Watershed Explorers: Designing a Virtual Reality Game to Promote Local Watershed Literacy

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This work-in-progress overviews the development of a multidisciplinary place-based virtual reality learning game to increase learners' watershed literacy by playing guided exploration of the Lehigh River watershed's historical and environmental issues. This desktop VR game aligns to the National Geography Standards to support schools' adopted curricula. Its design is informed by digital game-based and situated learning theories focusing on place-based and gaming features that support learning. "Watershed Explorers" may assist learners' emotional connection to their region through authentic and relevant learning experiences that might inspire them to support their local community welfare. The usability studies with the prototype version showed that players were engaged, felt immersed, and experienced a sense of presence.

Game Features

Game Avatars
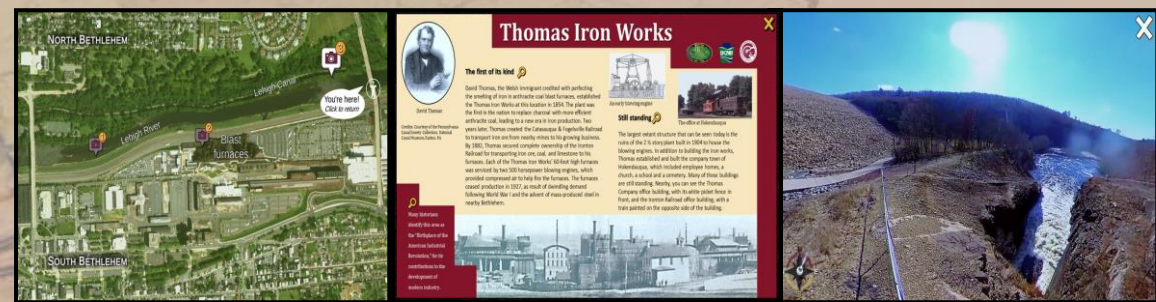The Watershed Explorers assist you during gameplay.

In **Della Informs**, I help you by keeping track of your progress and inform how much you have traveled during the expedition.

Your Progress 00min 22sec

Della Informs

Explorer Logs

Game controls

Basic interaction
Click the mouse

Journal
Watershed — Everyone lives in a watershed.
Our watershed is named the Lehigh River watershed since the Lehigh River flows through it.
Do you recognize any cities and towns in our watershed?

(Journal list: Watershed, Francis Walter, Rockport, Lehigh Gap, Walnutport, Cementon, Thomas Iron, Hamilton Street, Bethlehem Steel, River Confluence)

Glossary
SUPERFUND SITE
Polluted locations in the United States requiring a long-term response to clean up hazardous material contaminations.

WATERSHED
An area of land where all the water (surface and groundwater) flows to the lowest point-usually a stream, lake, river, and/or the ocean.

Gallery
(Gallery list: Watershed, Francis Walter, Rockport, Lehigh Gap, Walnutport, Cementon, Thomas Iron, Hamilton Street, Bethlehem Steel, River Confluence)

Bethlehem Steel by the Lehigh River, 1908

Explorer Logs
in center area of *progress panel*, they keep track of:
- notes in the **Journal**,
- historical photos in the **Gallery**,
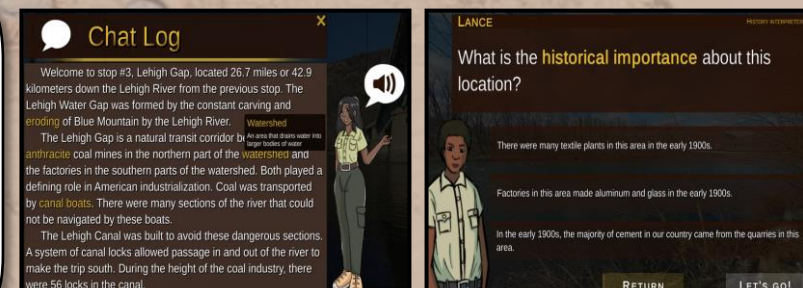- **keywords** in the **Glossary**.

Game Controls
illustrate and explain the basic actions needed to play the game.

Interactive Immersive Content

Thomas Iron Works
The first of its kind

FRANCIS WALTER DAM
Bear Creek Township, PA

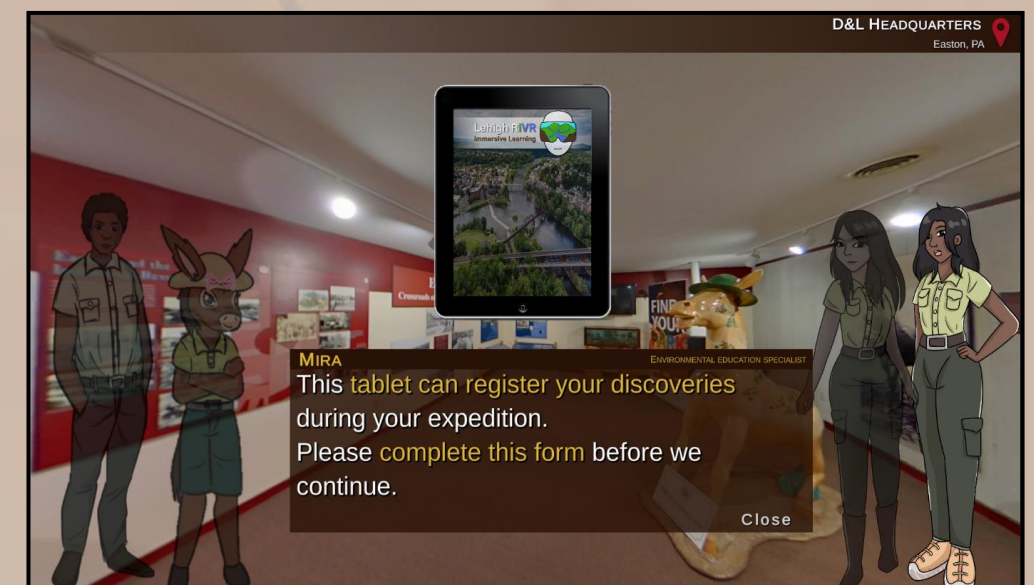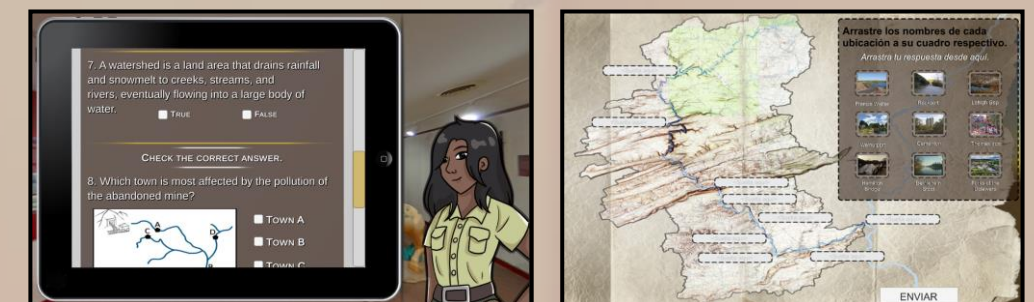Looking ME Upstream
Lehigh River Access

Built-in assistance
On-screen assistive features (e.g., tooltips, highlights, reminders) and just-in-time feedback.

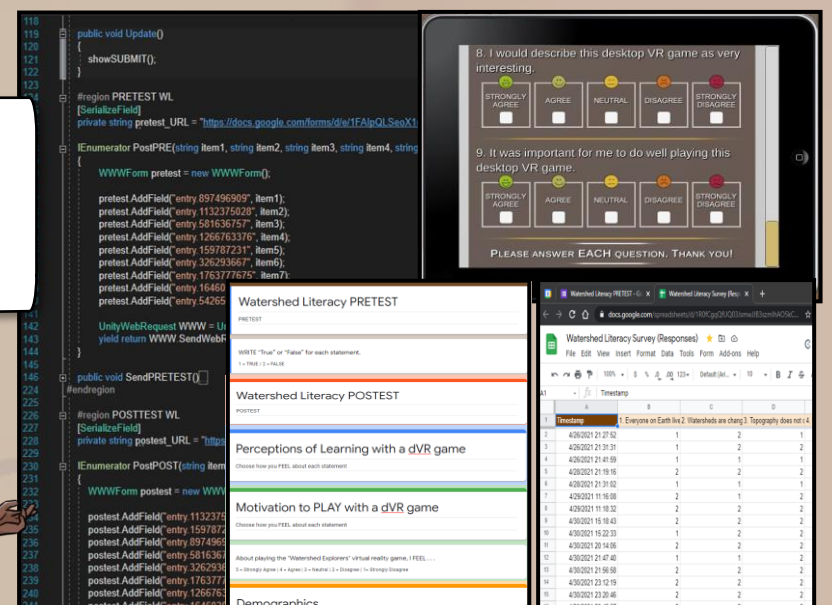**Localization**
Gameplay and Content in English and Spanish.

Chat Log
Welcome to stop #3, Lehigh Gap, located 26.7 miles or 42.9 kilometers down the Lehigh River from the previous stop. The Lehigh Water Gap was formed by the constant carving and eroding of Blue Mountain by the Lehigh River.

Options
On-screen Help Yes / No
Text Language English / Spanish
Volume

LANCE
What is the historical importance about this location?

MIRA
Nice try. Please try again.

Immersive Data Collection

7. A watershed is a land area that drains rainfall and snowmelt to creeks, streams, and rivers, eventually flowing into a large body of water.
True / False

8. Which town is most affected by the pollution of the abandoned mine?
Town A / Town B / Town C

D&L HEADQUARTERS Easton, PA

MIRA
This tablet can register your discoveries during your expedition.
Please complete this form before we continue.

Built-in data collection
via Unity, C#, Google Forms, and Google Spreadsheet.

Watershed Literacy PRETEST
Watershed Literacy POSTEST
Perceptions of Learning with a dVR game
Motivation to PLAY with a dVR game
Demographics

ENVIRONMENTAL LITERACY AND INQUIRY

Lehigh R**IVR** Immersive Learning

Many Thanks! THANKS