

# MIT STEP/TEA



## Learning Games Are Hard Fun

**ERIC KLOPFER:** MIT SCHELLER TEACHER EDUCATION PROGRAM (STEP) | THE EDUCATION ARCADE (TEA) | LEARNING GAMES NETWORK (LGN) | CMS, MEDIA LAB & ESD AFFILIATIONS

# Course Goals

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- Learn about educational technologies that are new, exciting, and classroom ready
- Understand the value and role of games in learning
- Construct your own understanding of learning by building
- Develop skills connecting games and simulations to the curriculum
- Create new ideas for connecting technology, play and learning

# Course Overview

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- Connecting games and learning
  - Intro to educational games
  - *Playing an educational game*
- Integrating curriculum and games
  - Connect games to curriculum in design and implementation
  - *Connecting a game to your curriculum*
- Introducing constructionism, simulations, and complexity
  - Learn through building simulations and games
  - *Exploring computer simulations*

# Course Overview (continued)

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- Learning to Simulate
  - Introduction to programming in StarLogo TNG
  - *Creating your own computer simulations*
- Designing Games
  - Understand the game design process
  - “Pitching” an idea for an educational game
- Staff
  - Eric Klopfer, Scot Osterweil, Wendy Huang, Daniel Wendel, Jason Haas, Susannah Gordon-Messer, Ilana Schoenfeld

# STEP/TEA Pedagogical Frameworks

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- What kinds of learning environments?

- Create highly engaged, motivated students
- Provide **immersive** environments, **relevant** problems
- Facilitate **collaborative, project-based** learning
- Game-like, active, “**Hard Fun**”
  - A teacher heard one child using these words to describe the computer work: "It's fun. It's hard..." I have no doubt that this kid called the work fun **because** it was hard rather than in **spite** of being hard. [S. Papert, 2002]
- Applicable to **formal** and **informal** settings, extending learning beyond walls of the school, beyond hours of the school-day

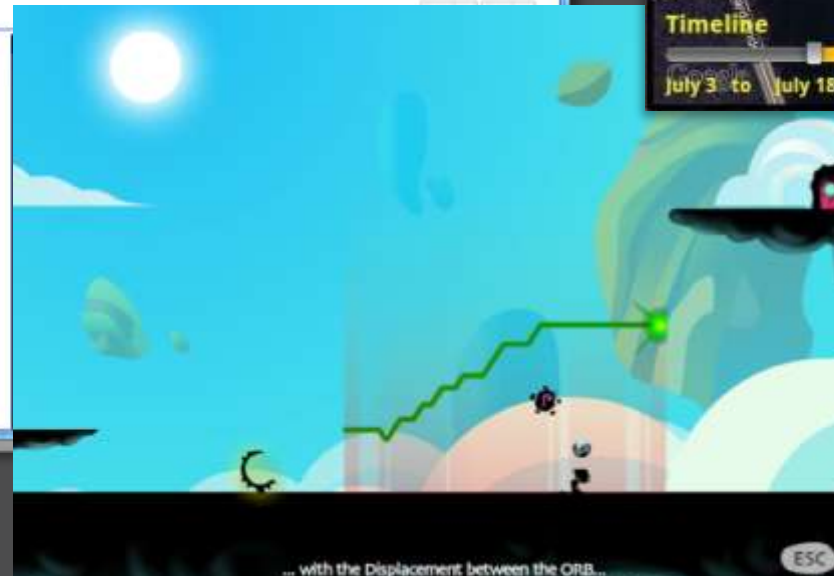


# Learning Through Game Play and Creation

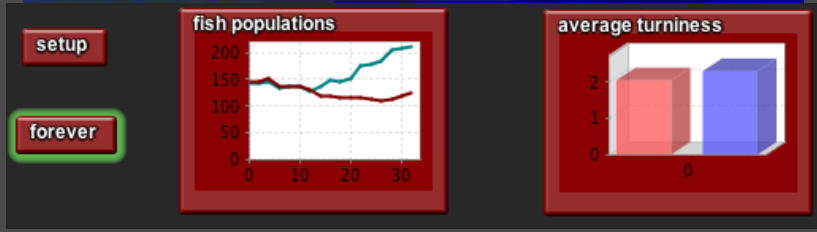
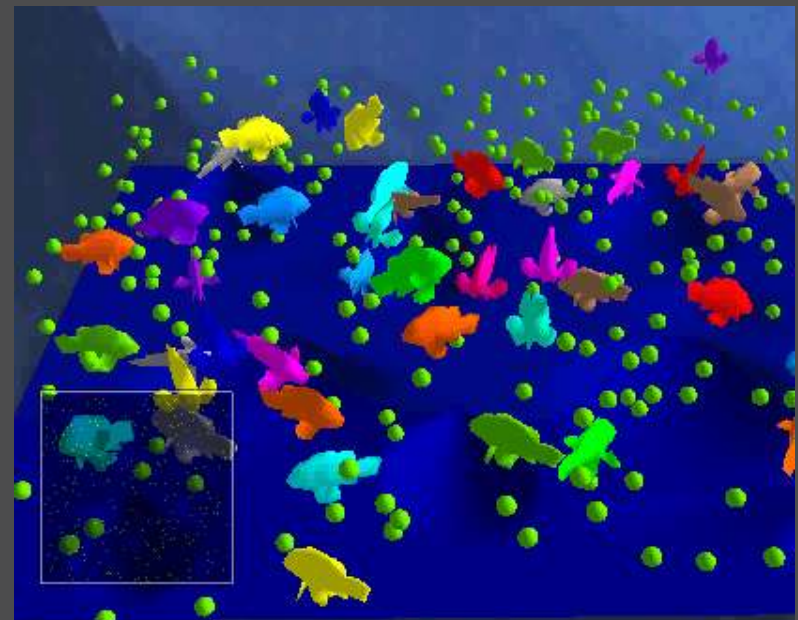


A screenshot of the 'vanished' website interface. The header features the title 'vanished' and the tagline 'Be the Scientist. Solve the Mystery.' Below the header, there are navigation tabs for 'EVENTS', 'FORUMS', 'INVESTIGATIONS', and 'NEWS FROM MIT'. A search bar is present with fields for 'username', 'password', and 'login'. A sidebar on the left is titled 'Happening Now!' and contains several news items with small images and text. The main content area is divided into 'Current Mission' and 'Toolbox' sections.


A screenshot of the TaleBlazer editor interface. The browser address bar shows the URL 'http://taleblazer.org/create/46'. The page title is 'TaleBlazer editor'. On the left side, there is a sidebar with a list of categories: 'Game', 'Map', 'Data', 'Agents', 'Roles', and 'Teams'. The main area contains a 'Pick Agent:' section with a 'Pick Agent' button. Below this, there are several buttons for 'New Agent' and 'Delete Agent'.



# Learning to Make Games, Sims and Apps



# Games? Learning?

A soldier in green and orange armor is shown in a combat environment. A speech bubble is overlaid on the image, containing a math problem. The entire image is crossed out with a large orange 'X'.

How many volts do I need for my laser canon to kill  $3 \times 6$  opponents?



# The Legacy of Math Blaster

- Edutainment
  - Where play is the **reward** for learning



# The Legacy of Math Blaster

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- Edutainment
  - Gets kids to eat broccoli
  - But doesn't promote healthy eating
  - What happens when the chocolate goes away?



# The Joy of Gaming?



# The Joy of Gaming = Hard Fun



# Feedback?

- How can we provide **more** feedback?



# Feedback

- **When** should we provide feedback?
  - Frequency and response type



# Gamification Everywhere

Mr. Zichermann said. “We use game concepts to get them to focus on things.”

fits that description. After graduating from high school, Mr. Kroll said, he was overweight, living at home and playing World of Warcraft at least six hours a day. He turned things around after starting to work out at a gym regularly with the help of an app on his iPhone called Fitocracy, in which badges are awarded by a robot character.

Mr. Kroll, who has lost about 75 pounds, says he plays video games less frequently now, but he still enjoys the gamelike challenges that the app sets for him at the gym. He said the app gives him “the same satisfaction of getting points and leveling up” that he gets from playing video games.

Ms. Snawder and her 9-year-old daughter, Emma, also know how well embracing games can work. Ms. Snawder signed up for a service called Zamzee to encourage Emma to be physically active.

At the end of the day, Emma wears a small motion sensor that records her activity level and sends her to bed. She gets hints for a brisk walk, an impromptu dance party in the living room and any



**Scroll King**

6/10

You're clearly persistent. You made it to the bottom of the page.

# Learning Goals?

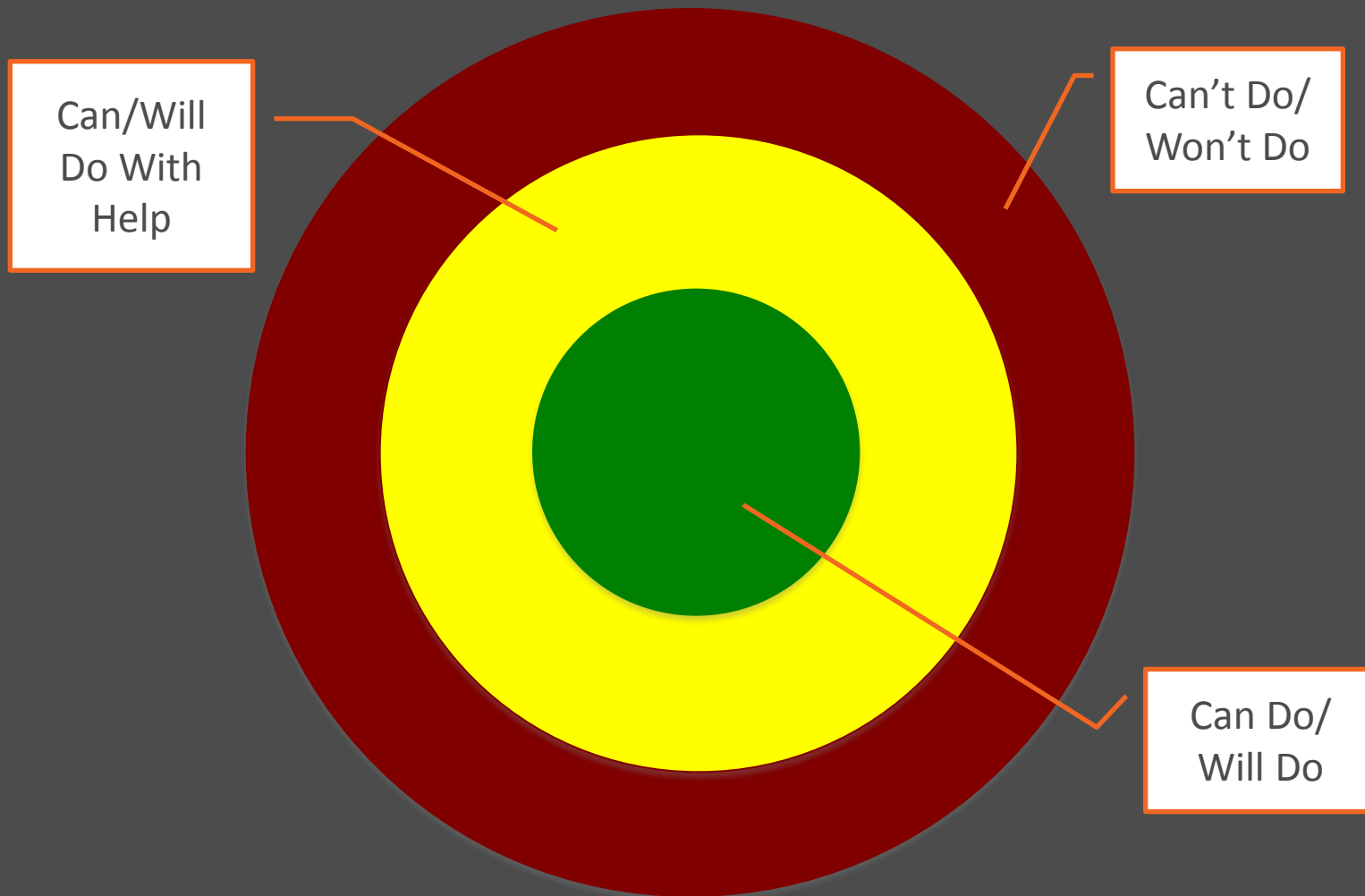
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- Cognitive Skills
- Non-cognitive skills
  - Persistence
  - Grit
- Metacognitive skills
  - Reflection
  - Abstraction

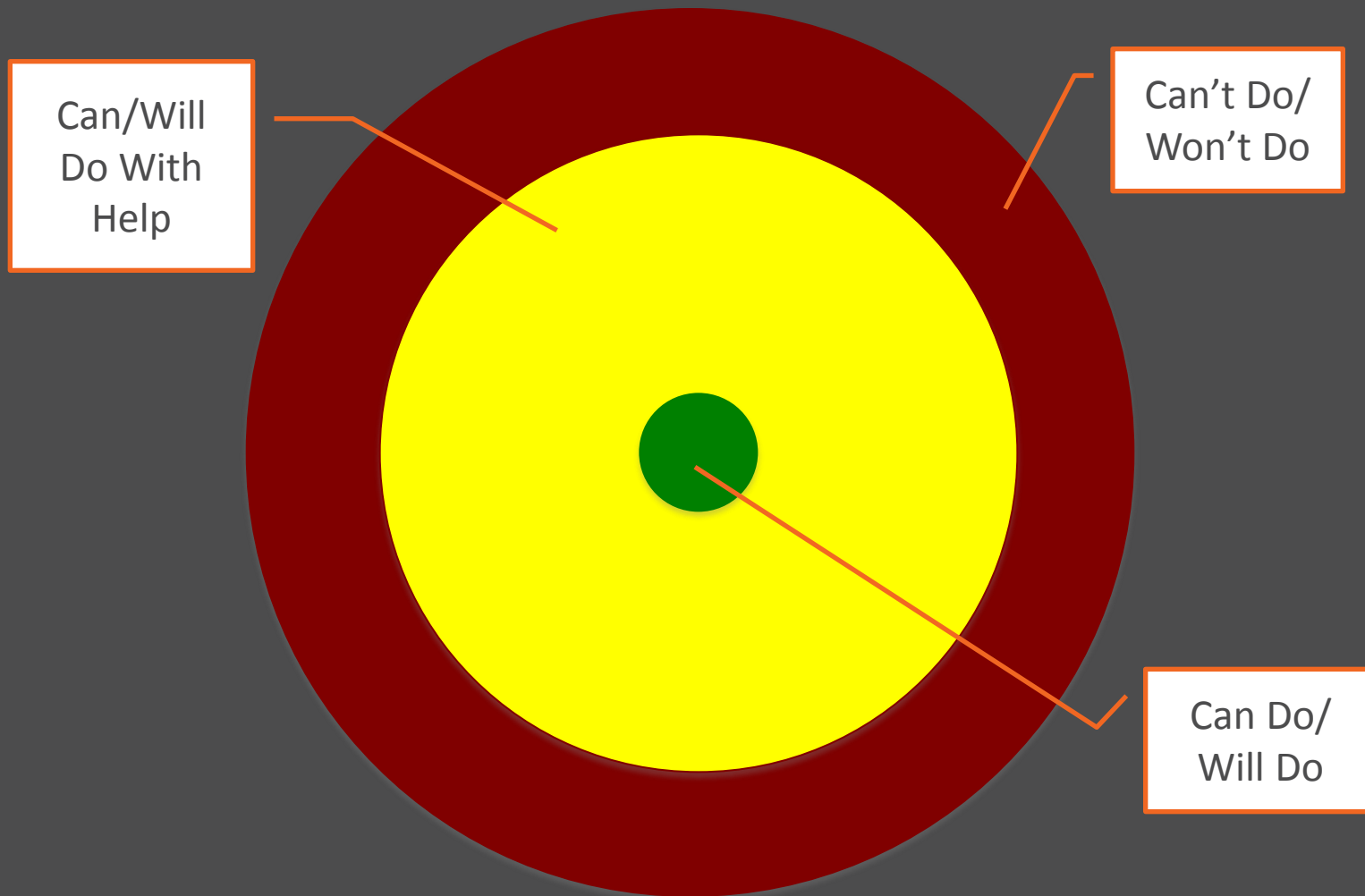




# Zone of Proximal Development



# Zone of Proximal Development



# The Fun of Structure

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Structured, goal-oriented,  
feedback-driven can be fun



In games we willingly submit to arbitrary  
rules and structures in pursuit of mastery,  
but only if we can continue to be playful.

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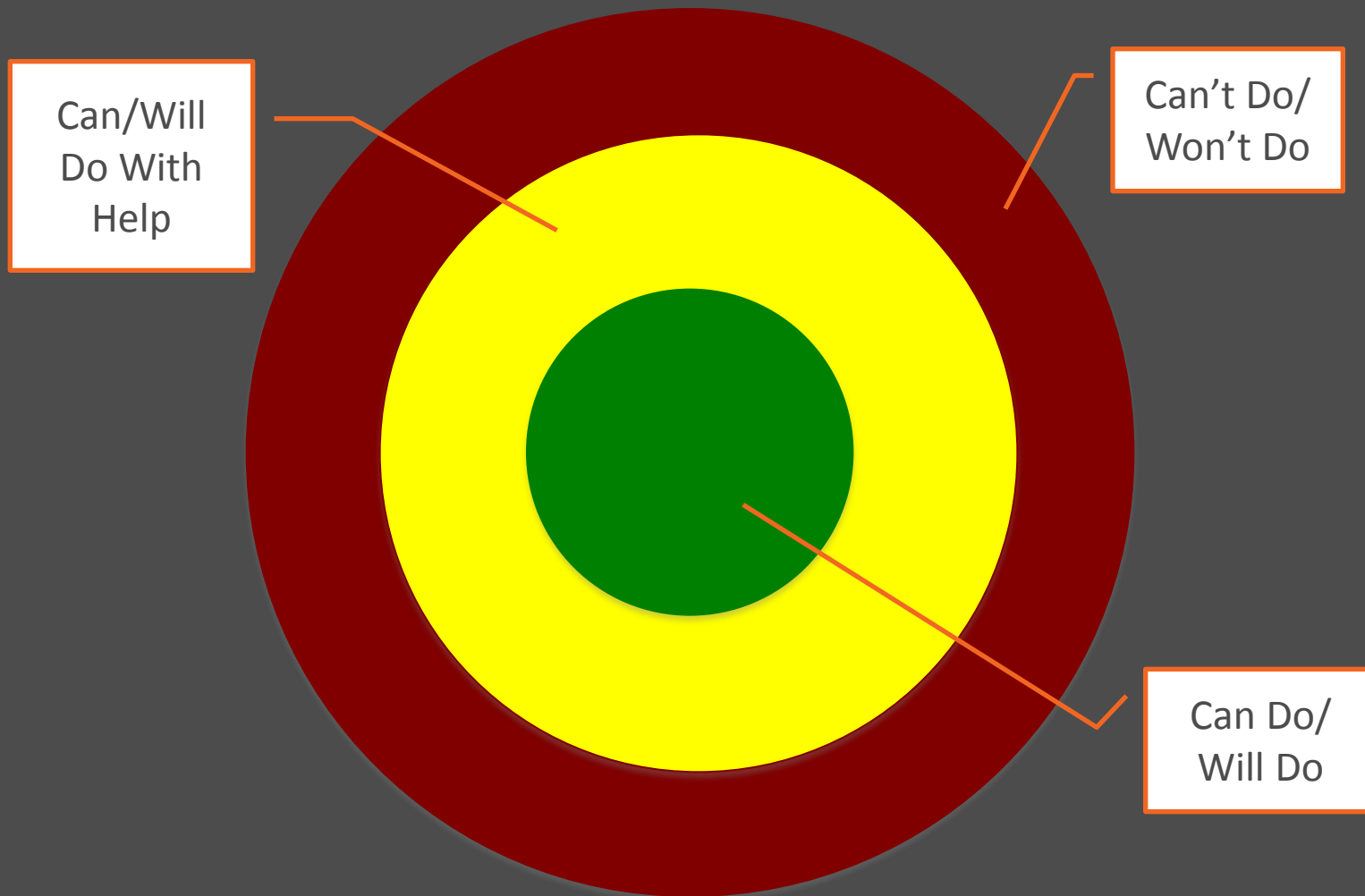
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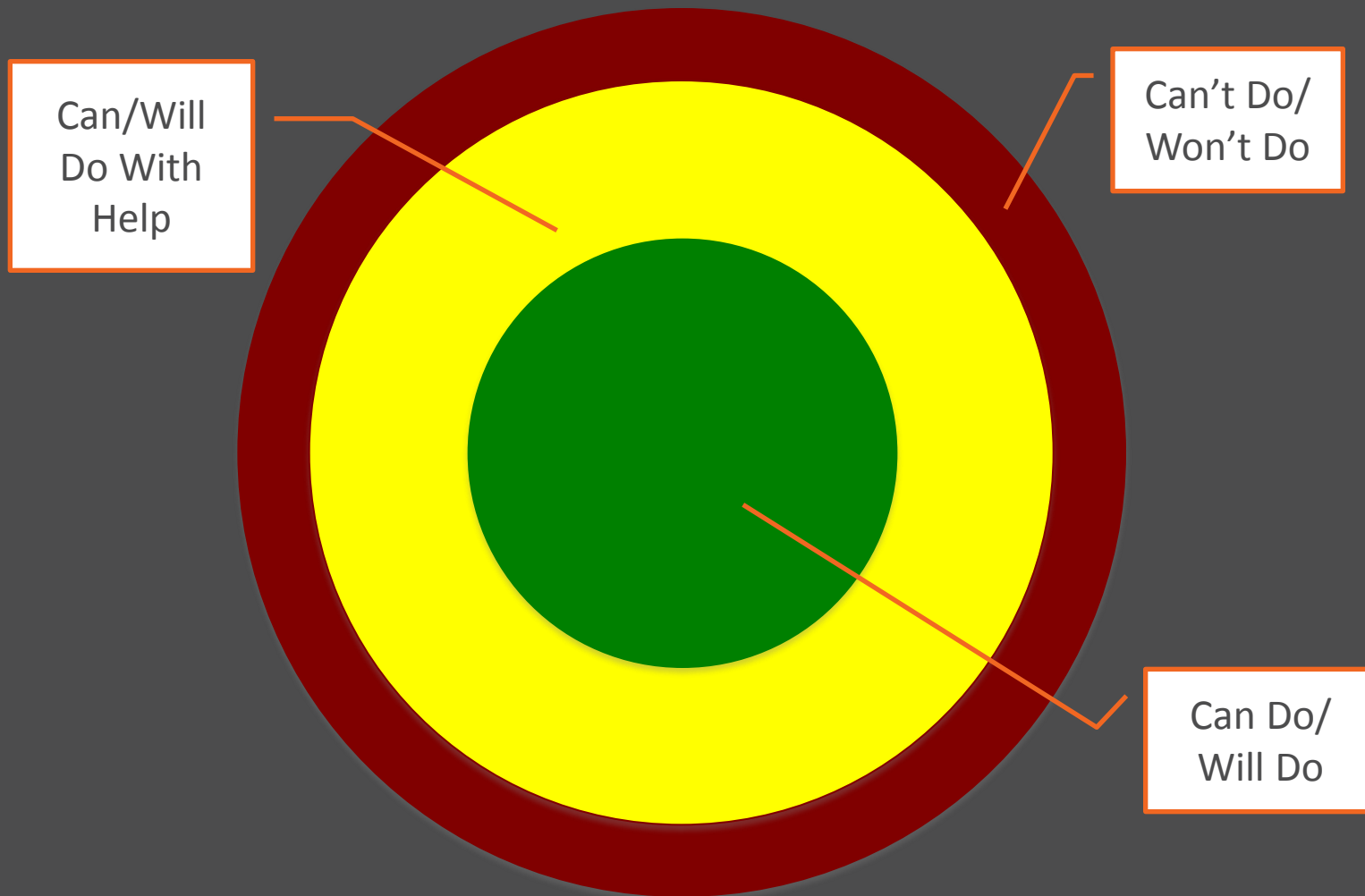


In games we willingly submit to arbitrary rules and structures in pursuit of mastery, but only if we can continue to be playful.

# Zone of Proximal Development



# Zone of Proximal Development



# Gaminess

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- What features are important to **structure** games?
  - Interesting **decisions** (*Sid Meier*)
  - **Consequences** to decisions (+/- value)
  - Clearly defined **goals** (*rules/constraints*)
  - Visible measurable **feedback** (*quantifiable outcome*)
  - Underlying **model**/system (*coherent system of rules*)

*Little Gaminess*

*Lots of Gaminess*

*Movies*  
*Dolls*  
*Books*

*Scavenger Hunt*  
*The Sims*

*WoW*  
*Risk*



# UbiqGames



## The Lab

Hands Tail Horns Mouth

A A U

### The Lab

Hands Tail Horns Mouth

Orzine

Zygote Stage  
Current mRNA codes for:

Razor Claws	Serrated Tail
Normal Horns	Normal Mouth

Develop

Twisty

You

Home Cage Search Document

Show Status

## Contract

Home Cage Search Document

Pay	Beetles	T
\$39	3	H
Beetles in Shipping Box:		
\$52	4	W
\$52	4	A
\$30	3	H
\$40	4	R

Current Contract (\$39)  
Hairless  
0/3 in Shipping Box

Game Status  
Level: 3  
Bank: \$205  
Contracts: 0/3

Hide Status

## Mating Cage

7363 ♂ Hairy HH

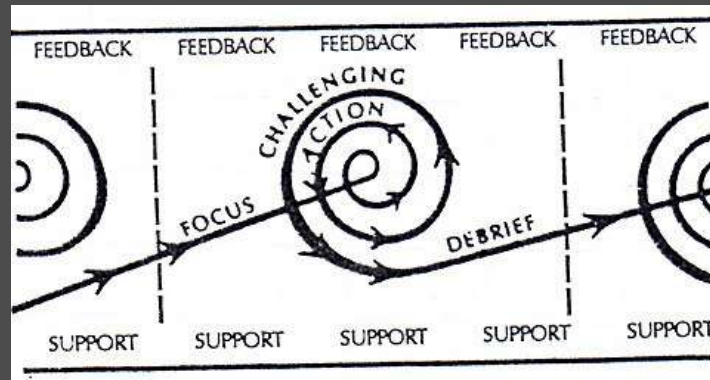
7374 ♀ Hairy Hh

Hatch Challenge



# Learning

Experience  
(games)



Resources



Reflection

# Radix - An MMO for STEM Learning

The screenshot displays the Radix MMO interface, which integrates educational content with a game environment. On the left, a notebook page titled "Tomato | Solanum lycopersicum |" provides information about the plant, including a diagram of its root system and a note: "Light: Sufficient light provides energy for fruit production." Below this, a pH scale is shown with Roman numerals IV, I, III, VI, V, II, and a diagram of a water cycle. In the center, a hand interacts with a map of a garden area. On the right, a "Zombie Drift" interface shows a projected map with zombie positions. The main game area features a dark, atmospheric scene with various characters and zombies. A chat window at the bottom shows player interactions: billybob: "Agh, zombie attack!", hedwick: "watch your mirrors, i had trouble here too", and SAY: "Where is ladyjane when you need her?!", along with a "Quest Log" button.

**FILAMENTGAMES**

**BILL & MELINDA GATES foundation**

# Vanished - An Alternate Reality Game

- A “Curated Game”
- With the Smithsonian Institute

The screenshot shows the Vanished website interface. At the top, there are navigation tabs for EVENTS, FORUMS, INVESTIGATIONS, and NEWS FROM MIT. Below these is the 'vanished' logo with a 'JOIN the site' button and the tagline 'Be the Scientist. Solve the Mystery.' A login section includes fields for 'username' and 'password', a 'login' button, and a search bar with a 'search' button.

The main content area is divided into three columns:

- Happening Now!** (orange header):
  - Museum Event:** This Saturday at the North Carolina Museum of Natural Sciences!
  - On the Forums:** Which hypotheses should we investigate next?
  - Video:** Meet Liz Cottrell, a volcanologist at the Smithsonian. She'll talk to you LIVE on Thursday.
  - Games:** In Ecollapse, you must remove links in a food web to save an ecosystem...or destroy it.
- Current Mission** (purple header):
  - MISSION BRIEFING:** A photo of a man and a woman.
  - LATEST BROADCAST:** CORBIN: We are unsure what's causing these alarming anomalies. Is there some vital piece of information we're missing? We need your help to investigate further.
  - Text:** There's a new broadcast out! We're desperately trying to figure out why our results are so different from theirs. So hit the forums and start coming up with theories. To help with your investigation, we've set up another [Scientist Videoconference](#) for Thursday.
  - Text:** Plus, we've got a new [data challenge](#). Get your cameras and hit the park, sidewalk or backyard! Document any animals you can find and share them with us. You can upload your data until April 22.
  - NEWS FLASHES:**
    - Two New Documents Unlocked!** Read them [here](#), then [join the discussion](#) and help us figure out what they mean.
    - Latest Journal Entry Revealed.** [Read it here](#) and help us figure out what museum we're going to next!
    - Code Breakers Needed!** Help us decrypt [these strange forum posts!](#)
- Toolbox** (blue header):
  - Events:** A calendar for December with a grid showing dates 1 through 31.
  - User Achievements:** A table showing user names and their achievement counts.
  - Post:** A poll titled 'How many hours a week do you spend on Vanished?' with options: 1 to 1 hours, 3- 5 hours, 6 or more hours, and a 'Vote!' button.

# Course Outline

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- Week 1
  - Connecting games and learning
- Week 2
  - Integrating curriculum and games
- Week 3
  - Introducing constructionism and simulations
- Week 4
  - Learning to Simulate
- Week 5
  - Designing Games

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