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## Analyzing students' language learning experience in an augmented reality mobile game: an exploration of an emergent learning environment

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### Abstract

In order to better promote the use of mobile technology in the field of language education, we created an augmented reality mobile game, Guardians of the Mo'ō, for ESL (English as Second Language) learners to enhance their cultural understanding, communicational skills and also language development. Through detailed analysis of the video recorded play-through data, we found that students were able to coordinate their actions and engage in both the virtual and physical world during problem-solving processes. Thus, we argue that the embodied gaming environment which Guardians of the Mo'ō provided afforded the dynamic learning experience, and it is a successful exploration of using mobile technology in creating a new learning environment.

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### 1. Introduction and Theoretical Grounding

Associated with term 'Web 2.0,' educators working in the field of Second Language Acquisition (SLA) have recently begun integrating various online language learning tools into the classroom (Steel & Levy, 2013). While this has been an excellent first step, 21st century educators must also be thinking about the emerging literacies that are being developed by their students every day with their increasing usage of newer technologies. As language teachers, it is their responsibility to play the role in guiding these students in how they use this new technology and

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presenting them with the affordances of having such devices both inside and outside the classroom (Thorne, Black, & Sykes, 2009; Steinkuehler & Squire, 2014). In fact, some educators have already been focusing on creating language learning experiences that extend beyond traditional classroom situations (see Thorne, 2008; Holden & Sykes, 2011; Zheng & Newgarden, 2012), and one of these key ways has been through gamification.

Playing video games can be educationally beneficial (Barab et al, 2007). In the domain of language education, societal interest in computer games, especially Massive Multiple Online Role-Playing Games (MMORPGs), has fueled interest in Computer Assisted Language Learning (CALL) for the past two decades (Newgarden et al, 2015). A good video game provides rich opportunities for players to experience the problem-solving and goal-pursuing processes (Gee, 2005). Players need to establish relationships with their partners, and negotiate with each other for a collaborative action (co-action, Zheng, Newgarden, & Young 2012). Mobile games, on the other hand, have created an extended space to the MMORPG virtual environment, in the sense that the situated and embodied environment can both exist in the virtual storyline and in the physical world. Combining the findings from MMORPG studies and the theories of mobile place-based learning, we created an augmented reality mobile game, *Guardians of the Mo'ō*, to enhance cultural understanding, linguistic awareness, and ultimately to promote students' active language learning.

## 2. Methodology

### 2.1. Our Game: *Guardians of the Mo'ō*

In the spring of 2015, Dr. Dongping Zheng at University of Hawai'i at Mānoa led her research team to start creating an augmented reality mobile game using the open-source platform ARIS. Developed by David Gagnon at UW-Madison, ARIS, or Augmented Reality for Interactive Storytelling, allows us to design place-based quests using GPS tracking functions on mobile devices without an on-site program, and also to create a non-linear and complex storyline for our game. Adopting ideas from Hawaiian mythology, our research team created the game *Guardians of the Mo'ō* around the story of players being the helpers or guardians of the Mo'ō (who is a gecko or Lizard Goddess in Hawaiian culture) that is ill and in need of help. Using both virtual objects such as drawings or notes and physical items such as the trees or works of art on campus, we were able to afford students' new experiences and interaction in both the virtual and physical space.

### 2.2. Participants and Procedure

This project received a tremendous amount of support from the Department of Second Language Studies, especially the Hawai'i English Language Program (HELP), whose students became our target players for the game. Having interviewed HELP students to understand their attitude and experience towards English learning via (mobile) technology, and after having taken several trips to various sites ourselves, we selected various locations on campus for our players to explore and interact with. In the data that we presenting, the three HELP students are all from South Korea, and their English proficiency level is intermediate (300 level at HELP). Student 1 (S1) and student 2 (S2) are female students, and student 3 (S3) is male. On the days of the gameplay, each of the student groups were accompanied on their gameplay sessions by two members of the research team. Each group received an iPad with the ARIS game downloaded for them. Simple training on ARIS was given before students began to play the game. For the students to progress through the game, they had to physically orient themselves in places that we selected from the UH campus. At each new space they arrived at, there was a new challenge or task that needed to be completed in order to advance to the next stage. The game play data was video recorded with the permission of all of the students and later selectively transcribed for analytical purposes. We adopted Conversation Analysis (Schegloff, 2007) to look closely at the turn by turn organization of students' interaction. Also with the embodied nature of the gaming environment, we also used Multimodal Analysis (Baldry and Thibault, 2005) to understand the semiotic resources that students use, and how it would affect their interaction and learning.

### 3. Analysis and Discussion

#### 3.1. Extract 1: Chinese character or Japanese character?

The current quest for this data is called “Symbolism of the River”: the students are asked to write a note with their own interpretation of how the river symbolize stages of life, or identify what Chinese character the shape of the river on campus represents. The purpose of the parallel choices is to encourage students to physically explore further in the garden, thus create more opportunities to interact with the physical world (there are signs around the garden with “correct” answers), including asking other people. Interestingly, this group found the sign with a “correct” answer to the second question (identify the character) very early, but they became confused with the wording on that sign and decided to look for other signs. After they finished this quest by answering the first question (stage of life), they have decided to go to the teahouse, which is located at the north end of the Japanese Garden on campus and ask the workers there about it.

01.S3: Excuse me? Uh, may I ask (.) a question?  
 02.T1: Yes  
 03.S3: Do you know what is the symbol of the river?  
 04.T1: No, \$I don't\$ Uh:: it's supposed to make a Kanji or  
 05. some kind of uh:: shape, but I don't remember what it  
 06. was suppose to make  
 07.S1: Ah::↓  
 08.T1: Yea  
 ((T1 looks at other person in the house quickly, twice))  
 (1s)  
 09.R1: Do you guys know what Kanji is?  
 10.S1: Kanji?  
 11.S2: (XXX)  
 12.R1: Do you know what Kanji is?  
 13.T1: hhhh  
 14.R1: >No no no<, I mean Kanji in general  
 15.T2: Oh, it's Japanese for the symbols they use,  
 16 [so-  
 17.T1: [yea, Chinese symbols]  
 18.S1: [Yea, yea]  
 19.R1: They are Chinese symbols  
 20.S3: Oh::  
 21.S1: Ah:::::  
 ((S2 raising both hands, palms up))  
 22.S1: +mwenci ala?†  
 what know  
 Do you know what it is?  
 +S1 GRABS S2'S ARM  
 23.S1: +Japanese language has different +(2s)  
 +POINTS AT S2  
 +HAND MOVES UP & DOWN  
 24.S1: +to write  
 +RIGHT HAND UP, POSING "WRITE"  
 25.S1: and Kanji is Chinese letter- Chinese shape  
 26.S3: Katakana, +Hiragana, and Kanji  
 +S1 NODDING  
 27.S2: Ah::  
 28.S1: Ah I see that, \$that's why Chinese character\$ ah I

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† The participants were speaking in Korean

29. get it now

Interestingly, the first person in the tea house (T1) was not actually telling them the answer to their question (line 4 to 6). Note that at line 7, S1 made a “ah” sound, with a long and dropping tone at the end. Normally, such a sound would be seen as a claim for understanding. However, when R1 picked up the key information in the dialog and went on asking about the word “Kanji” (line 9, 12 and 14), S1’s response clearly showed that at least she didn’t fully understand what T1 said from line 4 to 6. After R1’s question, both of the two people from the tea house (T1 and T2) gave their explanation of the word “Kanji.” In line 17, another key information “Chinese symbols” got overlapped with both the other person’s turn and the students’ turn. It’s important to note that all of this conversation happened unrehearsed, the two people in the tea house weren’t informed of these questions either. That’s why one researcher (R1) entered the conversation and repeated the important piece of information “Chinese symbols” in line 19. After this key point was brought up, at line 20 and 21, we have S3’s long “oh” and S1’s very long and fairly loud “ah” with winding tones. Both of these two reactions indicated that S1 and S3 really got it this time. However, S2’s gesture after line 21 is a clear sign of saying “I don’t understand.” For this reason, S1 grabbed her arm and started explaining at line 23. In 22, S1 requested for a confirmation from S2 in Korean. This gesture as well as the offering of explanation from S1 and later S3 showed their care towards both the quest, and moreover, their partner. Accompanied with various hand gestures, S1 used multiple types of resources to explain what she understood to her partner. S3 joined in the conversation at line 26 as well, and explained further in detail the writing system of the Japanese language. These several turns of explanation, from line 23 to 26, clearly displayed S1 and S3’s understanding of the confusion between Chinese and Japanese characters. It is reasonable to believe that their knowledge of the Japanese writing system including Chinese characters is known by S1 and S3, especially S3, who was able to name all three writing systems in Japanese language. The process of “making the connection” is precisely the action of “adaptive reorganization of knowledge” (Thibault, 2004). In that sense, the connection-making between the stored knowledge (Japanese writing system) and the situational problem can be seen as a way of situated learning.

### 3.2. Excerpt 2: What do you want to do, guys?

This excerpt occurred roughly in the middle of the gameplay session, where the group has gotten stuck in the library on a quest named “Decipher the Riddle”. The riddle was composed with Hawaiian directional words, and students need to decipher the meaning of it to proceed to the next place. The students asked a librarian for clues, but they were still indecisive about where to go next. That is the point when S1 asks her group for their opinions on what they should do next. She believes that the group missed a clue and must go back to the library to re-read specific instructions.

01 S1: +It has anything to do with time travel.  
+POINTS AT IPAD AND READING ALOUD  
02 +What do you want to do, guys?  
+GAZES AT S3 & S2  
03 (3.8)  
04 +For me, I want to go back upstairs.  
+POINT TO SELF  
05 S3: +Upstairs?  
+GAZES AT S1 AND GLANCES AT S2  
06 S1: Yeah, 4<sup>th</sup> floor.  
07 S2: +Why?  
+ RAISING HANDS, BOTH PALMS UP  
08 S3: Why? What-  
09 S1: Because (.) +to read again.  
+POINTS AT IPAD  
10 S3: +To read?  
+GAZES AT IPAD  
11 S1: +What about you? I’m just suggesting..  
+GAZES AT S4

- 12 S3: Read for what? +This?<sup>‡</sup>  
+POINTS AT THE IPAD
- 13 S1: No. The other<sup>§</sup>.  
(2.1)
- 14 What about +you guys?  
+HAND UP, PALM UP
- 15 +What do you want to do?  
+GAZES AT S2
- 16 S2: +I have no idea.  
+SMILES
- 17 S1: +What about you?  
+POINTS AT S3
- 18 S3: +I-I agree.  
+GAZES AT S1 AND SMILES
- 19 S1: +\$No::, you don't agree with me.\$  
+ GAZES TO S2
- 20 S3: Maybe we ask +this (.) to someone in library.  
+ POINTS TO IPAD
- 21 S1: This? +This chest? +So, you mean that we should find for it?  
+POINTS TO IPAD  
+S1 GAZES AT S2 & S2 NODS
- 22 +Ok, let's go.  
+S1 GAZES AT S3 & S2, STARTS WALKING

In this excerpt, the students found themselves unable to progress in the game without further negotiation. Looking more closely, S1 is vocal in taking on a leadership role in order to progress further through the game. After asking both group members for their opinions, we can see in Line 3 that she decides to voice her own opinion when she doesn't receive the support she was hoping for. She explains that she wants to re-read the instructions on the 4<sup>th</sup> floor of the library on line 4 and 6. However, S3 and S2 seem to disagree with her, especially considering S5's body language in line 7, so S1 attempts to strengthen her position by explaining herself in line 9 while pointing at the Ipad. Even though S3 remains skeptical in line 12, S1 remains persistent in asking for their opinions on lines 11, 14, 15, and 17. She seems to hope that the other students will validate her opinion by asking each of them directly, or at least take the leading role of a new negotiation. However, S2 is unable to provide an alternative plan, and S1 interprets S2's smile in line 18 to be a sign of disagreement. Finally, S3 creates an alternative plan to ask someone in the library again about the chest riddle, which is supported by S2's nod in line 21. Even though S1 was not able to motivate the other students to follow her original plan, it seems that she's is satisfied with the conclusion of the negotiation, settling on S3's plan in the end and she verbalizes her commitment to the new plan in line 22.

This example of dynamic negotiation in the target language is significant because it provides a clear example in which the students were self-motivated to solve the task on their own internally without explicit instruction. They used this opportunity as a means for social interaction and were able to come to a group consensus resulting in an action in the end. The use of the Ipad afforded them the chance to discuss how it would best be utilized in order to accomplish their goals. Did they want to use it to re-read the previous riddle or did they want to use it to display a picture to the librarian? Because they had the freedom to choose, the negotiation was able to become more fluid in its outcomes and the students could have been successful in solving the riddle using either option.

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<sup>‡</sup> The ipad was displaying a picture of a chest where the "riddle" was written.

<sup>§</sup> "The other" is referring to a previous written clue that they encountered earlier in the library.

## 4. Conclusion

By using both Conversation Analysis and Multimodal Analysis, it becomes clearer in how the students were able to collaboratively negotiate to solve problems and coordinate their actions in our game through vocalization, gaze, and physical actions. In our post-game interviews, by reflecting on the negotiations that took place, their experiences in visiting new areas of the campus, and their opportunities to speak with strangers in the real world, the students responded quite positively to these experiences overall. Considering this, it seems that the proposed benefits of this mobile project that had been outlined based on student feedback at the outset of the project were validated by these gameplay sessions. Because the students were provided with multiple opportunities for interaction throughout the game in a semi-structured, open-world setting, they were able to engage in dynamic interaction to solve the challenges they faced, as well as decide if they wanted to speak to strangers in order to receive extra help. Moreover, since Guardians of the Mo'ō was designed with student needs in mind and the researchers were able to document entire gameplay sessions as well as post-game interview sessions, this game (with further refinements) has excellent potential to fill in the gap that has been left open by previous studies in the field in terms of incorporating student perceptions into future iterations of MALL-orientated games.

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## Appendix: Transcription Conventions (Adapted from Jefferson, 2004 & Burch, 2014)

[	beginning of an overlapping turn
]	end of an overlap turn
(1.9s)	length of pause
(.)	micro pause
:	longiated syllables
↓	dropping tone
<u>Word</u>	louder speech
wor-	a cut-off sound
\$word\$	smiley speech
((word))	gestures
+	place where action begins, description of action