

Project Summary

The Wake research project considers how educational game design can be informed by learning progressions for science practices using large datasets.

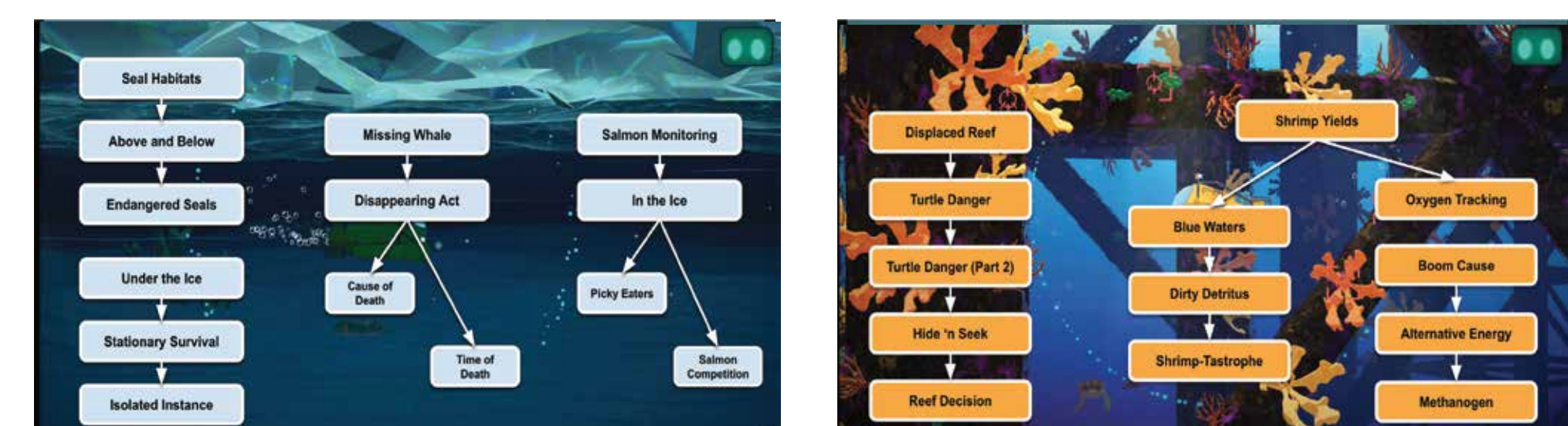
As a teaching tool, Wake is designed for use within grade 7-9 life sciences classrooms. The game demonstrates how the entire scientific enterprise, from observation to modeling, to arguing from evidence is used to understand and manage complex ecological systems.

As a research tool, Wake offers a platform for data collection and experimentation. Wake collects detailed telemetry data to develop new learning theory and supports learning engineering practices, such as A/B testing, to run experiments across different versions or populations.

An Open World Science Practices Adventure

Wake is large world, comprised of 14 different research sites across four primary ecosystems. Along the way, 60 aquatic species are encountered which interact with each other and their environment. Players have significant choice with how they proceed through the 52 jobs, which all explore a specific phenomena and all conclude with the player making a claim and/or providing evidence collected from observation, experimentation or modeling.

Students play as a junior scientist, Olivia, who grew up as the daughter of a Kelp Forest researcher. Olivia's family is bilingual Spanish/English, and recently lost Olivia's sister, Mer, in a horrible accident. Olivia's life is not all models and arguments, it is also full of ambitions, fears, and family dynamics. In the end, Wake is a story of growing up and coming into one's own identify as a scientist.



Arctic Jobs

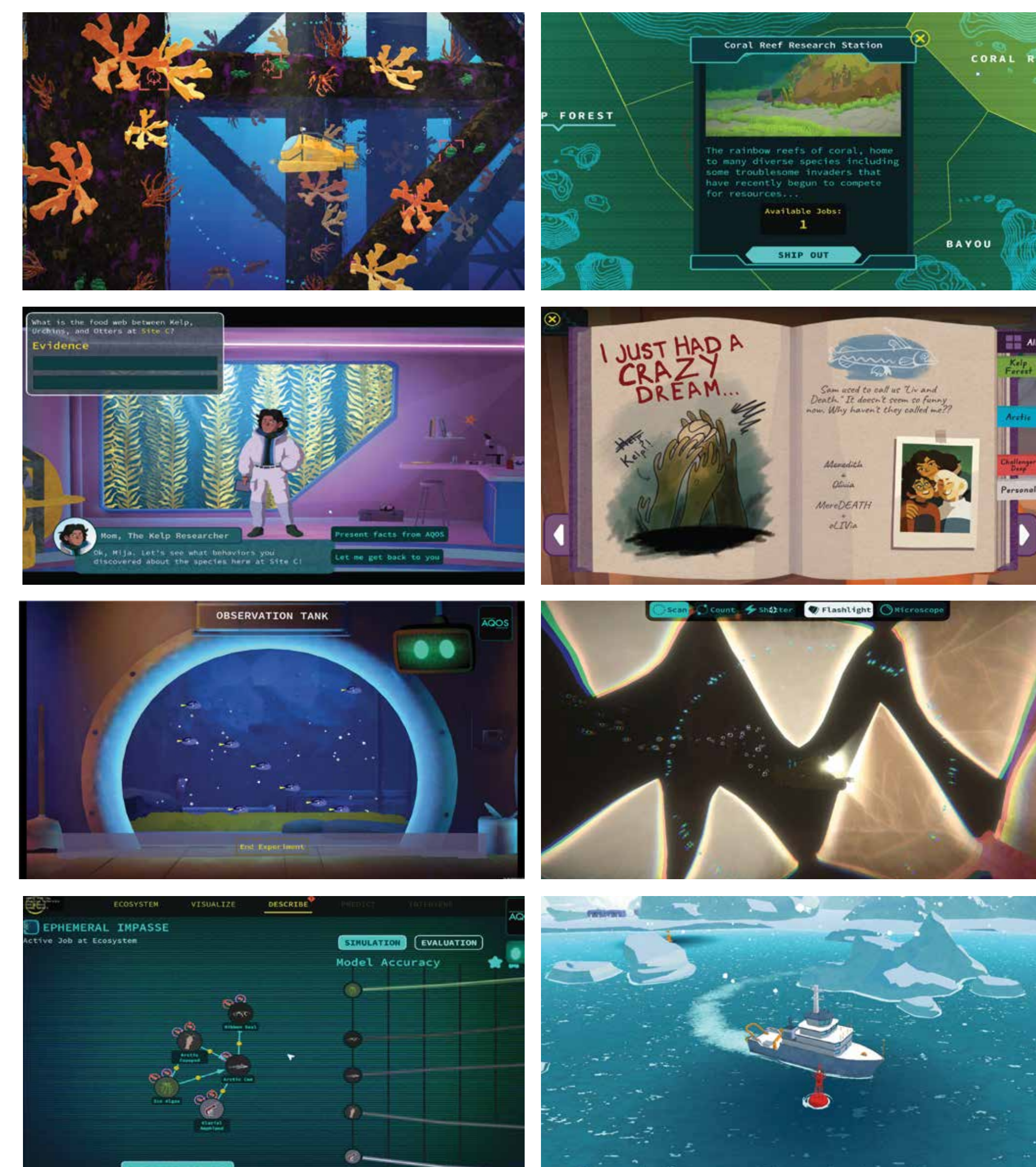
Bayou Jobs



Coral Reef Jobs

Kelp Forest Jobs

Screenshots



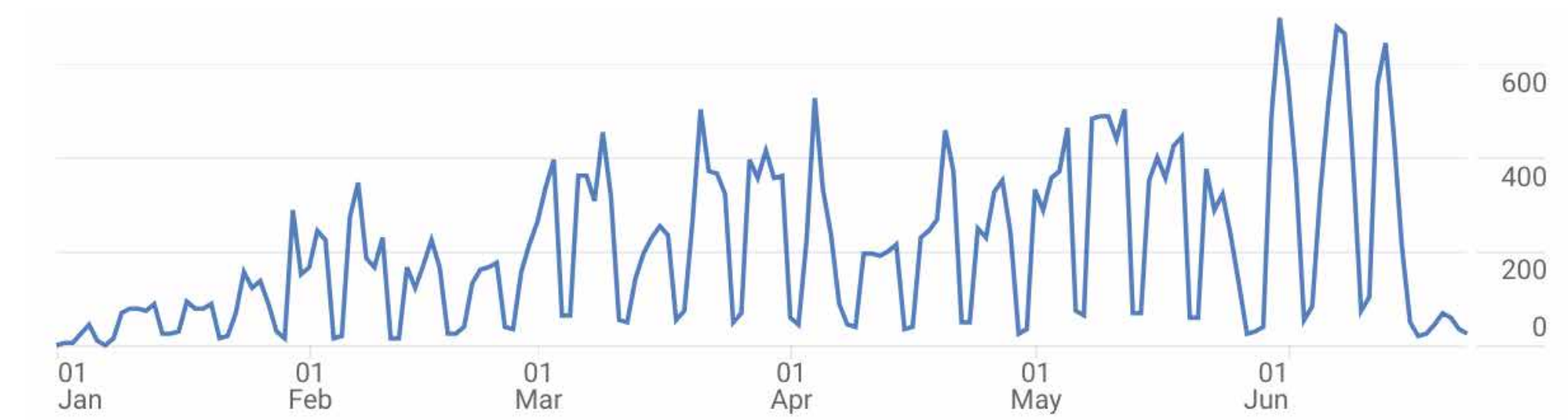
Tales From The AQUALAB



Significant Public Usage

Since launch in January, 2023 and with distribution provided by BrainPOP, PBS Learning Media and Field Day's website, Wake is already used broadly in schools.

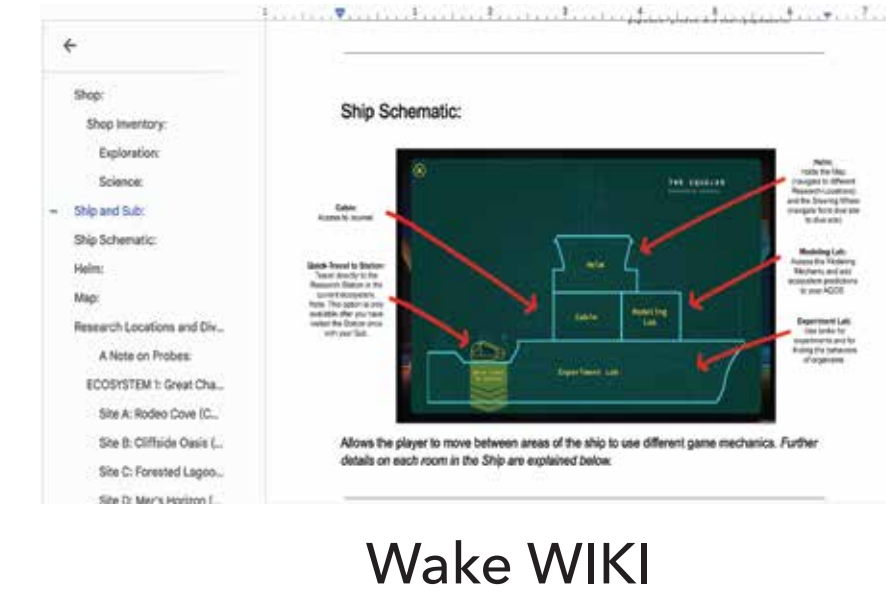
51K Plays **21K Users** **31 min ave. play/user**



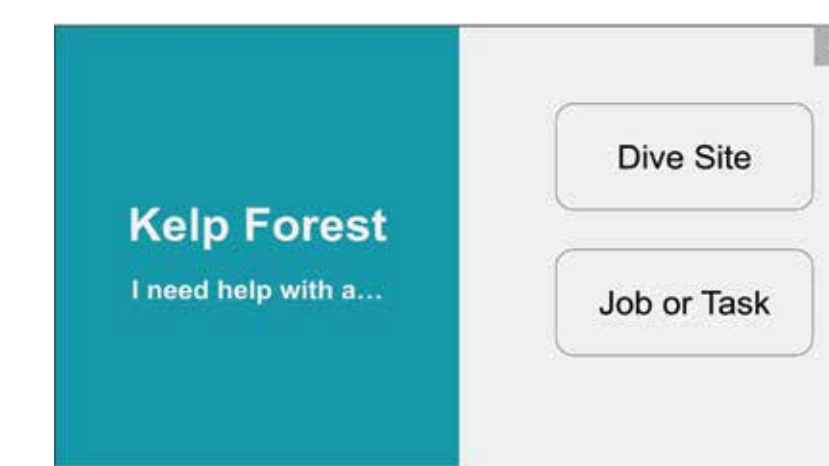
Co-Designed Educator Supports



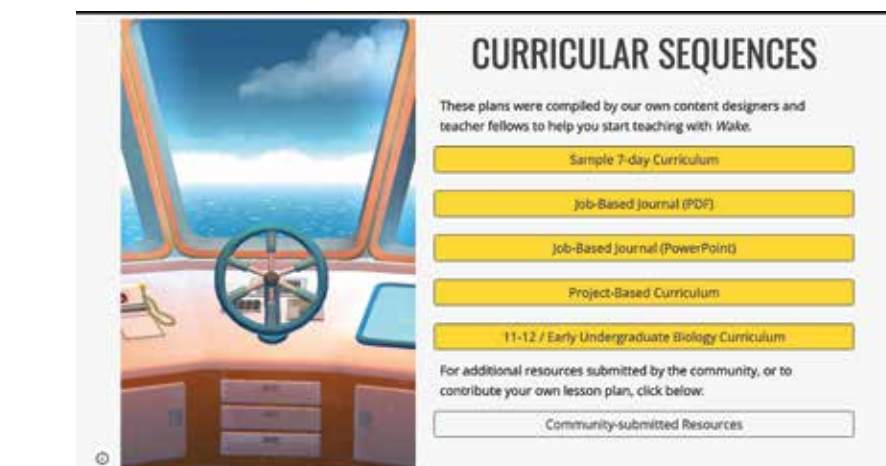
Educator Guide



Wake WIKI



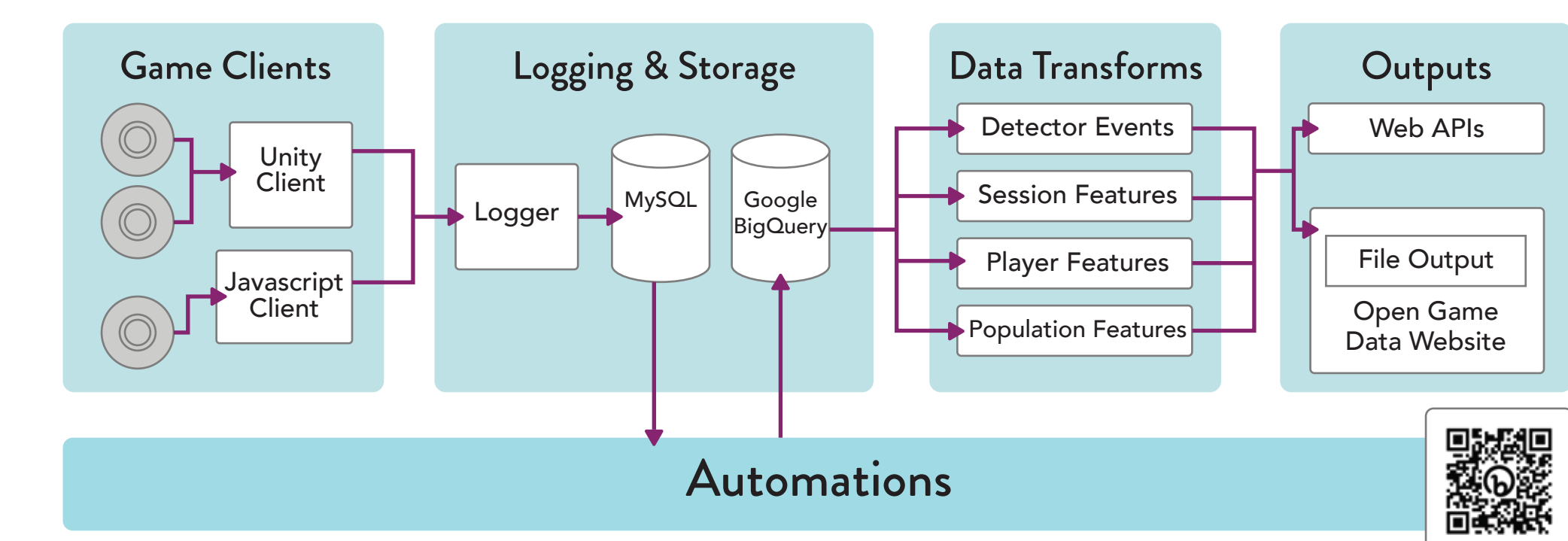
Interactive Troubleshooting



Five Curricular Sequences

Open Game Data

To support this research, we developed new research infrastructure to anonymously capture and process game telemetry events, then make them publicly available. As a broader impact, it is now being used by 14 game projects, logging millions of events daily.



Educational Data Mining

In addition to using analytics to improve usability during development, a number of innovative methods for educational data mining are being developed:

- Automated struggle detection using qualitative coding of text replays
- Pattern mining to derive learning progressions
- Clustering to develop player taxonomies

Early Studies Show Gains in Science Self-Efficacy, Interest and Identity.

Wake has been used in two classroom studies in Newton, MA.

The first study was in June 2022 with 5 teachers, 250 7th and 8th grade students (age 12-14). They played the game for 3-4 hours over 6-8 class periods. Pre-post surveys of science self-efficacy, interest, and identity all found significant gains.

The second study was in June 2023 with 4 teachers, 250 7th grade students. Pre-post surveys also included science practices knowledge. Data is currently under analysis.

Acknowledgments

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