

# Moravian History Mystery: A Mobile, Digital, Augmented Reality, Geospatial, Game-Based Learning Experience for Elementary Students

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## Purpose

Investigate the use of a mobile, augmented reality, game-based learning experience within an existing elementary history curriculum using a mixed-methods, design-based research approach.

## Research Questions

- 1) What flow experiences do young elementary students have while playing a serious 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?

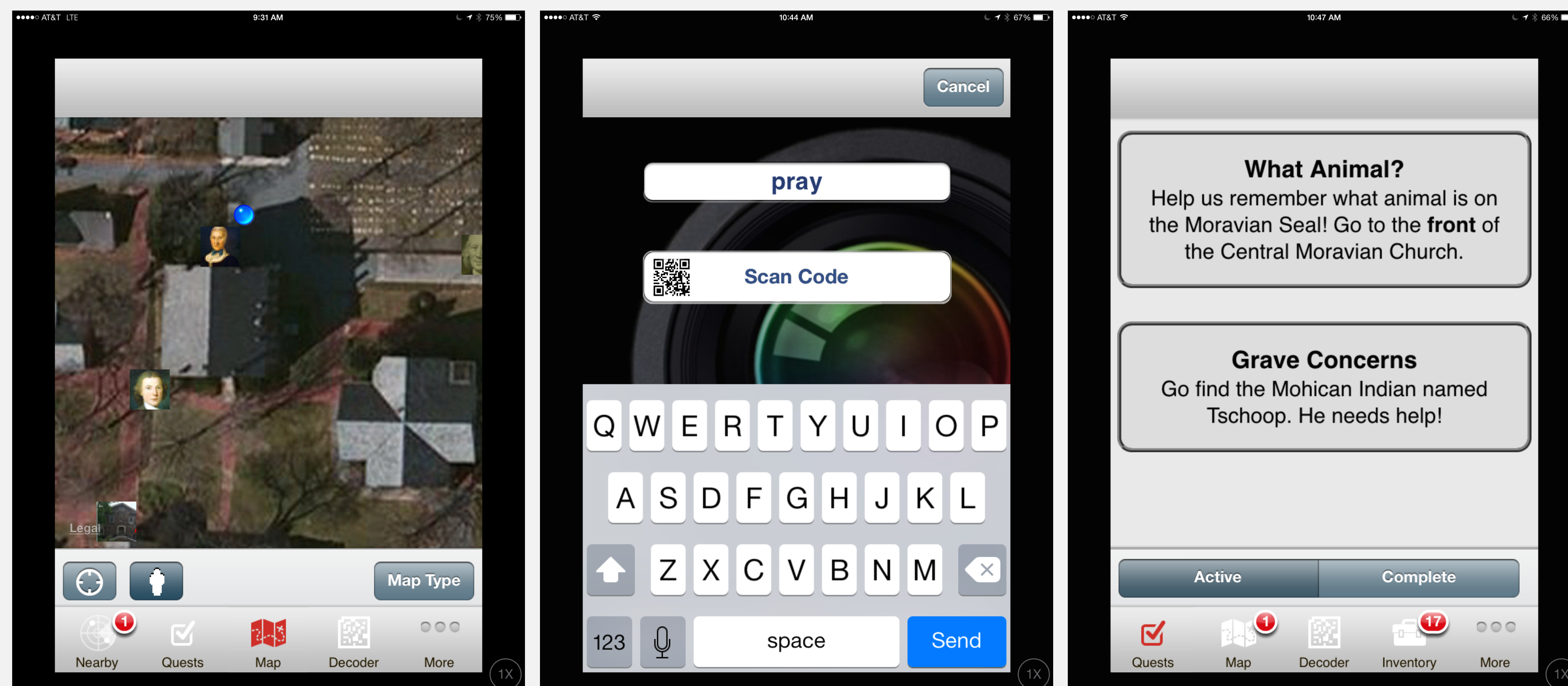
## Methodology

**Participants:** Three second grade classes at a private urban elementary school located in eastern Pennsylvania consisting of approximately 37 students ages 6-8, along with their classroom teachers.

### Data Sources:

- *Game attitudes questionnaire:* Assessed students' attitudes toward gaming both in educational and non-educational environments using a Likert-type scale.
- *Flow Questionnaire:* Assessed enjoyment and levels of engagement using a Likert-type scale.
- *Unit test:* Pre-existing, teacher-created, end-of-unit test was the primary assessment tool for examining students' learning outcomes.
- *Post-game debriefing discussion:* Teacher led, post-game debriefing discussion to assess game influences on unit content knowledge.
- *Teacher interview:* Semi-structured interviews with three participating teachers during and after unit.
- *Student interview:* Semi-structured interviews with a six of the participating students after unit.

**Game Design:** The ARIS platform was chosen due to its inclusion of game-elements and geospatial features as well as its strong user-community support groups. ARIS is freely available at [www.arisgames.org](http://www.arisgames.org). It was important to design a game that "felt like a real game" and not like "edutainment".



## Results

### Quantitative Results

- Students' overall mean flow score was 4.55 (N=32) on a 5-point scale.
- Across all three classes, almost two-thirds (64.7%) 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% better on game-related content.

	N	Total Test Average	Game related items	Non-game related items	Margin between Game and non-game scores	% 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%	80.0%
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%

### Qualitative Results

- Quantitative results were confirmed through qualitative data analysis.
- Students were able to recall historical facts from the game, including names of historical places and figures, and demonstrated an understanding of colonial Moravian society.
- Students voiced a strong preference for this type of game-based learning experience over more traditional instruction methods.
- Peer scaffolding and enjoyment are improved when playing with others.

## Discussion Highlights

- The results of this study suggest that a carefully designed serious game can be implemented as a successful social studies learning experience for children as young as seven years old.
- This study suggests that the impact of this game on learning outcomes may exist in a symbiotic relationship within the context of a full unit that includes other pedagogical approaches for instruction, including direct instruction.
- This study, however, also suggests that a successful game-based learning (GBL) experience may enhance a student's learning experience beyond the isolated gaming experience. Students may participate more fully in other elements of the unit and be more curious about the content as a result of gameplay. This idea that the gameplay had an impact on learning well beyond the immediate gaming experience is interesting and requires further study.
- Not only may these types of GBL experiences improve total curricular connection and understanding for students in general, but the data also suggests that that students who may not respond as well to traditional instruction do better with game-based learning.

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