distributed. Rather, their concentrations are determined by socio-economics. In the PISA, for example, Filipino students from private schools scored higher than those from public schools (390 vs. 328 respectively) (Philippines Department of Education, 2019). Urban students outperformed rural students (355 vs. 313, respectively). This implies that those most in need of economic opportunities are unable to participate in them because of a lack of language proficiency.

Several factors contribute to this situation. Schools are typically under-resourced, both in learning materials and teachers. Limited number of classrooms result to high student-to-teacher ratios (STR) which make teaching and learning difficult. In a PETS-QSDS (Public Expenditure Tracking Surveys-Quantitative Service Delivery Surveys) study conducted in 2014 involving a nationally representative sample of 946 Grade 10 high school teachers, approximately 38% mentioned the need for better physical facilities (Al-Samarrai, 2016). Additionally, about 60% expressed the need for additional teaching materials (Al-Samarrai, 2016).

As a response to this situation, the Ateneo Laboratory for the Learning Sciences has begun developing mobile phone-based games for English vocabulary learning and comprehension. In this paper, we describe the development and field testing of *Learning Likha: Rangers to the Rescue* (LLRR), a mobile game that exercises the skill of attention to details. The purpose of this paper is two-fold: (1) to describe how a narrative-centered digital game (NCDG) can be designed and implemented to teach attention to details and (2) to assess the target audience's response to the game.

2. Mobile Learning

LLRR is implemented for use on mobile devices such as cell phones and tablets. Mobile learning has become popular in educational settings because the use of mobile devices allows learning to take place anytime and anywhere (Christensen & Knezek, 2017). The availability and diversity of mobile applications has expanded the affordance of mobile devices into providing access to learning beyond the classroom (Mouza & Barrett-Greenly, 2015). Designers of mobile learning applications exploit the ubiquity of mobile devices so they can be used in both formal and informal learning (Kukulska-Hulme, 2012) while resolving the location and time barriers inherent in traditional learning environments.

Mobile phones are regarded as the primary computing platform in developing countries. As of 2018, the developing world had an estimated 102.8 mobile phones for every 100 people (ITU, 2018). As such, teachers and students have turned to the use of these devices as a way to integrate technology in education. Additionally, research has shown that young learners tend to be receptive to mobile learning applications (Sung et al., 2016). Rodrigo et al. (2019) surveyed 710 Grades 4, 5, and 6 students from two elementary state schools in Quezon City, Metro Manila, Philippines to determine their level of access to technology. They have found that they have access to cellular phones (63%), computers (54%), and tablets (36%) (Rodrigo et al., 2019b). Since mobile phones emerged to be the easiest to access, the mobile platform seemed like a promising venue for providing support to a wider range of learners.

3. Digital Game-Based Learning

Games are playful activities that provide high motivational value (Park et al., 2019). Few instructional techniques are able to encourage similar levels of engagement on tasks as games do (Tobias et al., 2014). The increasing popularity of games used in teaching and learning can be attributed to the motivational affordances (e.g. immediate feedback, challenges) that are typically built into them (Anastasiadis et al., 2018). They provide enjoyable experiences that can stimulate learners' motivation

while enabling the accomplishment of learning outcomes. Thus, educators are exploring the use of games for instruction because of their innate motivational qualities (Tobias et al., 2014).

Digital game-based learning (DGBL) pertains to the utilization of the entertainment power of games in educational contexts (All et al., 2016). It is characterized by a balance between teaching/learning and gaming (Prensky as cited in Beserra et al., 2014) to aid in the realization of learning goals. Games are commonly used to aid teachers in helping students acquire knowledge and skills in a variety of topics such as science, mathematics, and language learning, among others (Abdul Jabbar & Felicia, 2015). Moreover, DGBL is considered to be an instrument that is in a good position to promote 21st century skills such as creativity (Hsiao et al, 2014) and problem-solving (Lester et al, 2014)

3.1 Narrative-Centered Digital Games

Learning Likha: Rangers to the Rescue is an implementation of a DGBL format known as Narrative-Centered Digital Games (NCDG). NCDGs situate educational content and problem-solving activities within interactive story scenarios (Rowe et al., 2010). Story features such as believable characters and immersive plots are integrated into DGBL environments to help motivate learners and encourage them to persist in learning tasks for longer periods of time (Rowe et al., 2012). According to the Narrative-Centered Learning Theory, there are two (2) ways in which narrative can help motivate learners: (1) learners, through text, are transported to a different time and place that is real to them; and (2) learners themselves perform the narrative. Much of the appeal of NCDGs arise from their ability to contextualize educational content with interactive stories (Lester et al., 2013). Additionally, they have a natural capacity to foster engagement by tightly integrating learning goals into rich narratives.

3.2 Mobile-Assisted Language Learning (MALL)

Mobile-Assisted Language Learning (MALL) is an area within mobile learning that focuses on various language learning areas such as grammar, listening and reading comprehension, and vocabulary acquisition (Miangah & Nezarat, 2012; AbuSa'aleek, 2014; Sung et al., 2015). Language learning is said to be effective if the learner is exposed to the target language in meaningful contexts even outside of the classroom premises (Eun & Lim, 2009; Peterson, 2010; Amer, 2014). An example is a work by Yin et al. (2010) which explored the use of MALL to teach Japanese Polite Expressions (JPE) to support foreigners through a context-aware language learning environment. Additionally, there are studies that explore the use of story-/narrative-based games for teaching languages such as English (Chen et al., 2018) and Spanish (Prestopnik, 2016). Affordances of real-world experiences for learning a targeted language such as communicative and interactive activities were designed into the virtual environments to give learners the opportunity to learn the language within a narrative context.

4. Learning Likha: Rangers to the Rescue

LLRR is an NCDG that helps learners exercise their English reading and listening comprehension skills, and to practice the skill of noting explicit details. As a secondary objective, it exposes the learners to a variety of endangered species in the Philippines.

LLRR is the successor of a game *Learning Likha: Music for the Fiesta* (Rodrigo et al., 2019a). In *Learning Likha: Music for the Fiesta*, the player helps the main character, Likha, collect instruments that her band needs in order for them to play during the town's feast day. To achieve her mission, Likha needs the details regarding the instruments and their locations from her fellow band members and various shop keepers. A full description of this game and its field test results are available from Rodrigo et al., 2019a.

LLRR follows the same structure. The game's setting and initial motivation are first established through the use of a narrative: Likha, her friend Taro the Tarsier, and four other volunteer rangers help rescue animals and bring them to the Rescue Center in their town, Hiraya. Each volunteer is assigned

to rescue or help one of the following endangered species: a freshwater crocodile, a hawksbill turtle, a tamaraw, a warty pig, and a Philippine eagle. The game starts with Likha and Taro welcoming the player as the new volunteer ranger to Hiraya's Rescue Center. The player is then invited to the Rescue Center's Holding Area in which he/she selects one of the volunteer rangers (Figure 1).

A spoken and written dialogue between Likha, Taro, and the selected ranger describes the endangered animal to be rescued/treated and/or a related task that needs to be completed (Figure 2). Images and text on the game screen containing descriptive details supplement the audio that plays. There is also a notepad on the upper right corner of the screen that lists the key details about the animal to be rescued or the task to be completed. Given this information, the player needs to find the correct animal in the scene or perform the task based on the description provided by the dialogue. Feedback is given whether the player's choice is correct or wrong. A short explanation about the animal is also given after (Figure 3). The player does this for all volunteer rangers until all animals have been rescued. LLRR is available free of charge from both the Google Play Store and the Apple App Store.

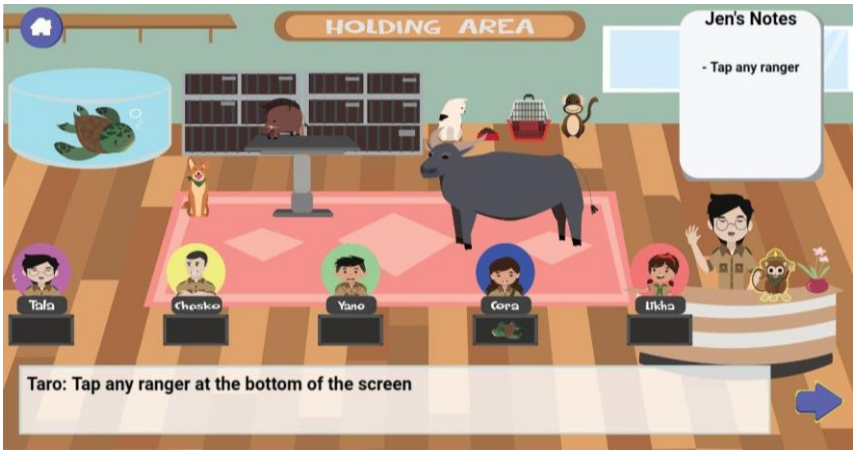

Figure 1. Hiraya's Rescue Center's Holding Area where player selects one of the rangers.

Figure 2. Sample dialogue scene describing the task after a ranger has been selected.

Figure 3. Description of the hawksbill turtle shown after the task has been completed.

5. Testing Methods

The testing was conducted at a public school in Quezon City, Metro Manila, Philippines. Teachers of Grades 4, 5, and 6 were asked to randomly select students from each grade level that may be invited to participate. During the study, the participants were grouped by grade level. Each grade level had separated testing sessions due to the limited number of cellular phones and earphones. Once settled in the venue, they were oriented on the objectives of the study and the details of their participation. They were then asked to complete a demographics questionnaire to determine their level of access to mobile phones. Additionally, it tried to determine their usage, attitude, and perceptions towards the English language by giving them 8 statements to which they would indicate their level of agreement (1 = Strongly Disagree to 5 = Strongly Agree). Sample statements are:

- I speak English at home.
- I find English difficult to learn.
- Learning English is important.

Once the participants completed answering the demographics questionnaires, mobile phones were handed to them. They were then asked to play LLRR for 20 minutes. They were also provided with earphones that they used while playing for full auditory attention.

After completing the game, or when the 20-minute allotted play time had passed, a post-test comprised of 19 multiple choice questions and 4 open-ended questions was administered to measure how much they remembered and understood the details from the story. Sample questions are:

- What is Taro?

  a. Monkey b. Dog c. Cat d. Tarsier
- What was the story about?

The participants were also asked to complete one final questionnaire with two sections, adapted from the Game-Based Learning (GBL) Engagement Metric (Chew, 2017) and the Intrinsic Motivation Inventory (IMI) (Ryan, 1982). The goal of the GBL questionnaire was to determine how engaged the students were with the game by asking them for their levels of agreement to 8 statements such as "I followed the instructions carefully in the Learning Likha: Rangers to the Rescue game." On the other hand, the IMI questionnaire posed 9 questions that asked participants to indicate if the statements were not at all true (1), somewhat true (4), or very true (7). A sample statement is "I enjoyed playing *Learning Likha: Rangers to the Rescue* very much."

Three (3) English teachers were likewise invited for a focus group discussion (FGD) to gather their insights about the game and how they may use it in their classes. They were asked about what they liked and did not like about *Learning Likha: Rangers to the Rescue*. Suggestions for improving the game were also solicited from them.

6. Analysis

6.1 Participant Profile

A total of 27 students participated in the study: 10 from Grade 4, 7 from Grade 5, and 10 from Grade 6. Out of the 27, 13 were male and 14 were female (Table 1). Majority of the students owned cell phones. Most of them played cell phone games, some of which were educational.

Table 1. *Profile of Participants*

	Grade 4		Grade 5		Grade 6	
Sex	M	F	M	F	M	F
N	4	6	3	4	6	4
Age Range	9 - 12		10 - 11		11 - 13	
Had their own cell phones	5 (50%)		5 (71%)		6 (60%)	
Played games on cell phones	8 (80%)		5 (71%)		10 (100%)	
Played educational games on cell phones	7 (70%)		5 (71%)		8 (80%)	

When asked about their usage, attitudes, and perception towards the English language, students were impartial about whether they spoke English at home (3.0/5.0) or with their friends (3.1/5.0). They did enjoy learning (4.3/5.0) and reading (4.3/5.0) in English. They expressed a desire to learn English (4.5/5.0) and agreed that it is important (4.5/5.0). These show that though the participants may not typically use English as a medium for communication, they do recognize its value and enjoy learning it.

6.2 Game Engagement and Comprehension Scores

The students generally self-reported positive feelings and attitudes towards the game. Results of the GBL questionnaire show that they carefully followed the instructions (4.6/5.0) and tried their best to pay attention to the details of the story (4.6/5.0). They were able to use their prior knowledge (4.5/5.0) and they agree that what they were learning from the game were important (4.7/5.0). They said playing the game interested them (4.6/5.0), that they fondly anticipate completing the tasks (4.7/5.0), and that the game was somewhat challenging (3.9/5.0).

The IMI results were similar. They expressed enjoyment (6.8/7.0), was interested (6.7/7.0), and said it was fun to play (6.9/7.0). It was important that they did well in the game (6.7/7.0), and so they tried their best to successfully perform the game tasks (6.7/7.0).

The results of the comprehension post-test were also generally good. Grade 4 students' post-test scores averaged 65%, Grade 5 students averaged 75%, and the Grade 6 students averaged 76%. A single-factor ANOVA showed that the differences between groups were not significant ($F(2,24)=1.27$, $p=0.3$). These results demonstrate the game's potential to foster positive emotions and contribute to the realization of learning outcomes.

6.3 Focus Group Discussion (FGD) with Teachers

A focus group discussion (FGD) was conducted with three (3) teachers (one representative per grade level) to learn more about the types of activities they give their students that are focused on reading comprehension and noting specific details. The FGD also sought to gather their insights regarding LLRR.

4.1.1 Classroom Activities for Identifying Details and Reading Comprehension

Seat works/homeworks on identifying details typically come in the form of giving learners stories to read and asking them to do one of the following: (1) enumerating specific story details; (2) listing down

their questions about the story; or (3) creating an outline of the story. Students are also asked to engage in silent and oral reading to improve their reading comprehension skills. According to the teachers, encouraging students to read in groups and present their learning might be a potential approach for improving their skills in identifying details. They asserted that students like to work in groups because they have someone to discuss with. Providing a reading corner that they can use during free time could encourage students to read more. Additionally, students are drawn to colorful, animated materials delivered through more modern-day medium such as laptops and cell phones.

4.1.2 Teachers' Insights Regarding LLRR

Based on the teachers' comments, they liked how LLRR teaches the students about the various endangered species in the Philippines and how they can be saved in certain situations. They were delighted by the rangers' names as they were "very Filipino". When asked about what they least liked about the game, they said some of the items were quite difficult to find, such as the plastic bottles and the Philippine Eagle. The teachers see the potential of LLRR being used in the classroom. They said they can use the game as a springboard to their lessons, acting as a tool for motivating the students. They think it would be a good supplement for teaching nouns and following directions. They also said that it can be integrated in other subjects such as Science and Values. Overall, they think the students would enjoy the game in their classes.

7. Conclusion

In this paper, we discuss the implementation and testing of *Learning Likha: Rangers to the Rescue*, a narrative-centered digital mobile phone game to help with practicing English comprehension and attention to details. The student participants found it interesting and fun. They exerted effort in understanding the content and completing the game tasks. Their comprehension scores were generally good in spite of them being non-native English speakers. The younger participants' scores were lower than their older peers but the differences were found to be not significant. Generally, the students expressed interest in learning English and understand the value of developing their reading comprehension skills.

A limitation of the study is that there was no baseline assessment of the participants' pre-existing English language skills. Hence, assessment of learning gains is not possible at this time. Still, this work is an attempt to address the need for additional learning materials that can be used in the classroom. The conversation with the teachers shows there is potential in utilizing the game in their classes. They have identified certain topics in their curriculum that could benefit from incorporating LLRR as a supplementary material. They think it could help in motivating students by making learning fun and interesting. Additionally, the game's narrative was particularly designed for Filipino learners to make it more relatable and familiar to their context. As previously mentioned, the mobile platform is the most accessible to a wider range of audience, including those who may be underprivileged. The hope is that this game, as well as its predecessor, *Learning Likha: Music for the Fiesta*, is in some way able to supplement the realization of learning goals.

Acknowledgements

We thank the Ateneo de Manila University; the principals, teachers, volunteers, and learners of our partner public schools for their participation; Ma. Rosario Madjos; and the Commission on Higher Education and the British Council for the grant entitled *JOLLY*: *Jokes Online to improve Literacy and Learning digital skills amongst Young people from disadvantaged backgrounds*.

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