Moravian History Mystery

An Outside Augmented Reality Game for Elementary History

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The problem

- Social studies is overshadowed. There is more and more time spent on math and language arts.
(Zhao & Hoge, 2005; Lee, 2008)

- Students find social studies boring and not relevant.
(Zhao and Hoge, 2005).

The opportunity

- Games can be engaging.
  (Kiili, 2005; Sweetser & Wyeth, 2005; Bressler, 2014)

- Some games have been shown to improve learning outcomes.
  (Van Eck, 2006; Steinkuehler and King, 2009)

- My interests lie with: Mobile, Digital, Augmented Reality Games

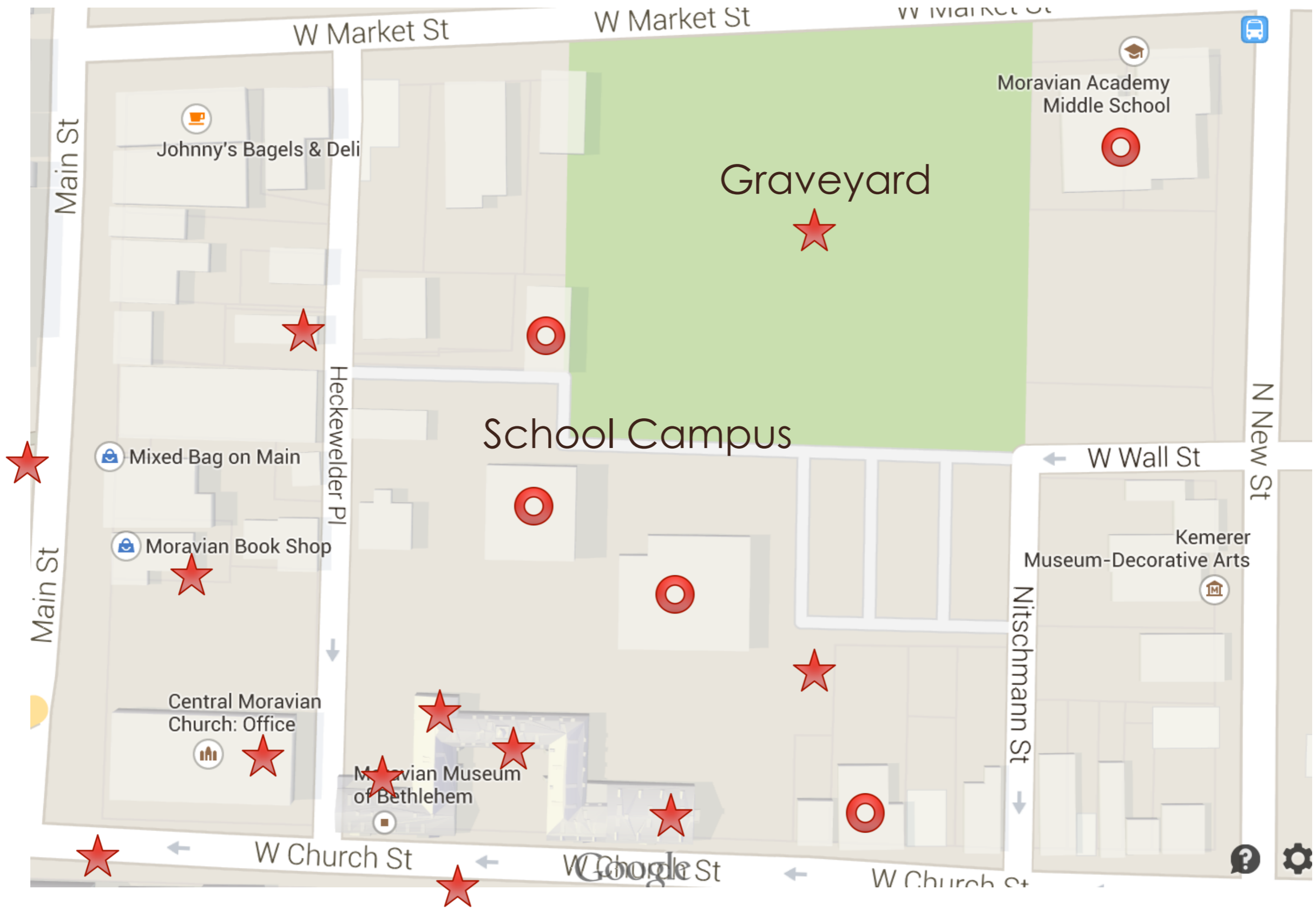Mobile ➡ AR ➡ History in Context

Research Questions

1   What **flow** experiences do young elementary students have while playing a mobile digital augmented reality game?

2   What relationship exists between young elementary students' mobile digital augmented reality game based learning experience and their **learning outcomes**?

3   What are the **attitudes** of young elementary students regarding this type of game based learning?

4   (+ A lot of unanticipated exploration of the design process)

Moravian Academy 2nd Grade

- 3 classes
- 3 teachers
- Located in historic district
- Colonial Moravian History is part of the current curriculum

Graveyard

School Campus

W Market St

W Market St

Main St

Johnny's Bagels & Deli

Moravian Academy Middle School

Heckewelder Pl

Mixed Bag on Main

Moravian Book Shop

Central Moravian Church: Office

Moravian Museum of Bethlehem

W Church St

W Church St

W Wall St

N New St

Kemerer Museum-Decorative Arts

Nitschmann St

W Church St

Google

★ Historical Sites

◎ School Buildings

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Methodology

UNITS	33 second graders aged 7-9; grouped in pairs or triads determined by teachers	21 females & 12 males	3 Classes of 10-13 students; 5-7 pairs or triads
TREATMENTS	Groups played AR iPad Game	Teacher-led class debrief sessions after each play session	
OBSERVATIONS	Assessed flow rates of groups through **observations**, assessed individual flow rates through **survey**, post-treatment full class **debrief**, and selected student **interviews** (RQ1)	Assess individual learning through teacher-designed curriculum-aligned **post-test**, **debrief**, and **interviews** (RQ2)	Measured individual gaming attitudes through **survey** (RQ3)
SETTINGS	Historic district and school campus	Classroom for debrief	School conference room for interviews
TIMING	Each class had 2 play sessions within 5 days.	All classes participated over a 3 week period.	

The Game

- Utilized ARIS platform

- GPS triggered AR

- Introduction in classroom
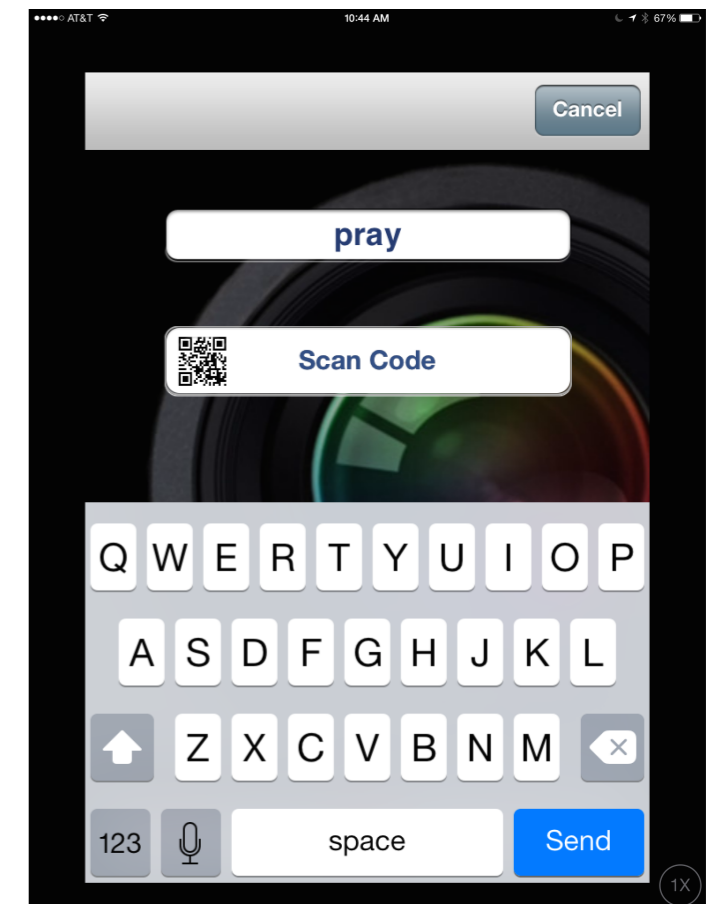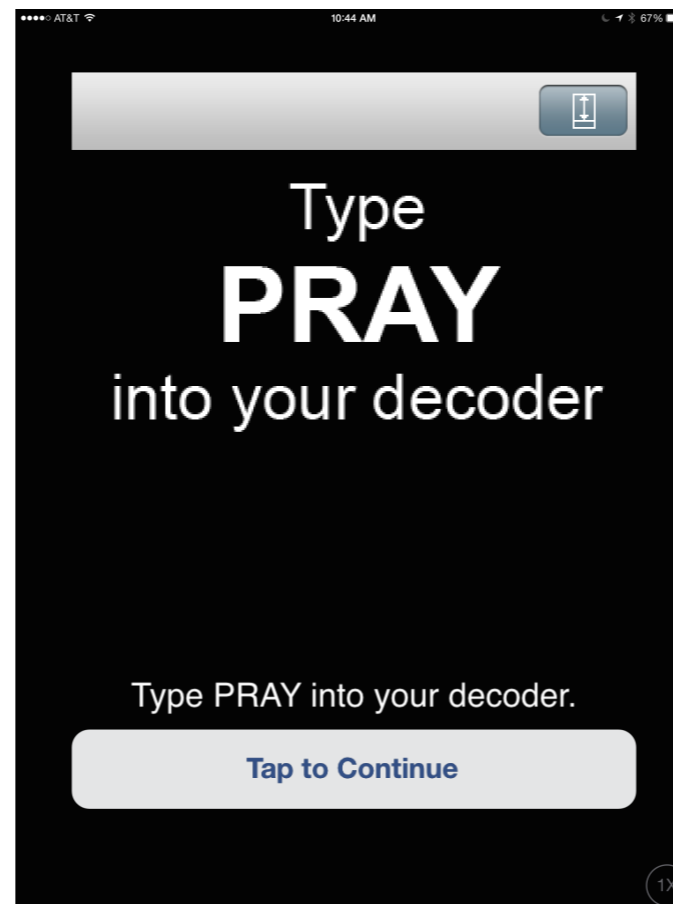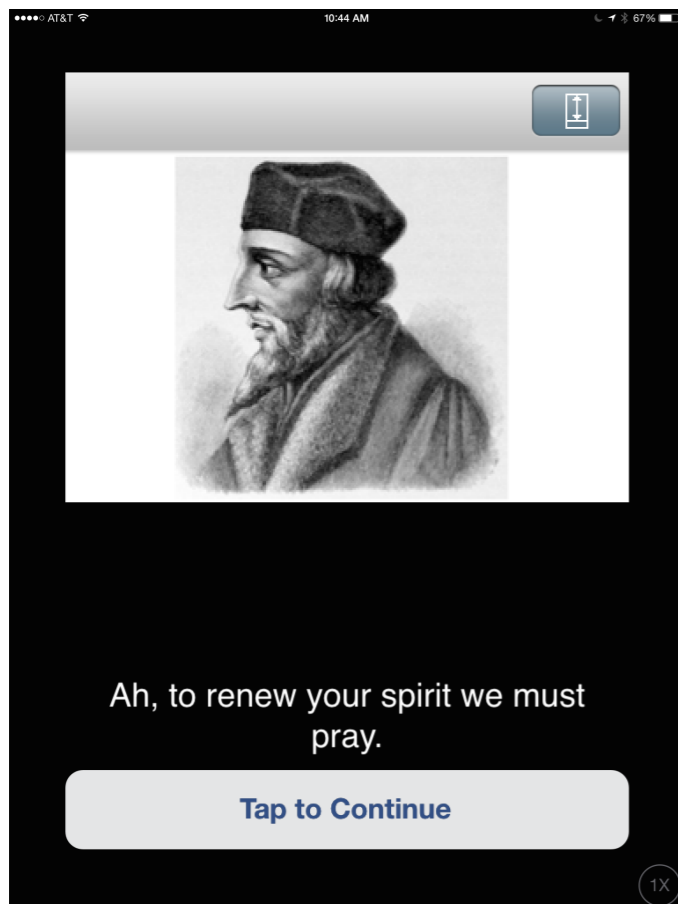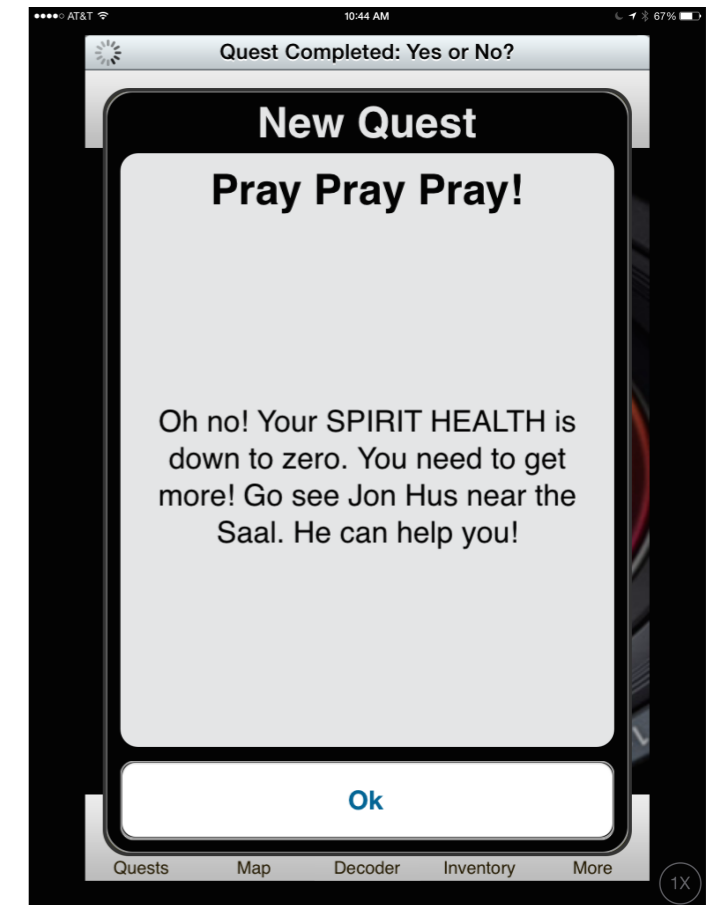
- Students played in pairs or triads
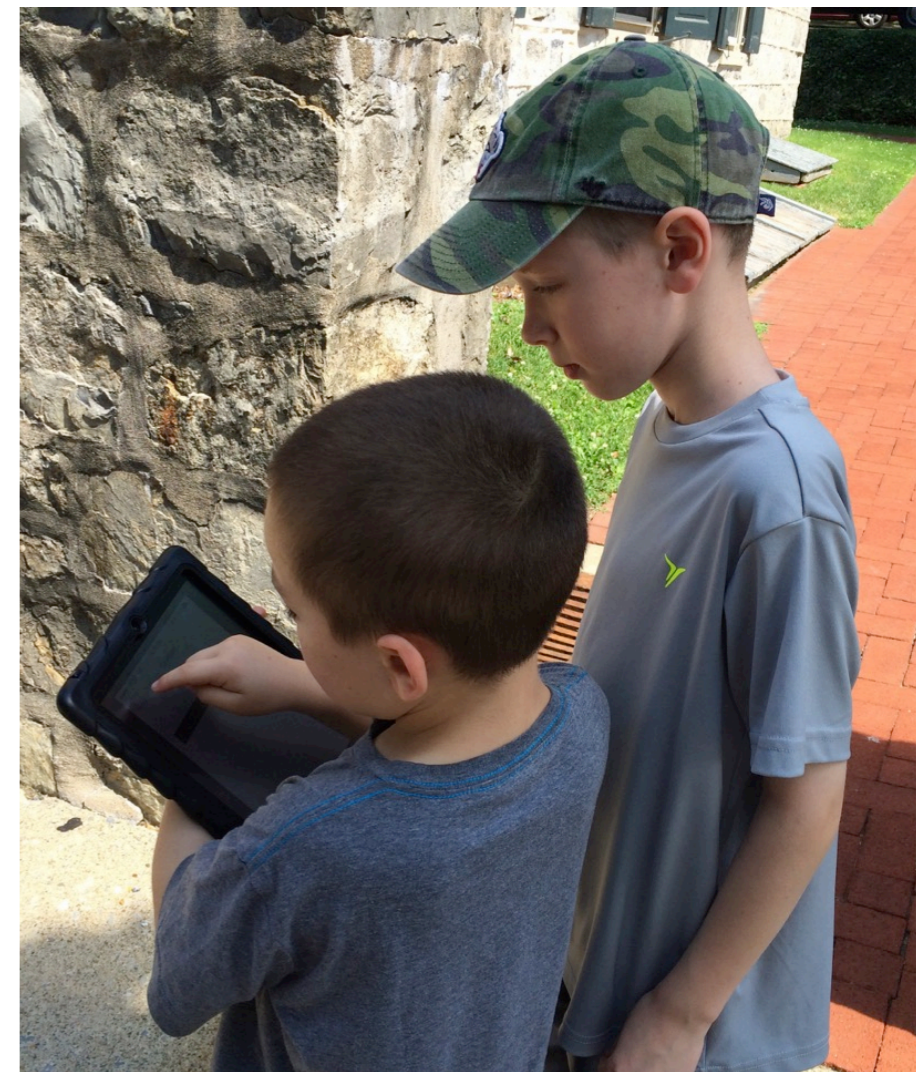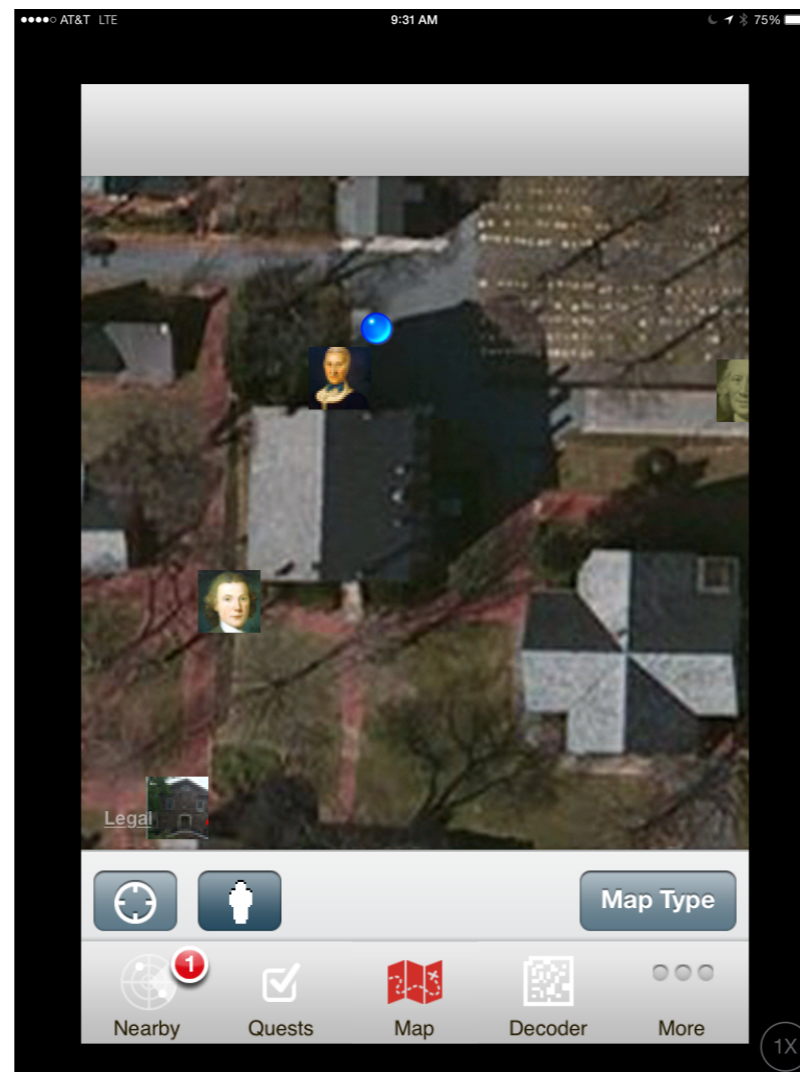
Quests & Levels
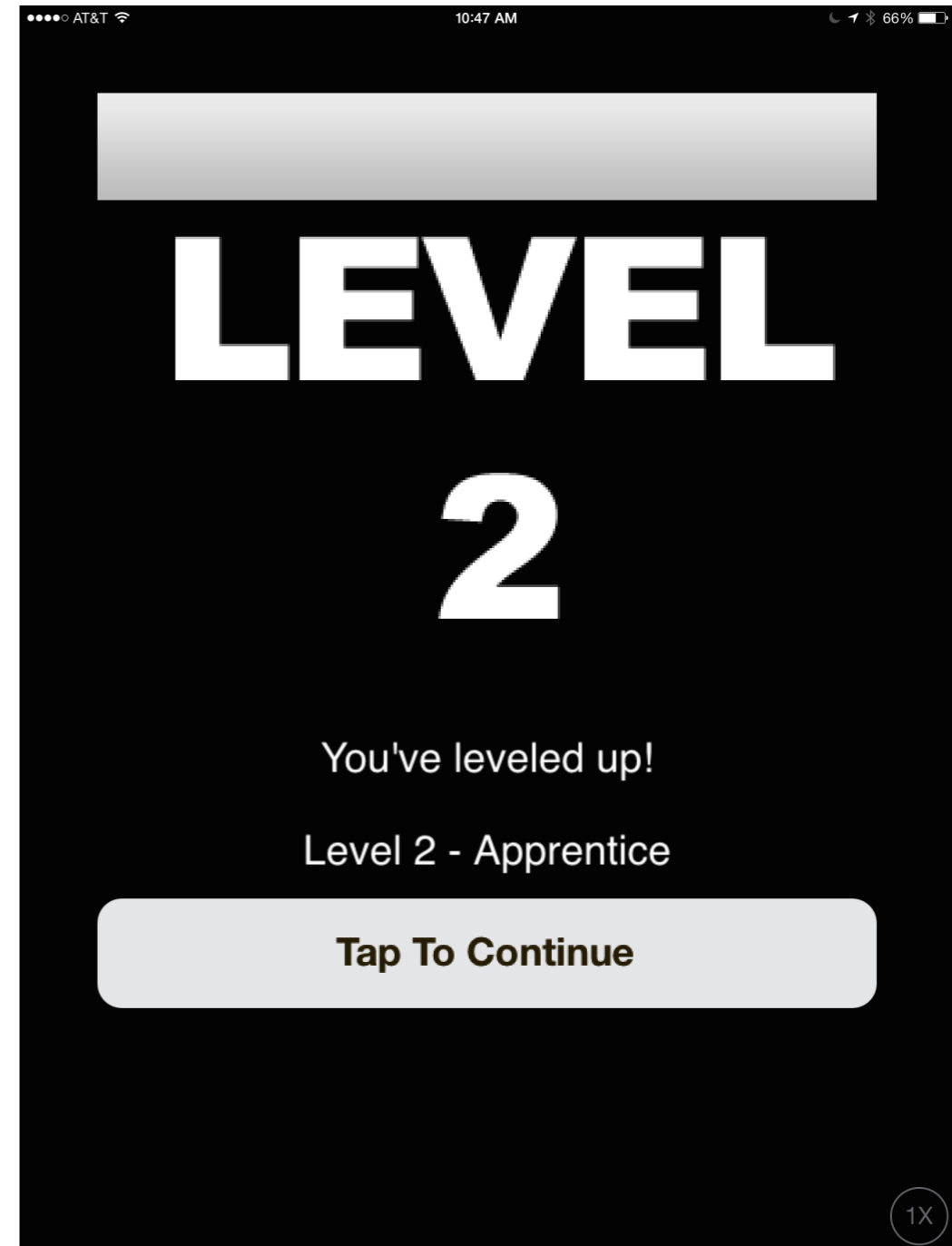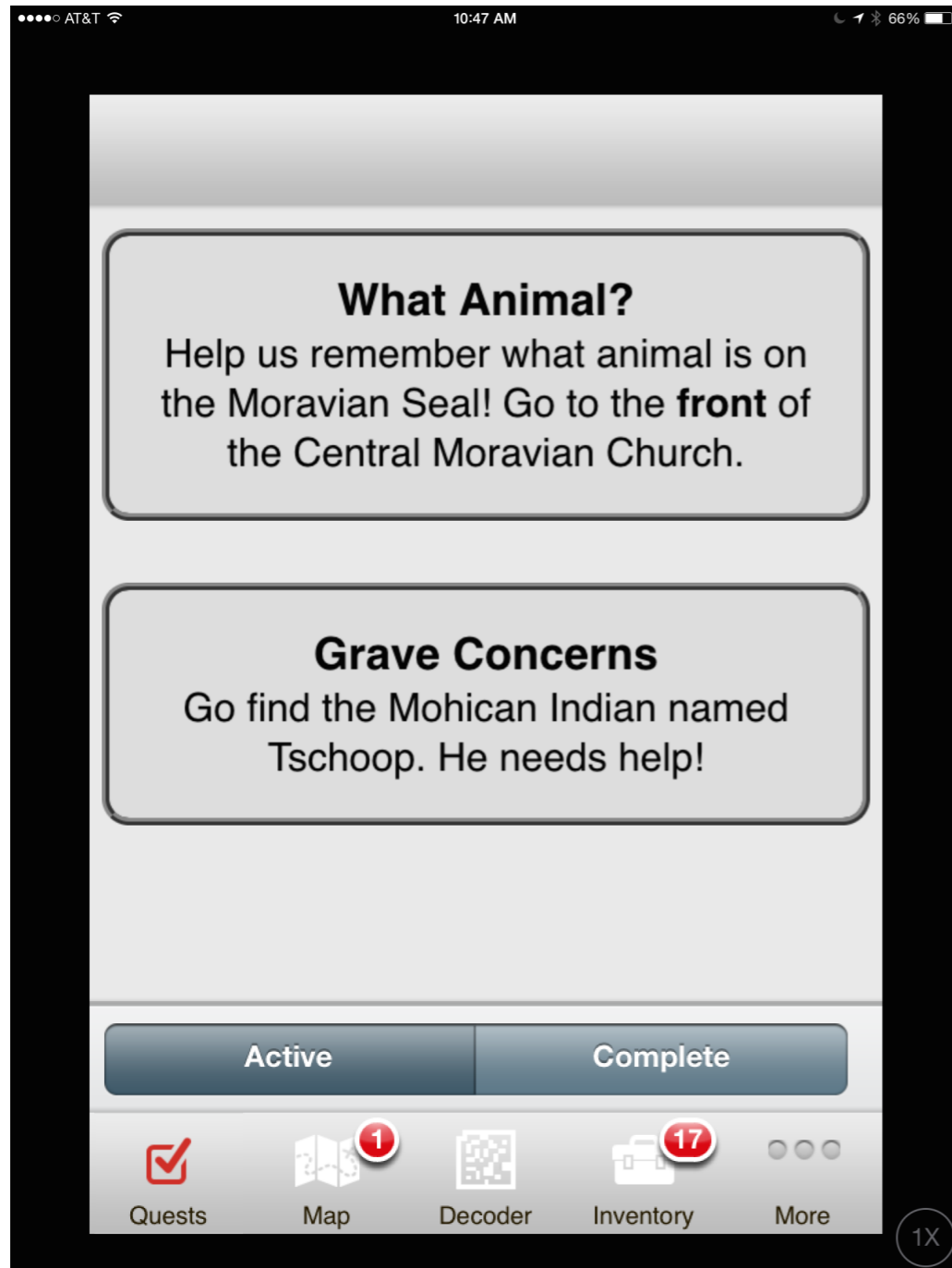
Customs of Society

⬇

Action of Game

Feeling like a game...
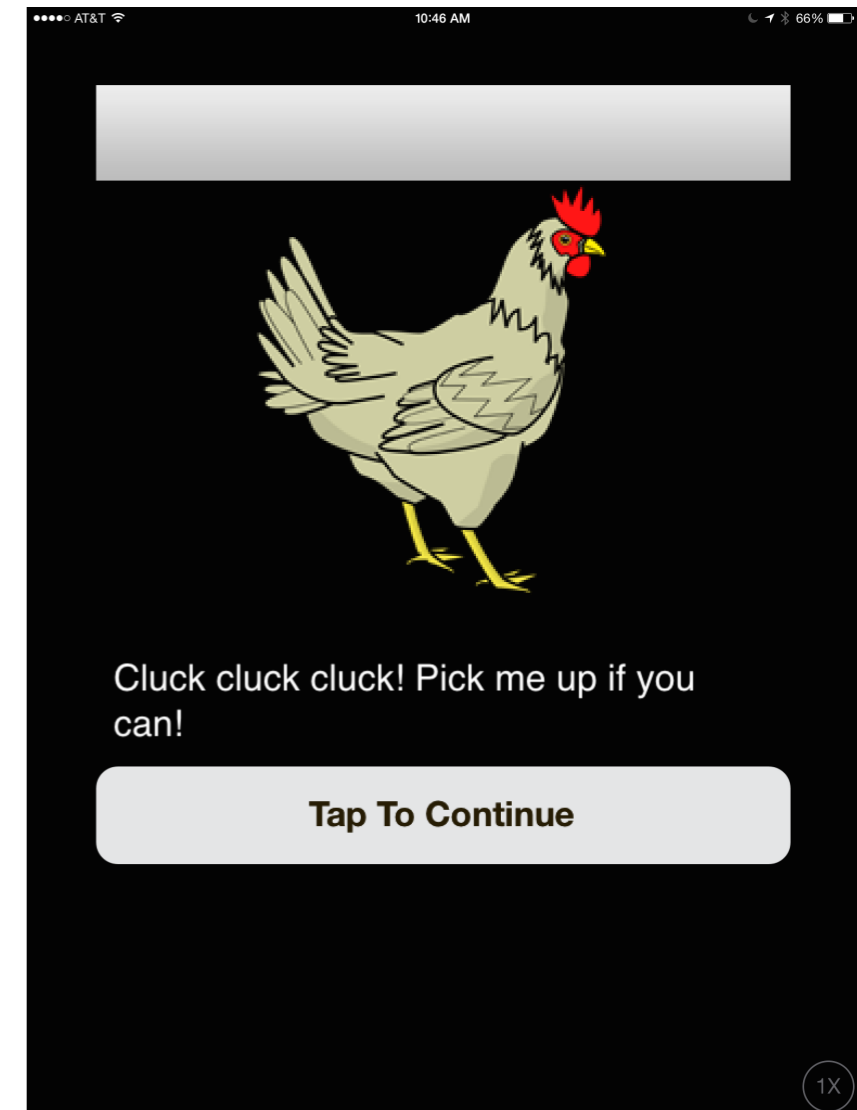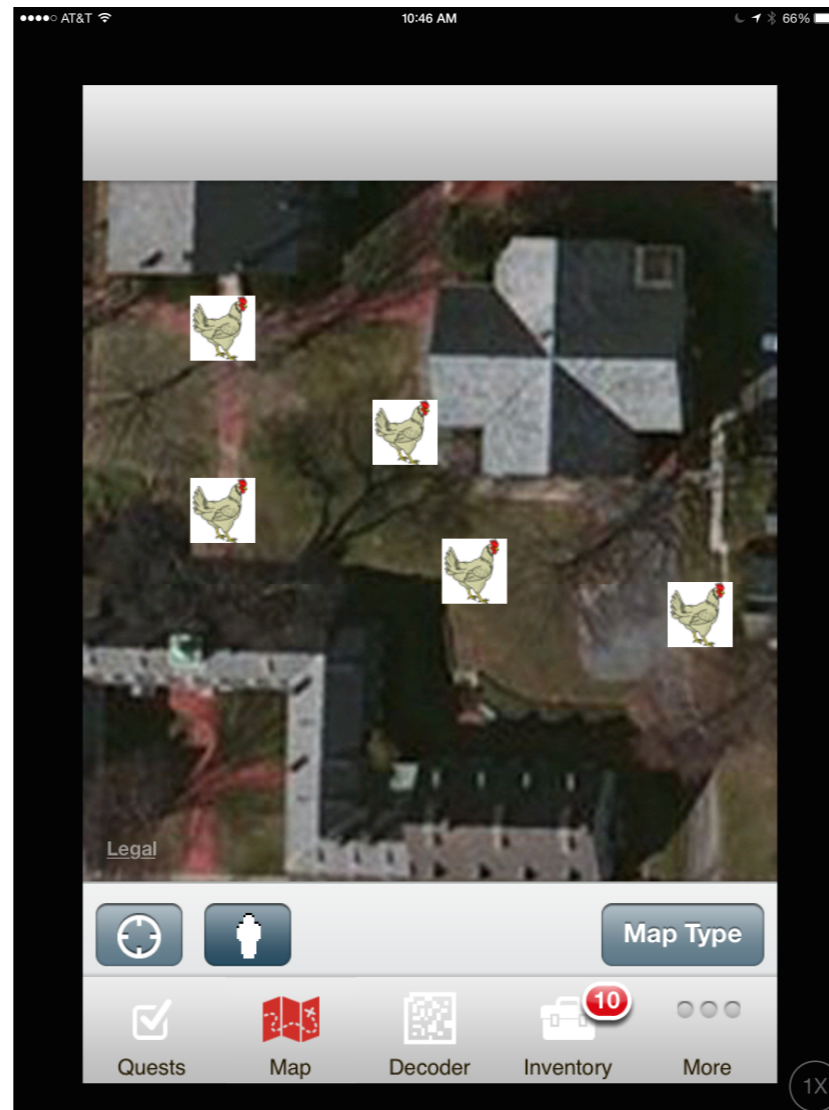
Data Analysis

Qualitative data was used to triangulate and contextualize quantitative findings.

Quantitative sources:
- Game Attitudes Questionnaire
- Flow Questionnaire
- Observer Flow Ratings
- Post-unit test scores

Qualitative sources:
- Observer and researcher notes
- Post-play debrief sessions
- Teacher interviews and short answer questionnaire
- Student interviews

Image: http://gregmaciag.typepad.com/.a/6a00d8345242c469e2017c382d6256970b-pi

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Findings - Flow

Students experienced high rates of flow.

	N	Mean	Std. Deviation
Class 1	12	4.36	.36
Class 2	10	4.61	.39
Class 3	10	4.71	.38
Overall	32	4.55	.39

Observations, field notes, and debrief session transcripts support this finding of flow.

- "Sometimes, I felt like it was so real that I almost wanted to touch it, like shake the person's hand." (20-C2D1-13)

- "It felt like it was only ten minutes long." (10-C1D2-2)

- "Level 2, YES!" [fist pump] (B1A-OS-51)

Findings - Flow

There were some potential barriers to flow:

- Trouble seeing the iPad in direct sunlight

- Trouble navigating - not understanding geospatial concepts

- "Glitches" with GPS triggering

- Trouble sharing iPad with partner

However, these did not appear to pull kids out of the "magic circle".

Findings - Learning

- 65% of students performed better on game content than non-game content.

- Students who performed below 90% on non-game content (N=12) performed an average of 14.6% on game content.

- Suggests students who may not respond as well to traditional instruction do better with game-based learning.

	N	Total Test Avg	Game related items	Non-game related items	Difference between Game and non-game	Percentage of students performing better on game related items
Class 1	12	66.7%	71.7%	62.1%	9.6%	81.8%
Class 2	12	89.4%	95.3%	91.7%	3.5%	50.0%
Class 3	11	92.9%	95.0%	91.1%	3.9%	63.6%
Overall	34	83.2%	87.6%	81.9%	5.6%	64.7%

Findings - Learning

Teacher: And you had to get them in order. Do you remember the order of the buildings? What was the first one? Henry? Do you remember?

Henry: The oldest?

Teacher: The oldest one. What was it called? Or do you remember how it was spelled?

Henry: [spelling out loud] S-A-A-L?

Teacher: S-A-A-L, good. And we call that, the way we say that is Saal [pronounced it correctly with a z sound]. Saal, the s sounds like a z. Good. Greg, what was the second one built?

Greg: Old Chapel

Teacher: The Old Chapel and [pause] Gillian?

Gillian: Central Church!

Teacher: Central Moravian Church, right! … we'll be going to the uh Museum and you'll see how they went from having their chapel in a room and the reason why they had to build a bigger church was the Chapel and then a bigger one. So you'll be able to…understand why better once you see that small Saal and then why they had to keep building bigger churches…

(2,13,5-C1D2-19-27)

Findings – Learning

- Mobile digital game-based learning preferred over traditional learning
  "Like it was more, I mean the game…it had like *more*, it wasn't just a whole page with um with just one…kind of Moravian..." (S22-C2D1-112).

- Mobile GBL is preferably experienced with a friend
  "I mean like more fun to do it together, we can explain what's happening to each other, and we can um solve out problems together." (S15-I-55)

- Playing in small teams led to lots of peer scaffolding
  "because I know the child's personality, the one whose a little bit higher, he probably would have been a little pushier in the classroom…as opposed to the game…he was just enjoying the game so much…I really think that helped him be a helper…to succeed with the game." (T3 -TD1-156-159)

Findings – Game Attitudes

- Mean of 4.45 on the game attitudes questionnaire

- Students have a positive opinion of games

- Feel a high level of self-efficacy towards games

- Possess a positive attitude toward learning with games

	Mean	Std. Deviation	N
I know I could play a game like *Club Penguin* or *Minecraft*.	4.19	1.151	37
I like learning with games.	4.35	1.006	37
I like playing games.	4.81	.739	37
I can figure out the best way to play a game by myself.	4.43	1.168	37

GBL Implications

Serious games for social studies can be effective with young elementary students

"As we were reading through the information, they would make references to things they learned in the game or things they did in the game. I think that's a little bit empowering for them because they're like hey, we already know about this. Whereas before, they didn't know anything until we told them." (T2-TD1-33)

Game Design Implications

For young learners:

- Geospatial skills require significant scaffolding

- Reading requirements needed to be both grade level and not distracting to gameplay.

- Video content was not received well in initial testing.

- Certain types of gaming activities were popular and well received such as collecting items, typing codes, and figuring out the right order.

- Curriculum content needs to be an active part of the game experience and not provided as "additional info".

- Teachers provided valuable insights that guided the researcher's design process.

Questions?

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