Origins

Roots at UW-Madison

Rooted in academic research and university-based development groups, Gear Learning at UW-Madison’s Wisconsin Center for Education Research serves as a game development resource for campus researchers and external partners.
Brief History

2009 - 2012

2012 - 2016

2017 - Present
Designers
Artists
Animators
Programmers
Interns
QA Testers
Graduate Students
Undergrad Students
# Complex Content Areas

<table>
<thead>
<tr>
<th>Virology</th>
<th>Astronomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regenerative Medicine</td>
<td>Human Development</td>
</tr>
<tr>
<td>Empathic Accuracy</td>
<td>Embodied Cognition (Math)</td>
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<tr>
<td>Implicit Bias</td>
<td>Human Development</td>
</tr>
<tr>
<td>Electric Circuitry</td>
<td>Medication Safety (Opioids)</td>
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<tr>
<td>Environmental Science</td>
<td>Veterinary Sciences</td>
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</table>
What does it mean to Design a learning game?

- The role of a learning game designer is to work with subject matter experts to map **gameplay mechanics** with **learning objectives** that lead to learning.

- As closely as possible, we want the **rules** of a given subject matter should be the **rules** of gameplay.
Why does UW need a game development studio?

- It is necessary to design and develop the games from the ground up to fully understand the process and the impacts.

- It is not plausible to access the necessary game events to collect and analyze gameplay data from commercial games to draw any meaningful conclusions.
Implementation

How are our games being used?

**Higher Ed Classrooms**
- In-Class activity
- Assigned activity (homework)
- Extra credit

**Workshops / Professional Development**
- Activity
- Training
Higher Ed Classrooms

Formal Learning Environments

• In-Class activity - Instructors playing along with students in class - **HIGH IMPACT**

• Assigned activity (students often do this in groups) - **MODERATE IMPACT**

• Extra Credit - students do this if their grade needs a boost - **LOW IMPACT**
Games a Professional Development

Changes in the last decade

- Technological literacy has made conventional PD sometimes feel obsolete and less valid
- Well designed game mechanics are proving to be much more effective than gamification
- Trainees feel a sense of ownership over the pace and focus of their training.
Pro-social Behaviors

CRYSRALS OF KAYDOR

Players can engage in prosocial behaviors, including recognizing others' emotions while interacting with aliens on a far away world. To communicate with the aliens you must first understand their emotional cues and earn their trust with positive social interactions.
Implicit Bias

Gear Learning is continuing a long partnership with LEAD Center at WCER. In this game, players experience racial bias during interactions with other characters, as well as in the virtual environment.
Radiology

Breast Imaging Trainer
A game designed to improve breast scan evaluation accuracy by providing an easily accessible experience that emulates the real-world process of breast scan evaluation.
Partnering with W.W. Norton we developed a first-of-its-kind resource in astronomy education where students, as a class activity, learn content that spans the entire scope of the course from basic physics to cosmology.
Data Analytics

Iteration and Development

Improvements pave the way to new systems and methods

- Assessment Data Aggregator for Game Environments (ADAGE) - 2012-2015 - NSF Cyberstem

- GameSparks (3rd party) - Cosmos Only

- Sprocket (Gear Learning) - 2017-Current
Prototype data collection system

- Not extendable
- Unmanaged
- But, it laid the foundations for future efforts
Widely used, but limited

- Not ours (3rd Party)
- Limited resources for our needs
  - Vendor needs to make local copies of data
  - Can’t produce live visualizations.
- However, quick implementation in a pinch
Fixes all the problems!

- Full control of data
- Extendable, modular
- Clean
Data Analytics

Sprocket - Architecture

Multiple, small NodeJS applications in AWS/EB

- **Including**
  - Data Collection
  - Data Visualization
  - Authentication
  - Remote Configuration
  - Remote Storage
  - All round MongoDB/S3

- **AWS is great!**
  - Automation
  - Load Balancing
Data Analytics

Sprocket - Data Format

**Contexts and Events**

- **Contexts**
  - Nested
  - Lends to funneling naturally
  - Groups events in a logical way

- **Events**
  - Tagged to a single context
  - Myriad event types with any data types
Data Analytics

Sprocket - Data Format - Mario Bros 1

- **Context A**: Game Start First Play
  - Event 1: Press Start

- **Context B**: World 1-1
  - Event 2: Jump
  - Event 3: Enter Pipe
  - Event 4: Climb Flagpole

- **Context C**: World 1-2
  - Event 5: Jump
  - Event 6: Pick Up Item
  - Event 7: Player Dies

- **Context D**: Game Start Second Play ...

- Query {Context:A} returns all 7 Events and two children context ID
- Query {Context:C} returns Events 5, 6, 7
Data Analytics

What kinds of questions can we answer?

Our games can report every action the player takes which will help us answer a variety of questions.

- **Level 1** - Did the player play the game?
- **Level 2** - Did the player play successfully?
- **Level 3** - Is the player showing improvement over time?
Data Analytics

Did a player complete a task?

First time mission 6 completion time distribution

Second time mission 6 completion time distribution
Data Analytics

Was the task completed successfully?
Data Analytics

Is the player showing improvement over time?

<table>
<thead>
<tr>
<th>Mission</th>
<th>Completion time (C1)</th>
<th>Completion time (C2)</th>
<th>Failure time (F1)</th>
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Data Analytics

Sprocket - Data Visualization

AT PLAY IN THE COSMOS

Correct Use of Tool When Prompted

Tools Used Per Mission

Correct Use of Tool When Prompted

MIKE BEALL
DIRECTOR
Data Analytics

Sprocket - Remote Configuration (And LTI Integration)
Data Analytics

What’s next?

Discussion Points

• What data do instructors want/need?
• Could gameplay data be integrated into Canvas?
• Should PII be merged with Gameplay data?
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