Moravian History Mystery

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The problem

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

- Social studies marginalization discourages time-consuming methods, such as projects or field trips, and encourages transmission-driven methods, such as worksheets and textbooks. (Fitchett, Heafner, & Lambert, 2014; Kisiel, 2003; Ransom & Manning, 2013)

- 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 augmented reality games.

Mobile ➡ AR ➡ History in Context

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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. How do **teachers** respond to their **role as designers** in design-based research involving game-based learning?

Setting: Moravian Academy 2nd Grade

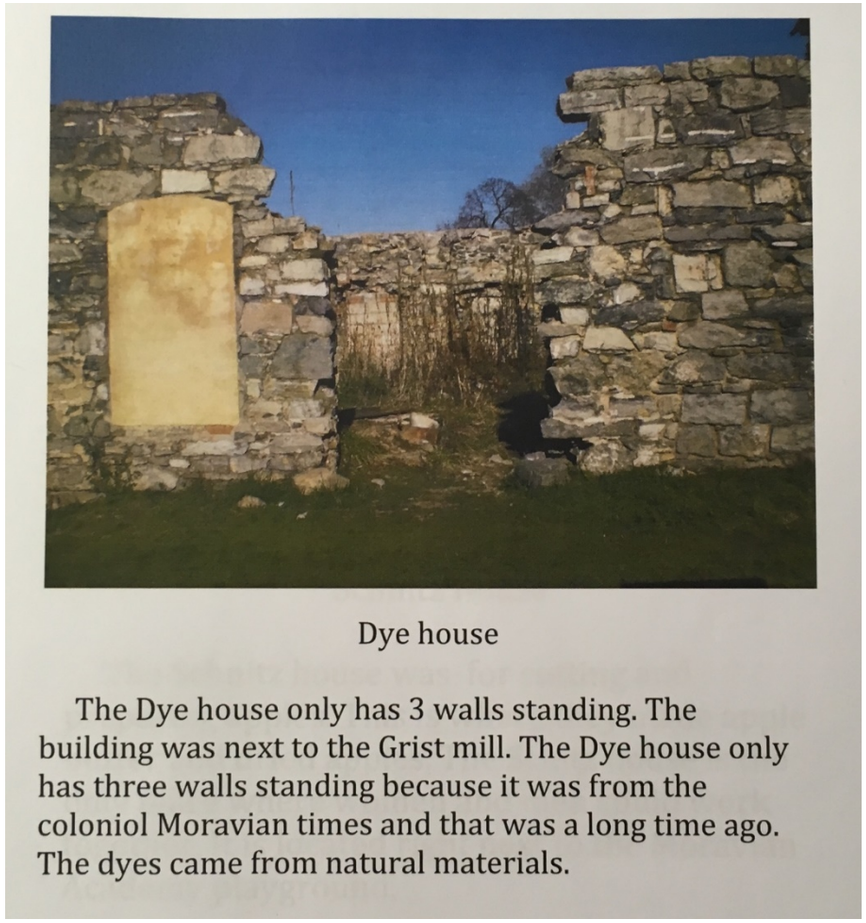
- Located in historic district
- Colonial Moravian History is part of the current curriculum

Participants

- Students have a positive opinion of games
  - Feel a high level of self-efficacy towards games
  - Possess a positive attitude toward learning with games
- Teachers all had 10+ years of teaching experience
  - Original curriculum designed by one of the teachers
  - Were "open to doing something new" with the curriculum

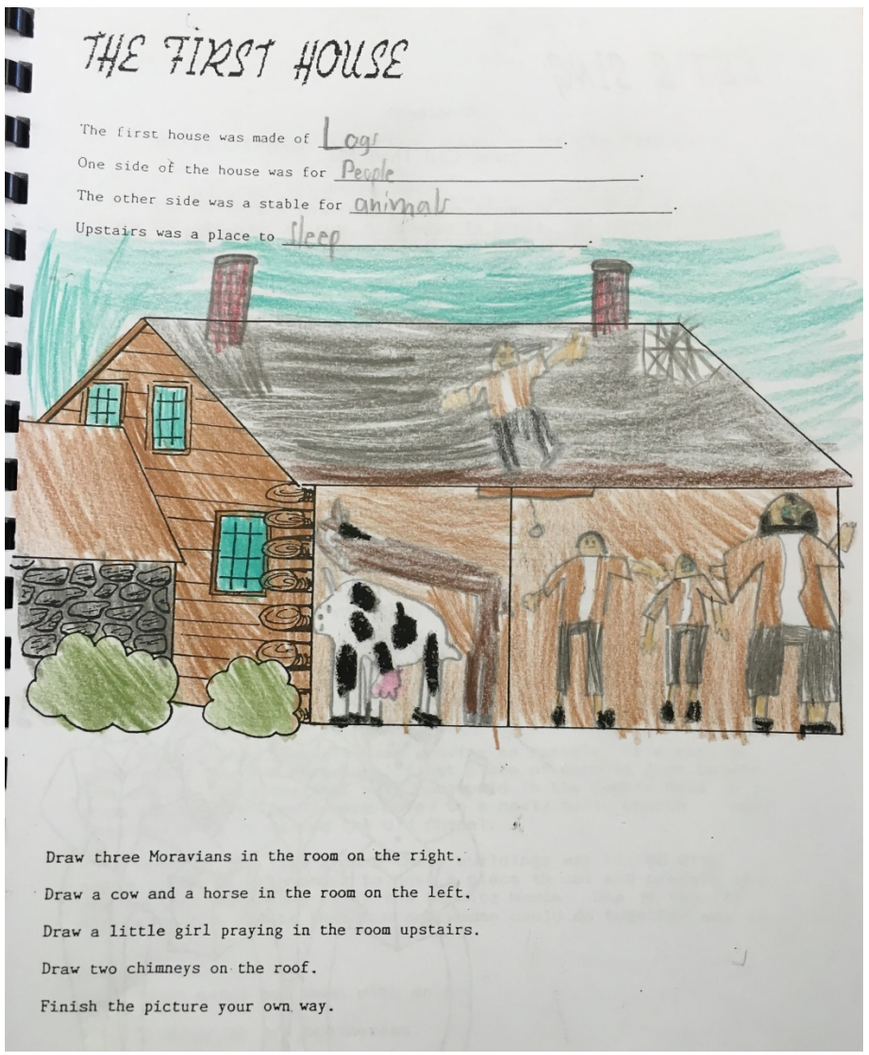
	Classes	N Teachers	N Students	Student Game Attitudes Mean
Year 0	3	3	unknown	Unknown
Year 1	3	3	37	4.45
Year 2	2	2	22	t/k
Year 3	2	2	unknown	t/k

Original Curriculum



Dye house

The Dye house only has 3 walls standing. The building was next to the Grist mill. The Dye house only has three walls standing because it was from the coloniol Moravian times and that was a long time ago. The dyes came from natural materials.



THE FIRST HOUSE

The first house was made of Logs.

One side of the house was for People.

The other side was a stable for animals.

Upstairs was a place to sleep.

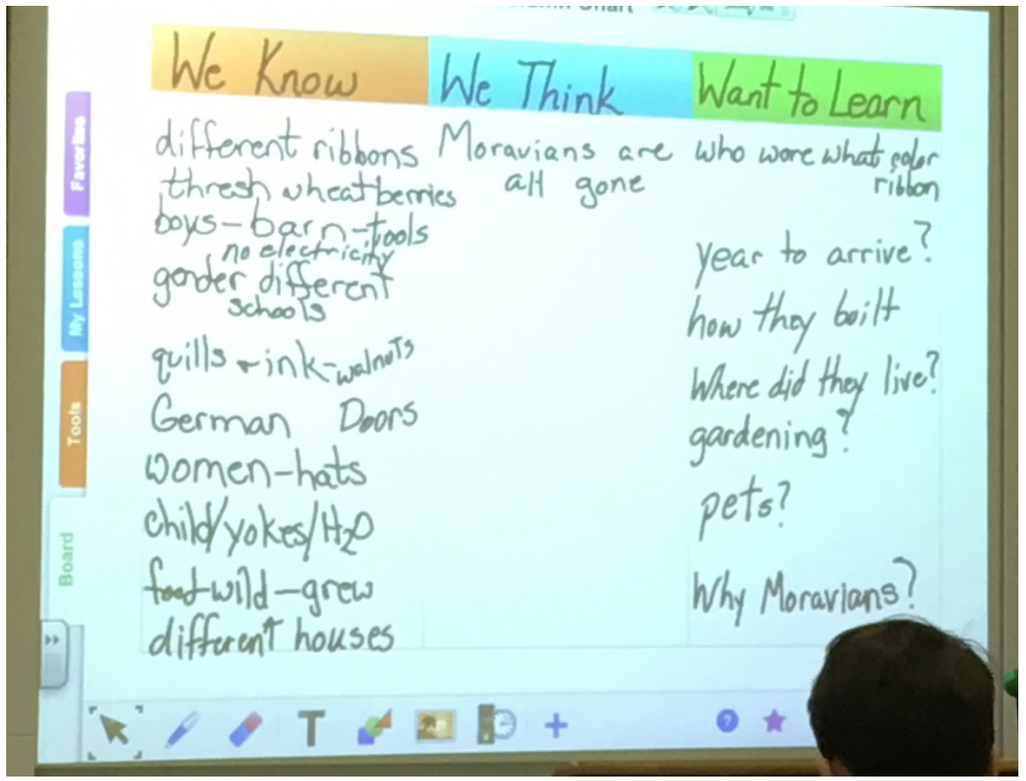
Draw three Moravians in the room on the right.

Draw a cow and a horse in the room on the left.

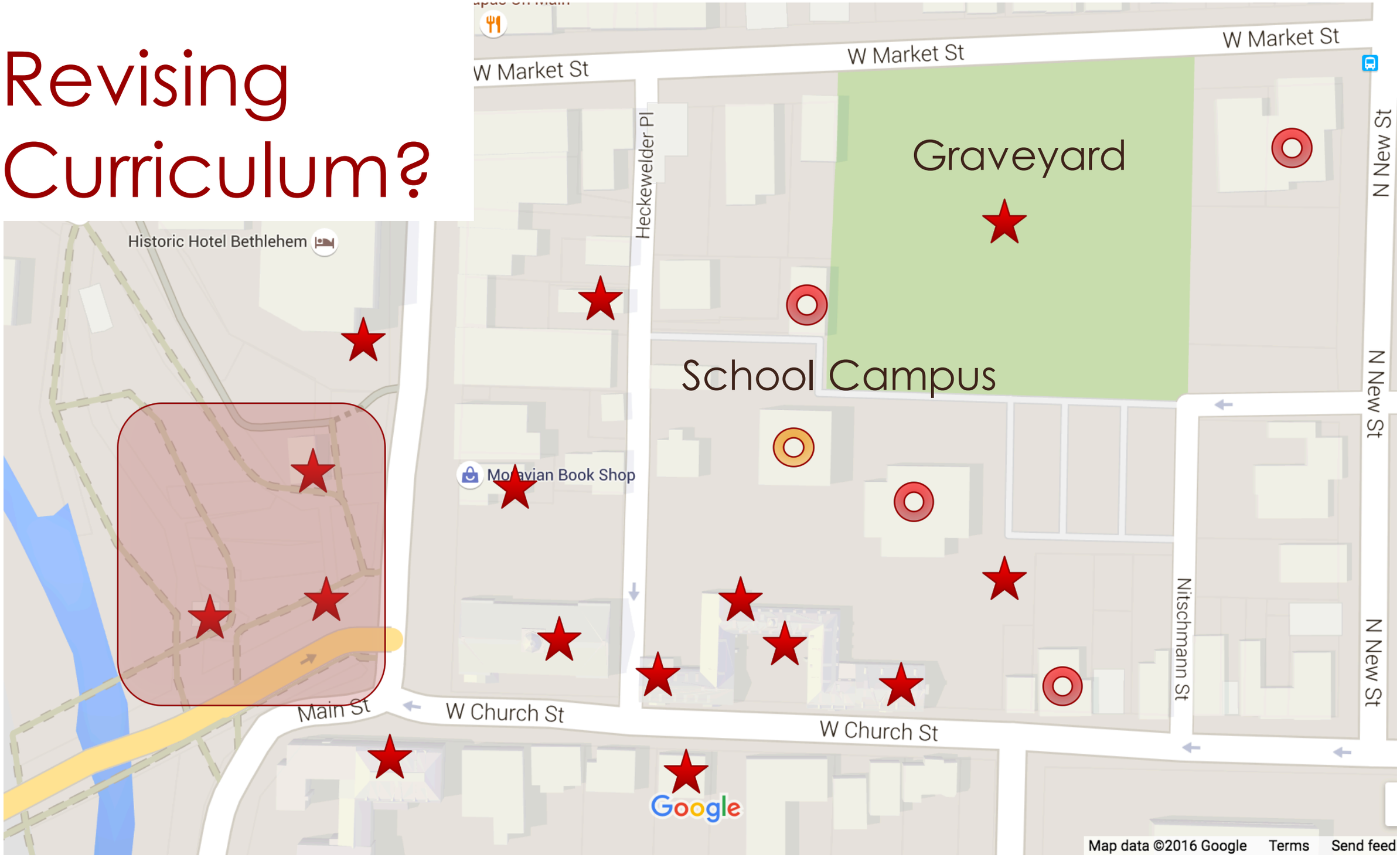
Draw a little girl praying in the room upstairs.

Draw two chimneys on the roof.

Finish the picture your own way.



Revising Curriculum?



★ Historical Sites

○ School Buildings

◎ 2nd Grade Building

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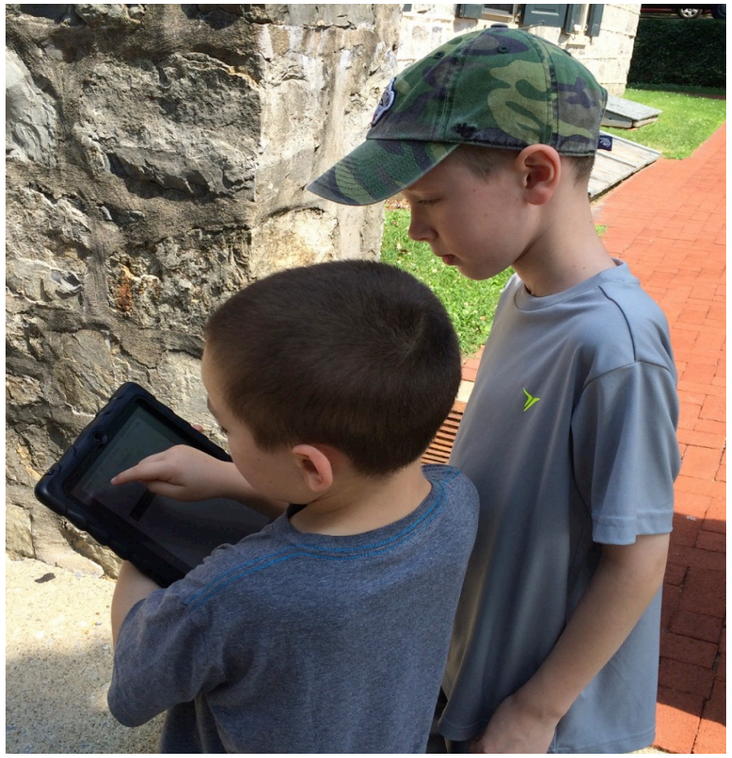
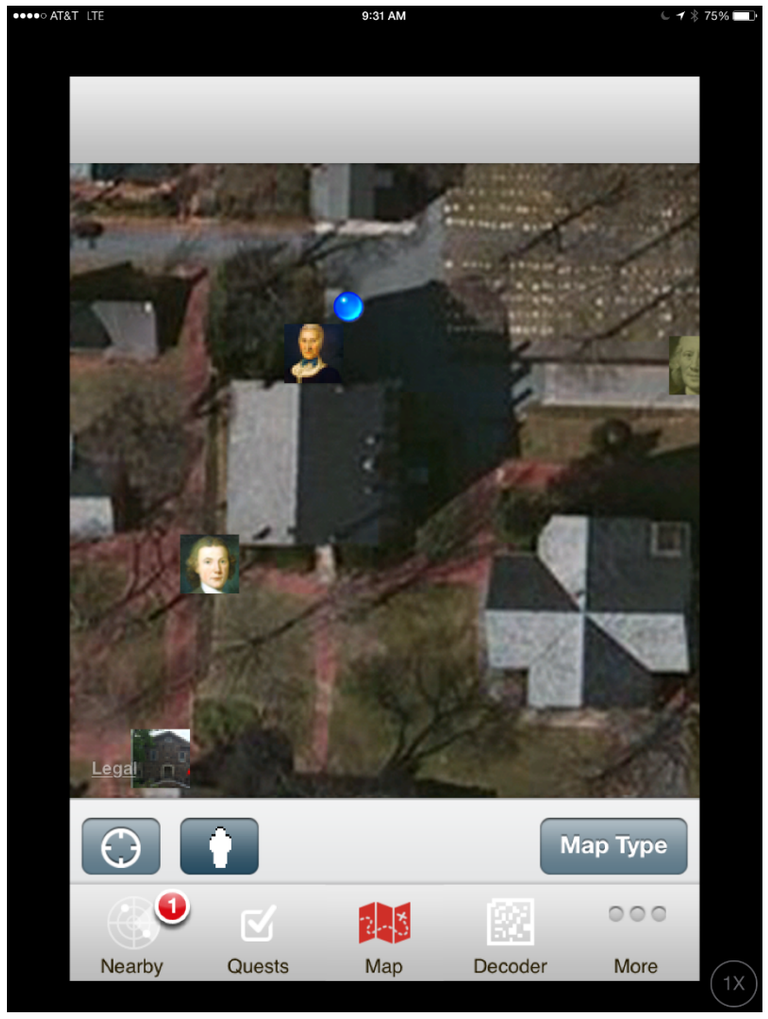
Methodology

UNITS	XX second graders ages 7-9; grouped in pairs or triads determined by teachers	Approx. 60% female	Multiple 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 **posttest**, **debrief**, and **interviews** (RQ2)	[Year 2: Added start-of-unit pretest, more extensive observation, and "stealth" in-game pre/post assessments]
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.	

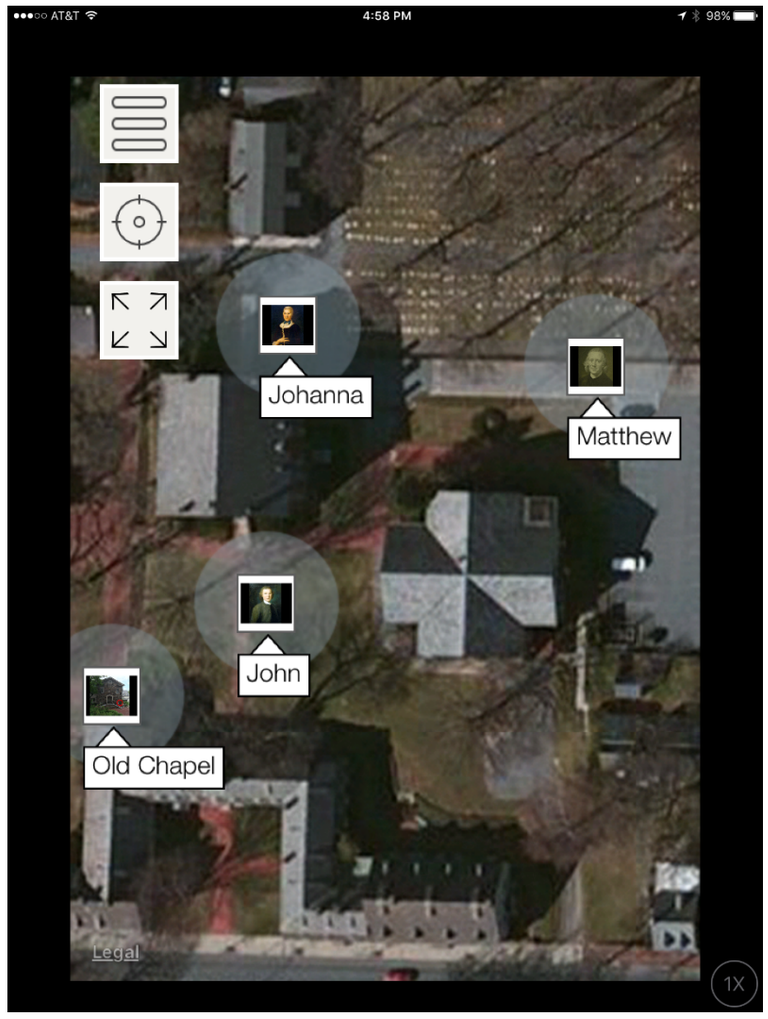
The Game

- Utilized ARIS platform
- GPS triggered AR
- Introduction in classroom
- Students played in pairs or triads

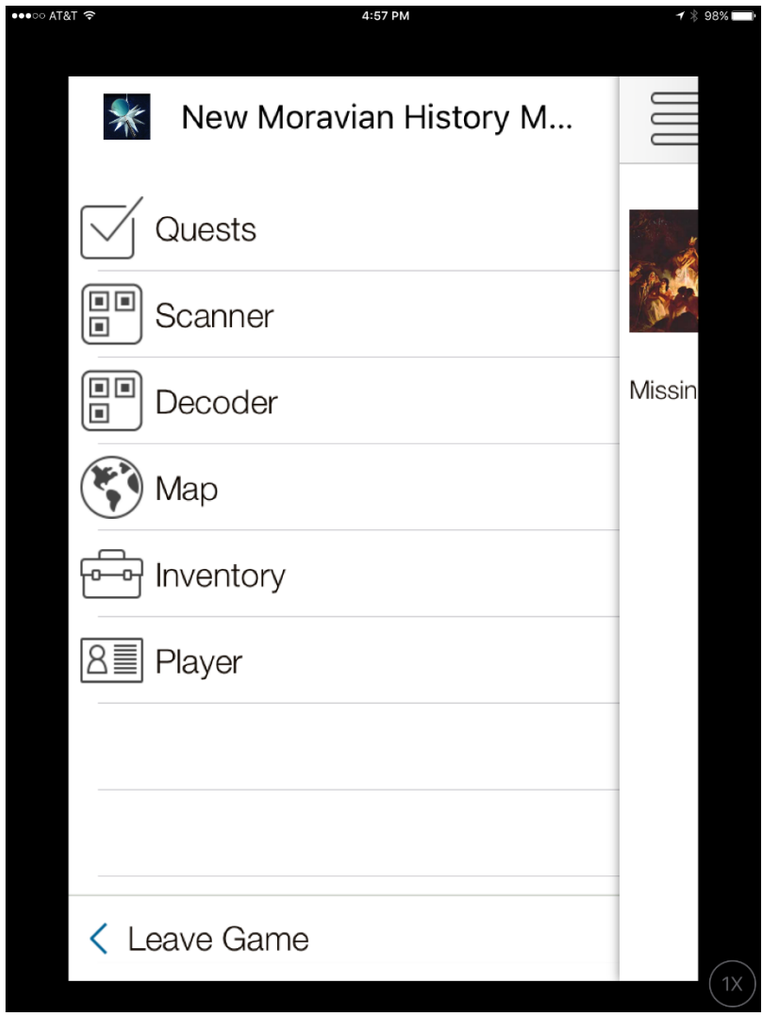




Year 1 Map



Year 2 Map



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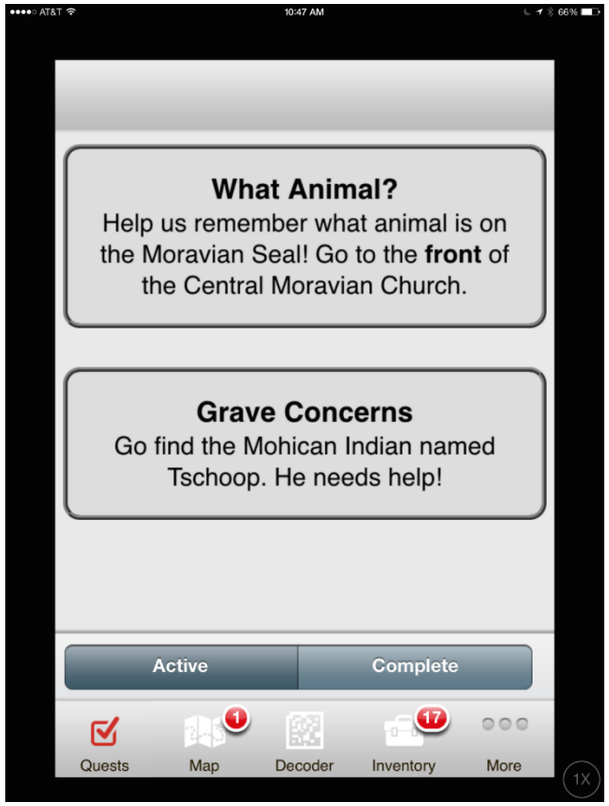
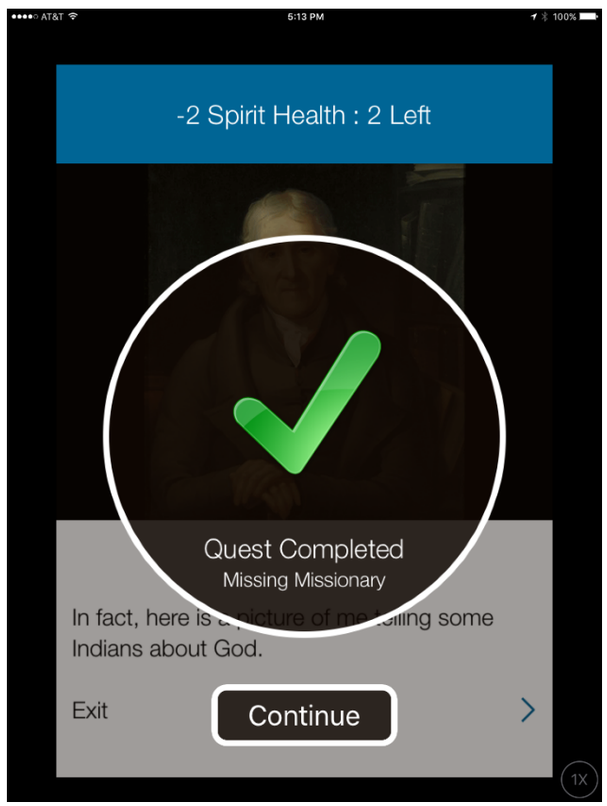
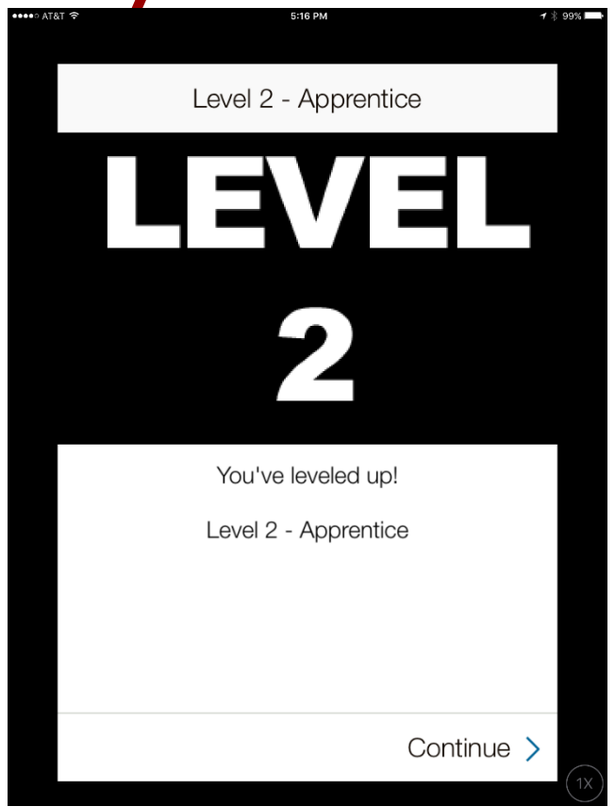
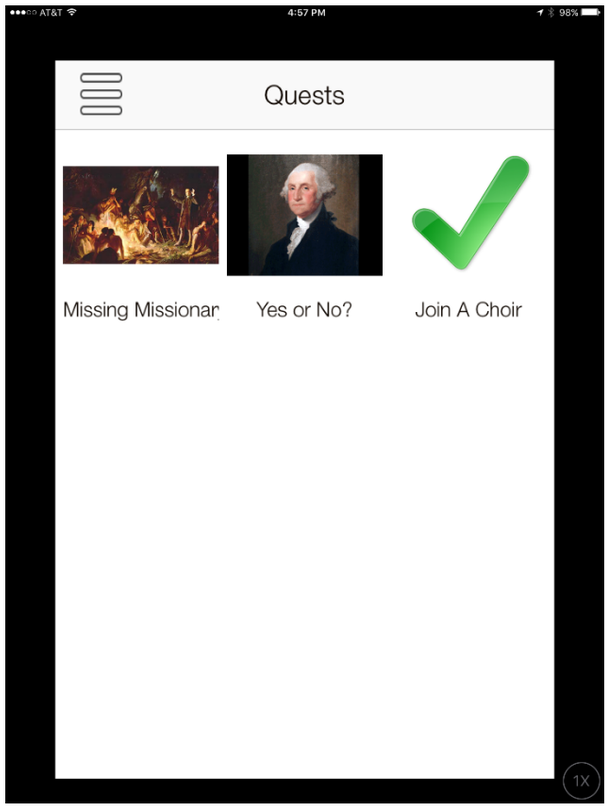
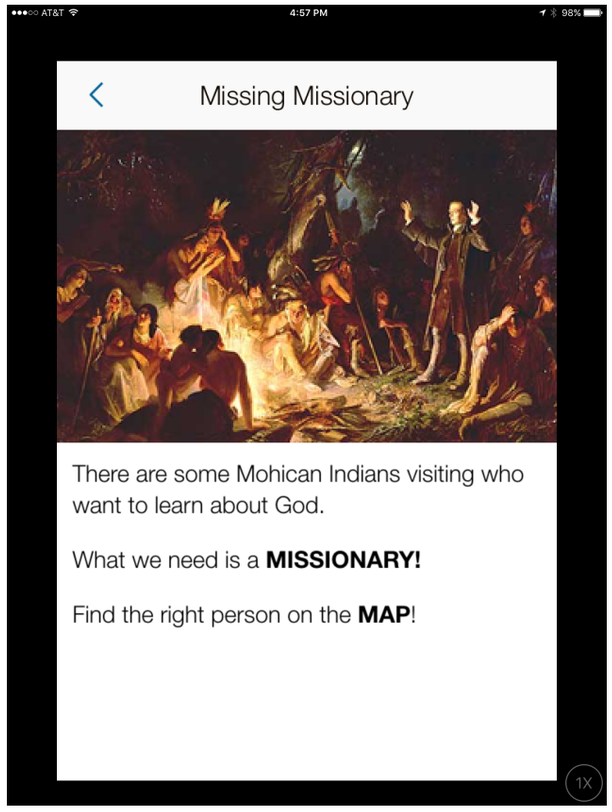
Quests, Levels, & Inventory!

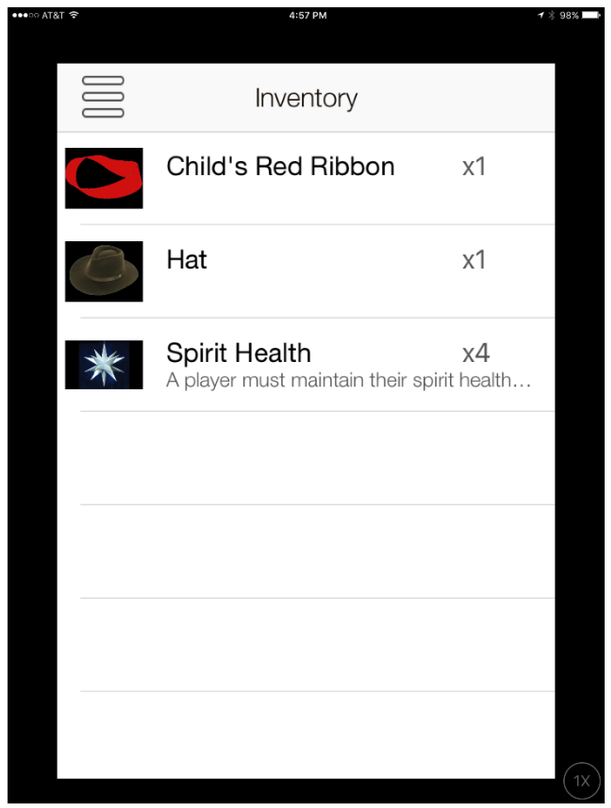






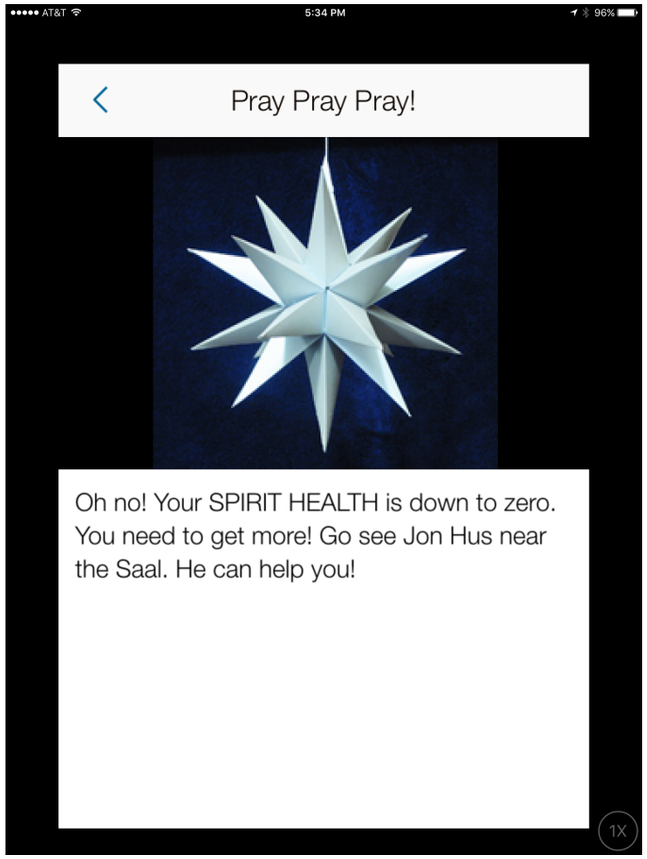


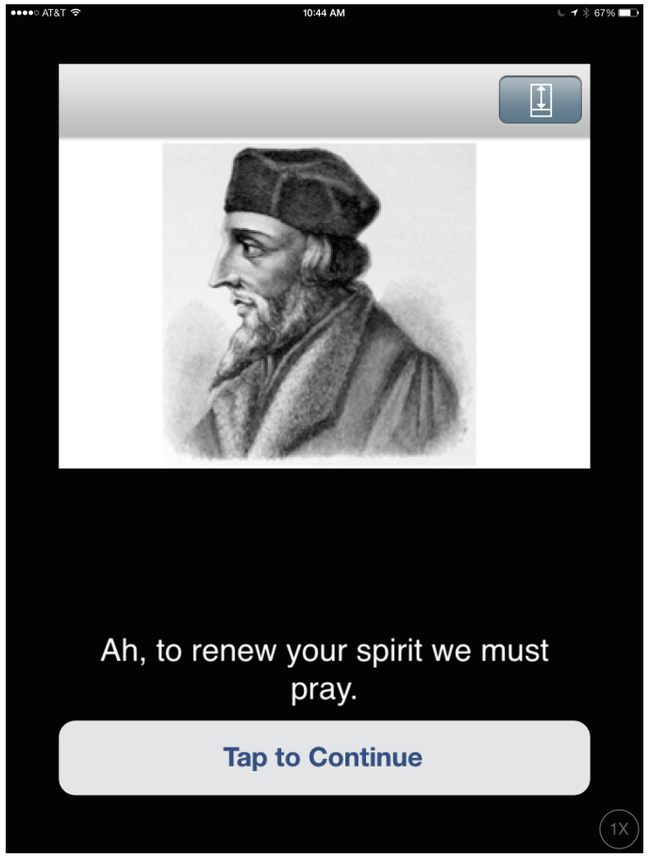


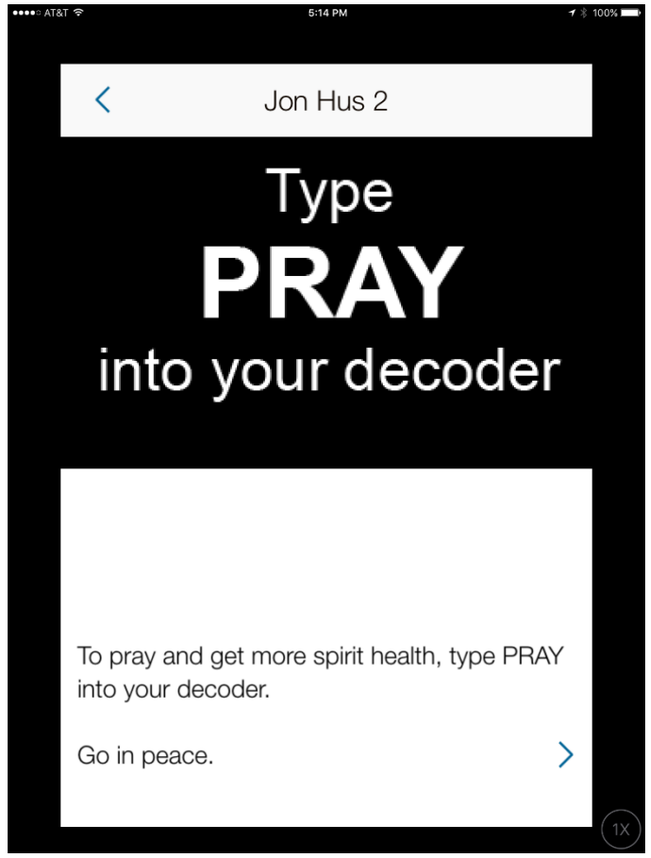


Customs of Society

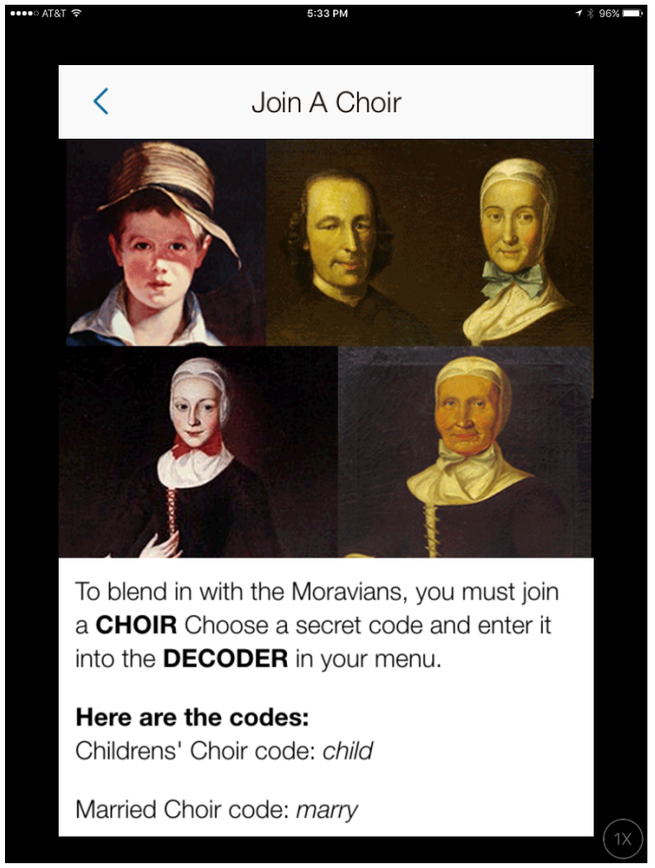
Action of Game

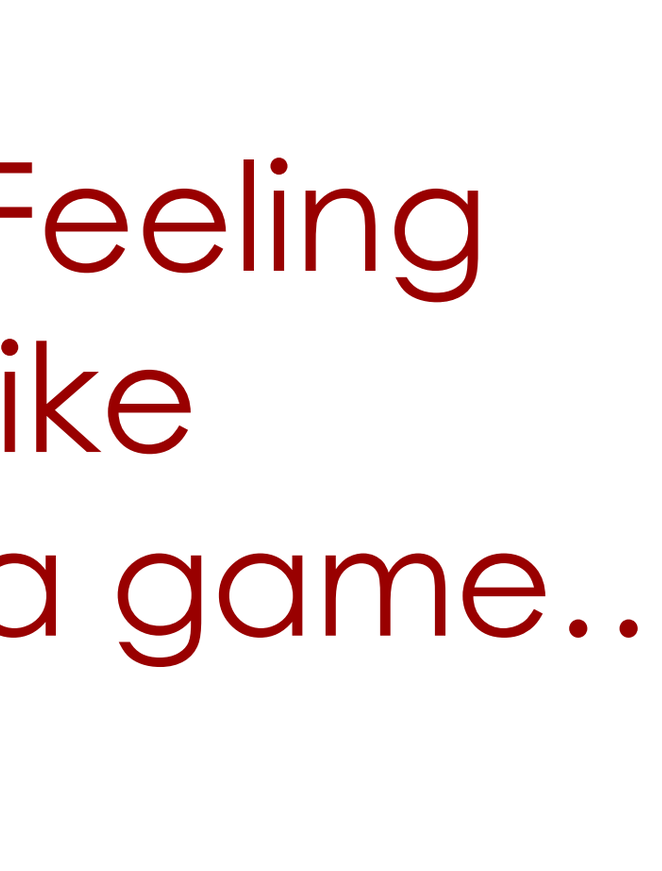






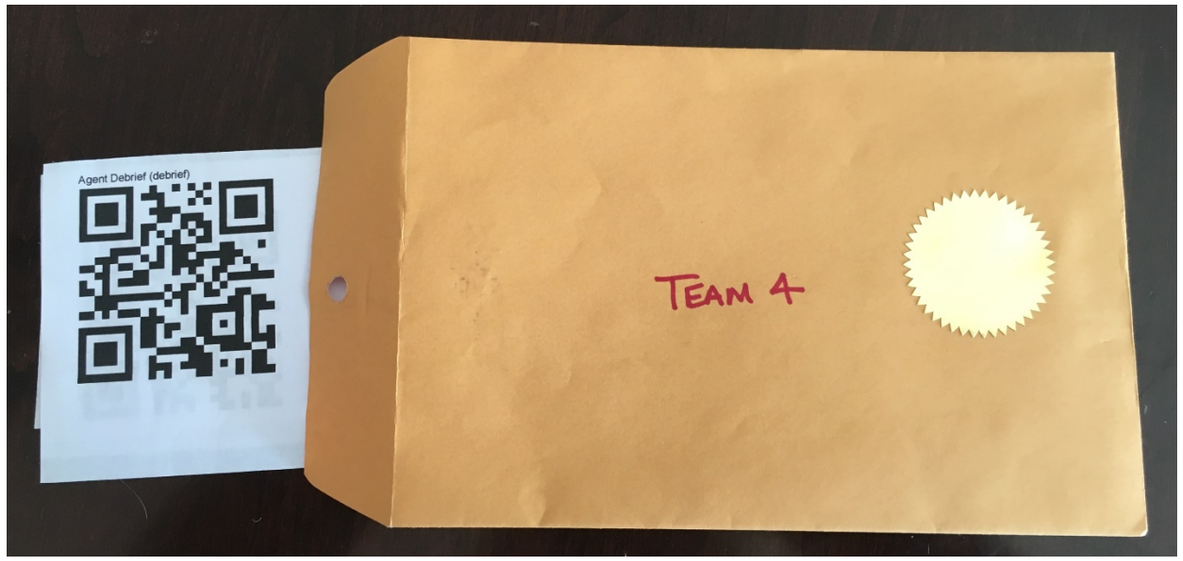
Feeling like a game…

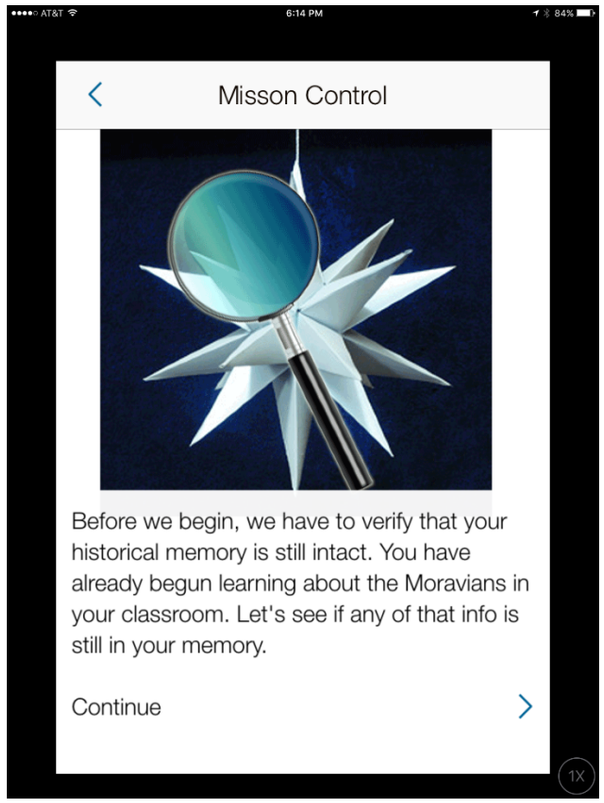


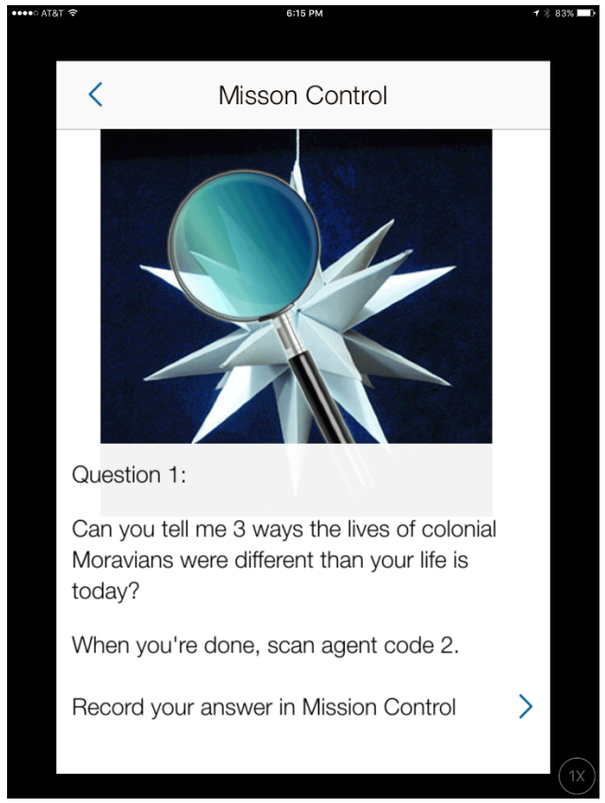


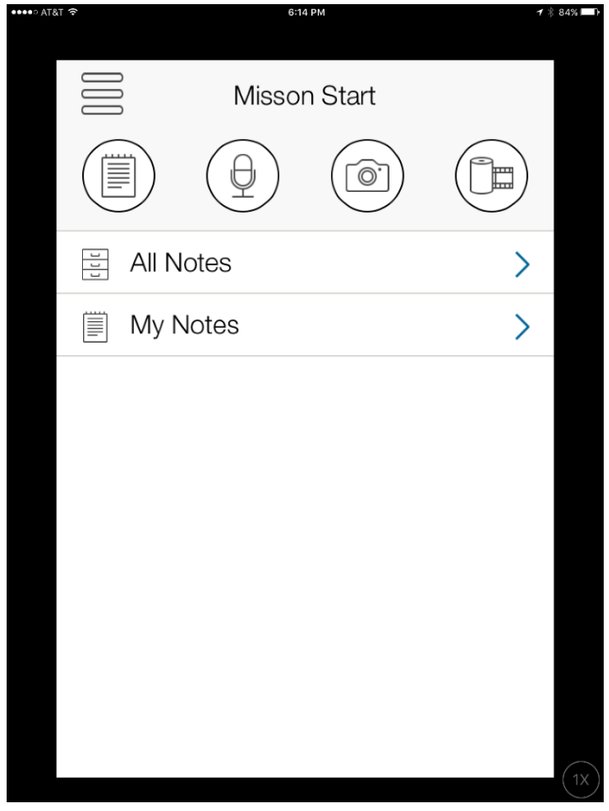
Stealth Assessment

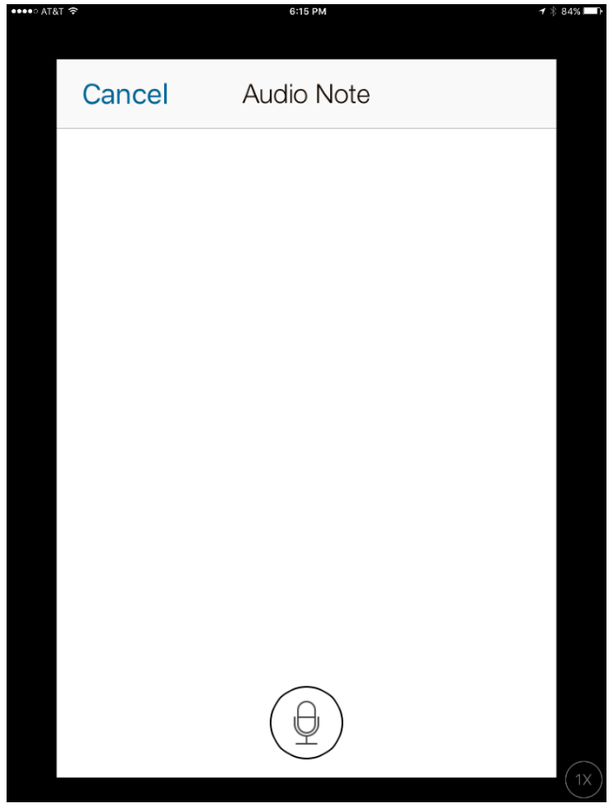
Pre and post gameplay

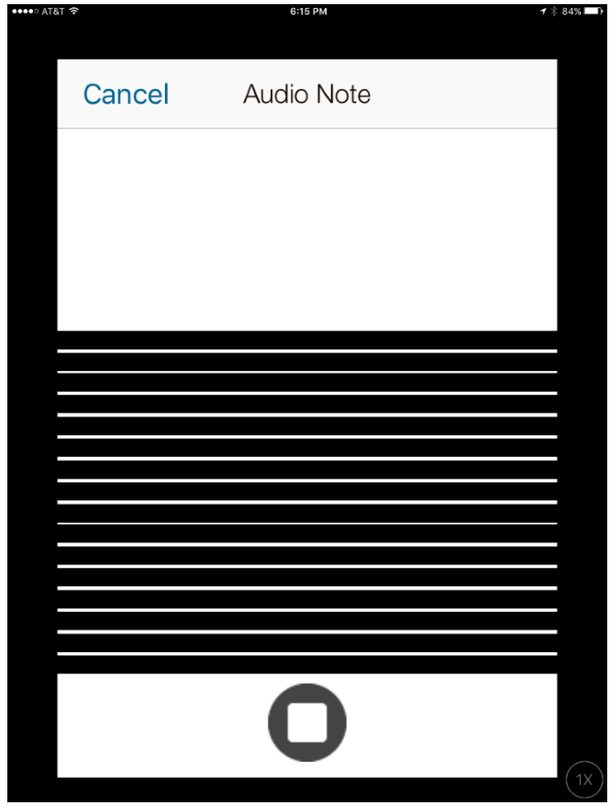


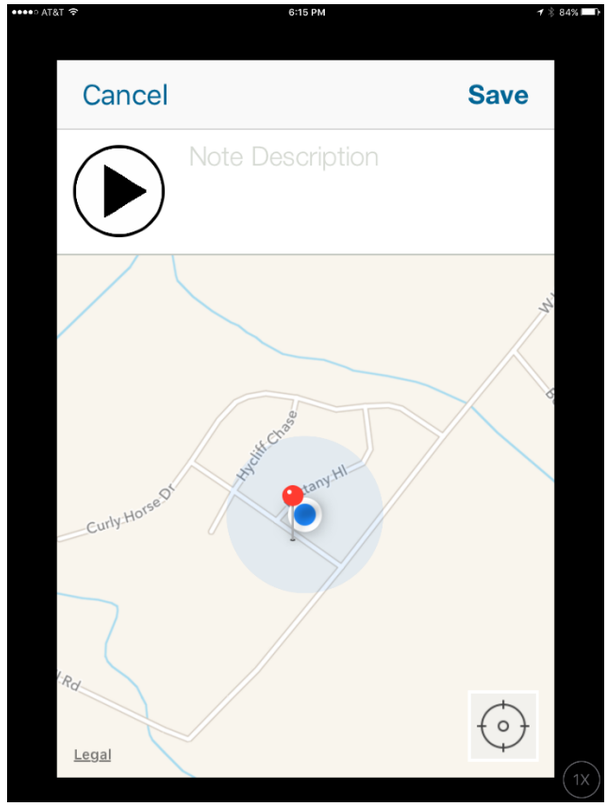












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Data Analysis

Qualitative data was used to triangulate and contextualize quantitative findings.

Quantitative sources:

- [Game Attitudes Questionnaire]
- Flow Questionnaire
- Post-unit test scores.
- (Year 2: Pretest + posttest)

Qualitative sources:

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

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Findings - Flow

Students experienced high rates of flow.

Year 1 - Flow questionnaire results.

	N	Mean	Std. Deviation
Class 1	13	4.36	.35
Class 2	13	4.23	1.06*
Class 3	11	4.67	.38
Overall	37	4.41	.70

(*Student #17 in class 2 had a very frustrating time with his partner who wouldn't share the iPad and reported all 1's on his Flow questionnaire)

Year 2 - to come

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 students out of the “magic circle”.

Findings - Learning

- 61% of students performed better on game content than non-game content.
- Students who performed below 85% on non-game content (N=13) all but 1 scored higher on game related items than non-game related items. The one exception (StuNum 7) was one of two students who missed a gameplay session, being absent on the second day.
- This concomitant variation suggests that the gameplay experience enhanced students' learning, particularly among students who were less academically successful.

Year 1 - Unit test results.

	N	Total Test Avg	Game related items	Non-game related items	Margin between game and non-game scores
Class 1[a]	12	67.1%	71.7%	62.1%	+7.5%
Class 2[b]	13	88.2%	95.3%	91.7%	+2.6%
Class 3	11	93.0%	95.0%	91.1%	+3.9%
Overall	36	83.0%	87.6%	81.9%	4.6%

([a] StuNum 7 was absent during the 2nd day of game play and StuNum 12's test score was not made available to the researchers; [b] StuNum 17 had a very poor gaming experience due to partner issues)

Year 2 - to come

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)

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)

Evolution of teachers-as-designers

Year 1 - Pre Unit → Year 1 - During Unit → Year 1 - Post Unit → Year 2 - Pre Unit → Year 2 - Post Unit

Passive

- What did you bring us?
- Sounds fun
- Nice enrichment activity to curriculum

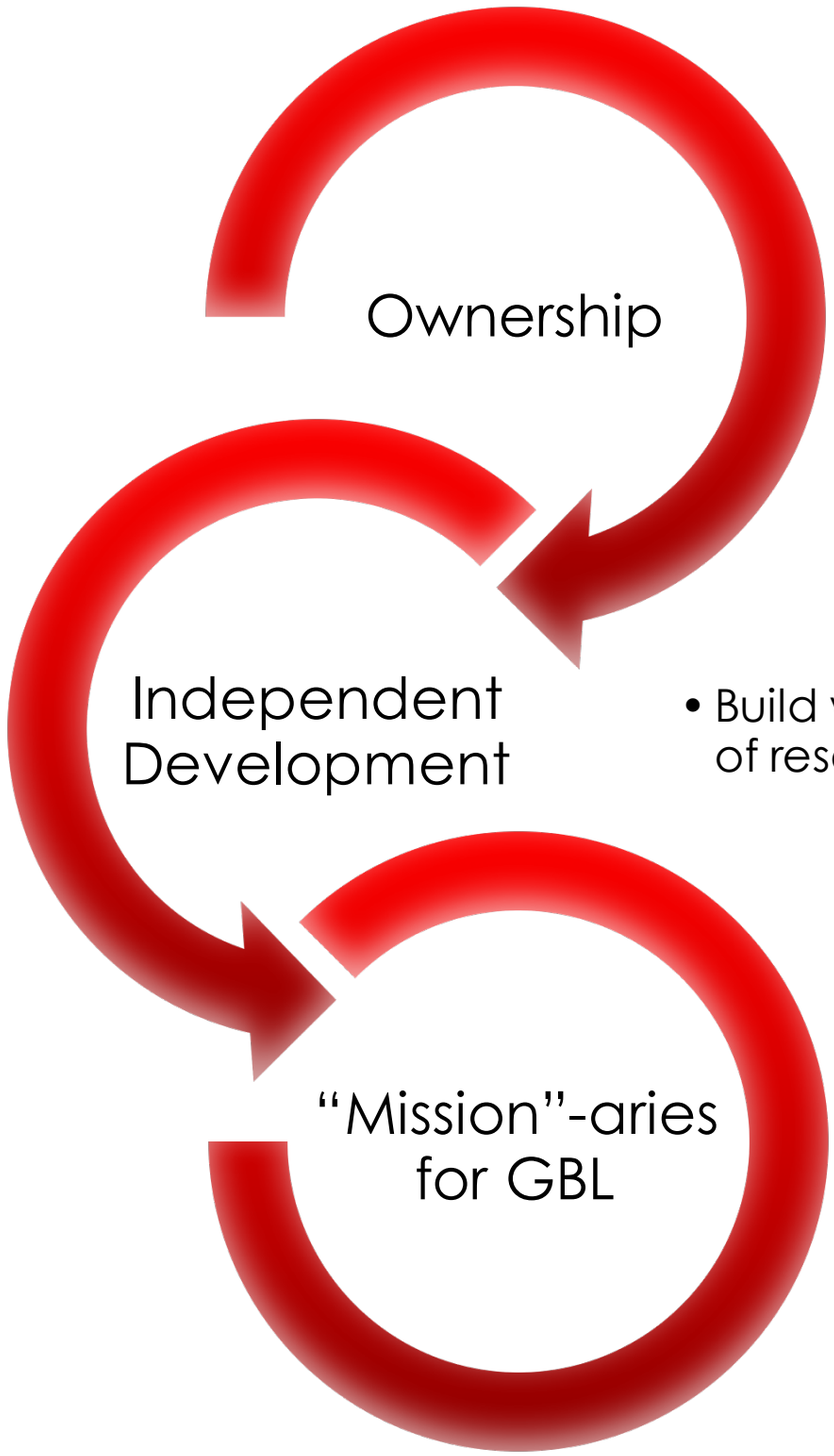
Engaged

- Play testing
- Recognizing game impact on learning
- Noting game breakdowns
- Making Suggestions
- Planning implementation

Driving

- Want to continue & expand
- Looking for other GBL opportunities
- Understanding game design principles
- Brainstorming new levels
- Game is central piece of curriculum

Next phase?



- "We want to implement the following changes..."
- Build without help of researcher
- Aid other teachers
- Have students build

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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