

# Educational Games and Data Hands On

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THE EDUCATION ARCADE



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PROGRAM

the education arcade



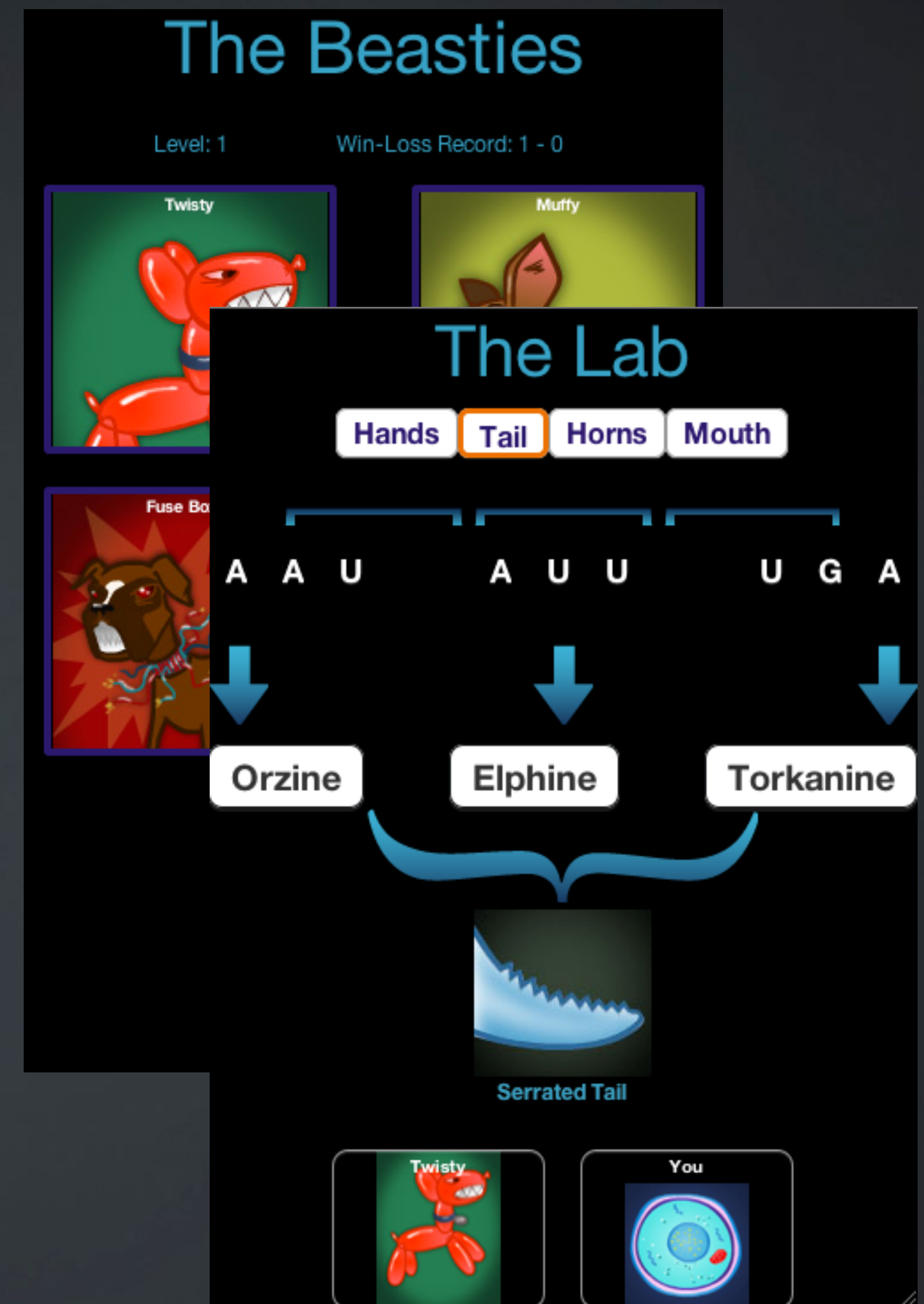
# UbiquGames

Designed for the Mobile Web

Paced to encourage short and frequent game play

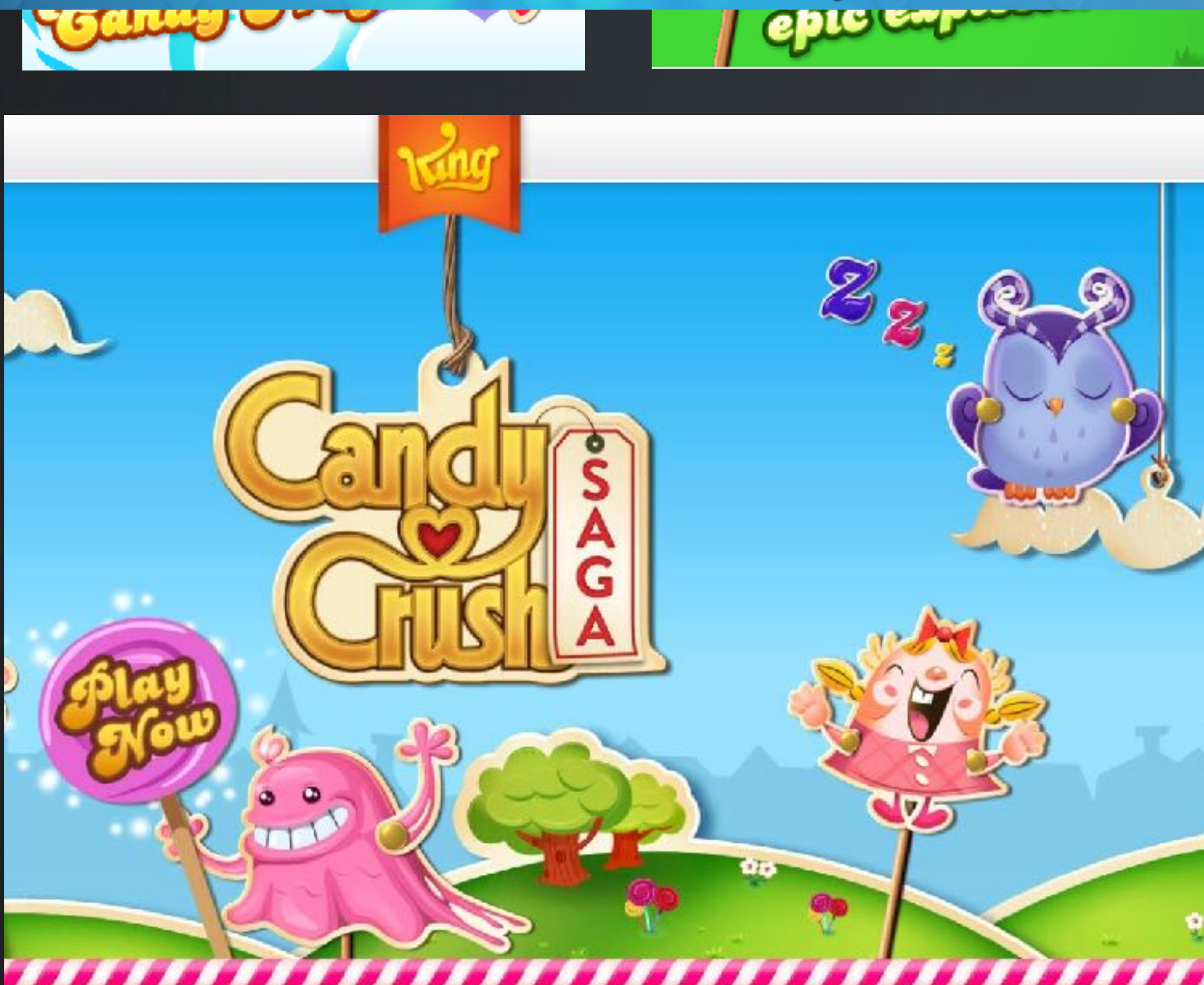
Played in the “interstitial” spaces in school

Connected to specific class learning goals through curriculum



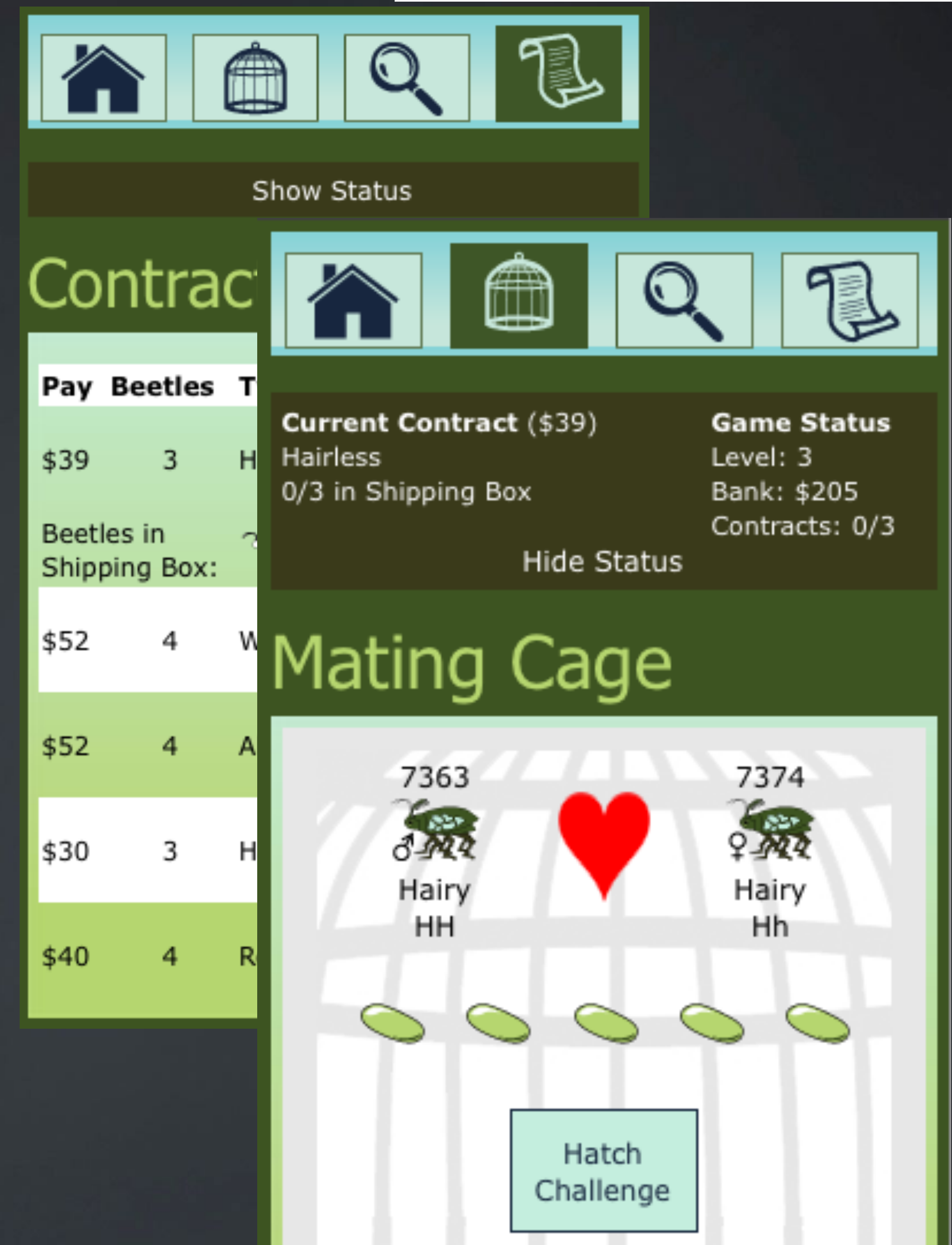
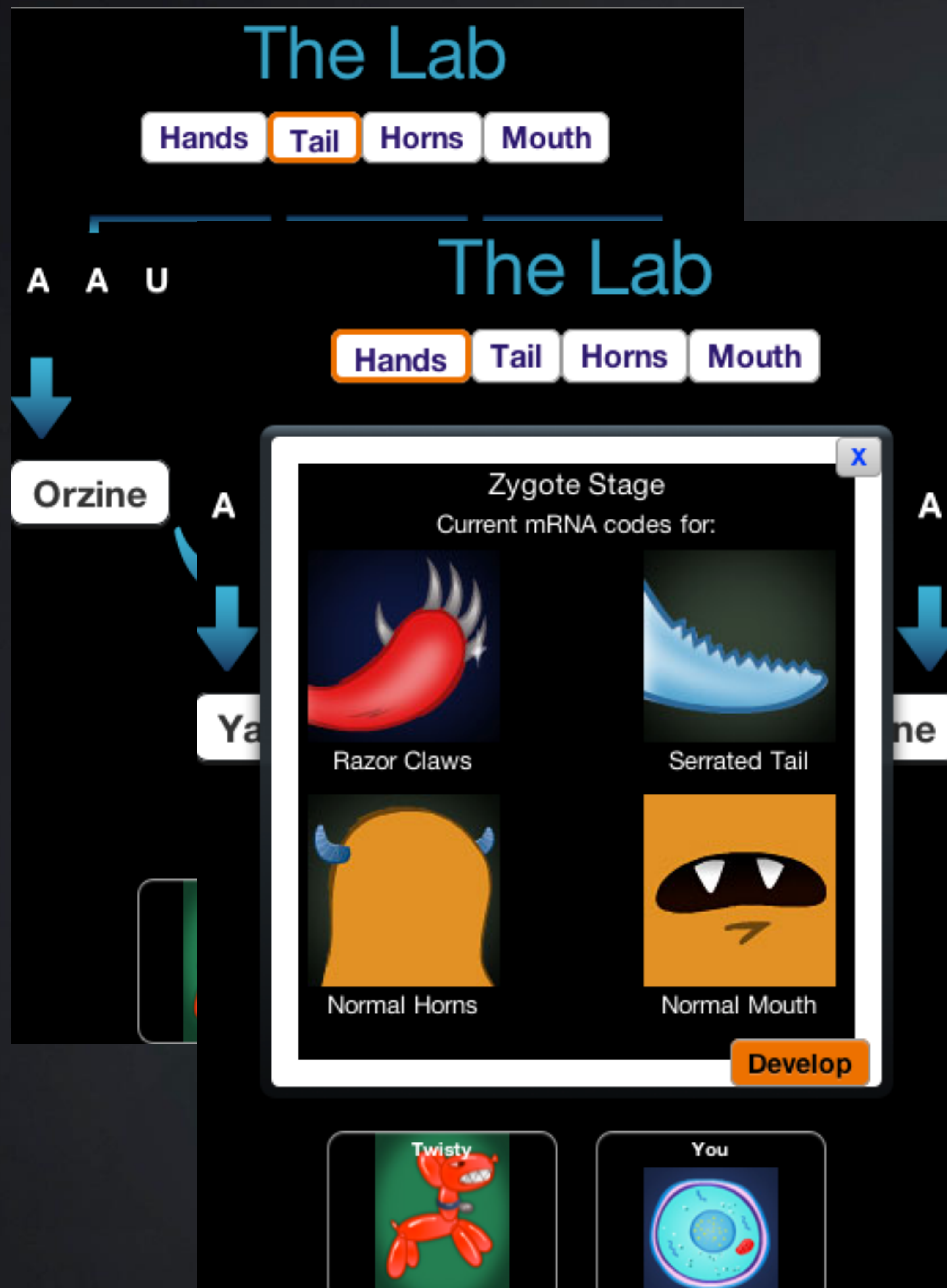


# Mobile Social Games





# UbiqBio





# UbiquBio Research Study

- Teachers

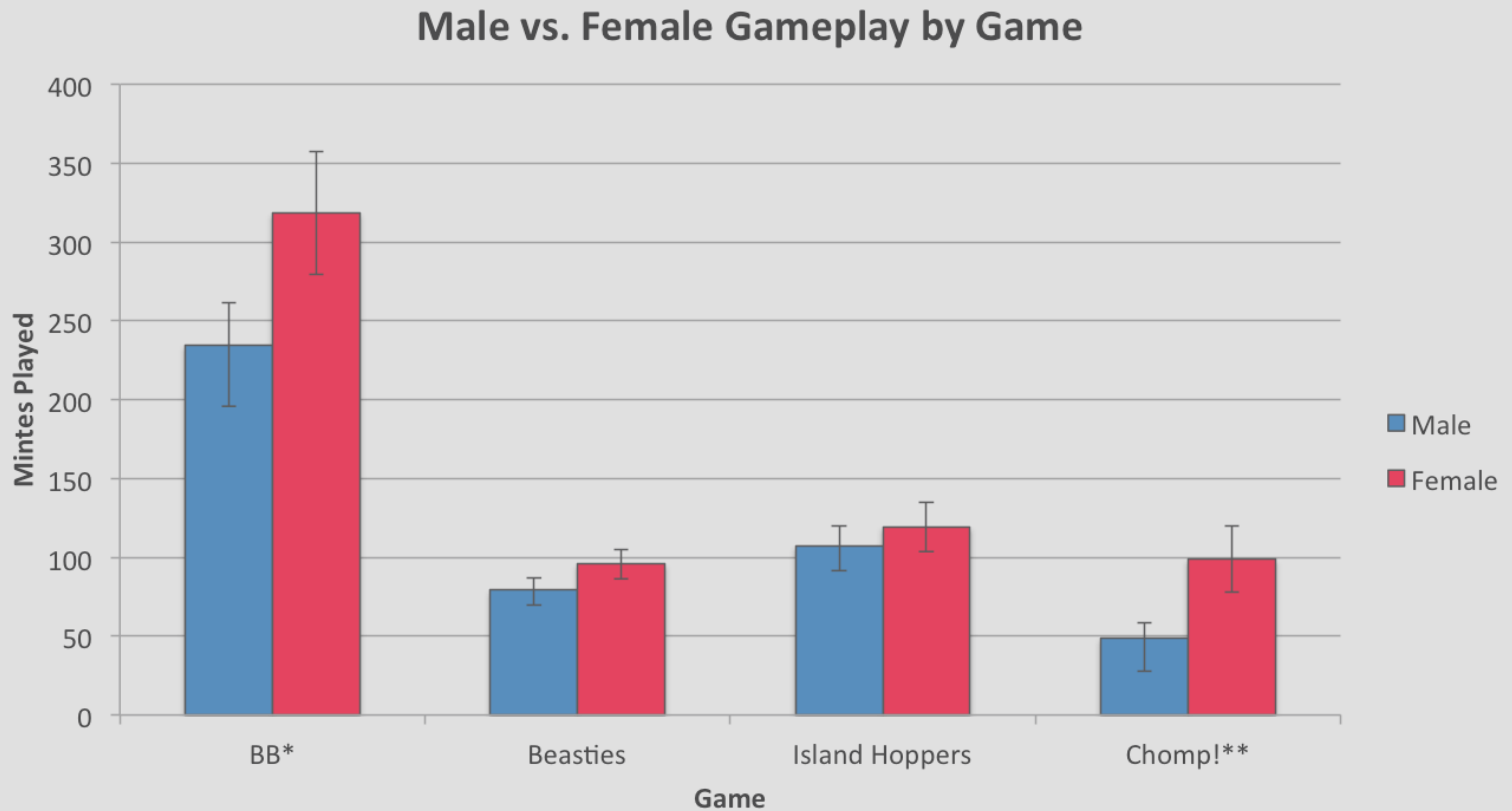
- 7 Teachers from 4 Boston Area Schools
- All schools were urban low SES
- Games implemented each over ~1 week, with varying style

- Students

- 156 experimental students - provided with phones
- 83 control students (same teachers from prior year)



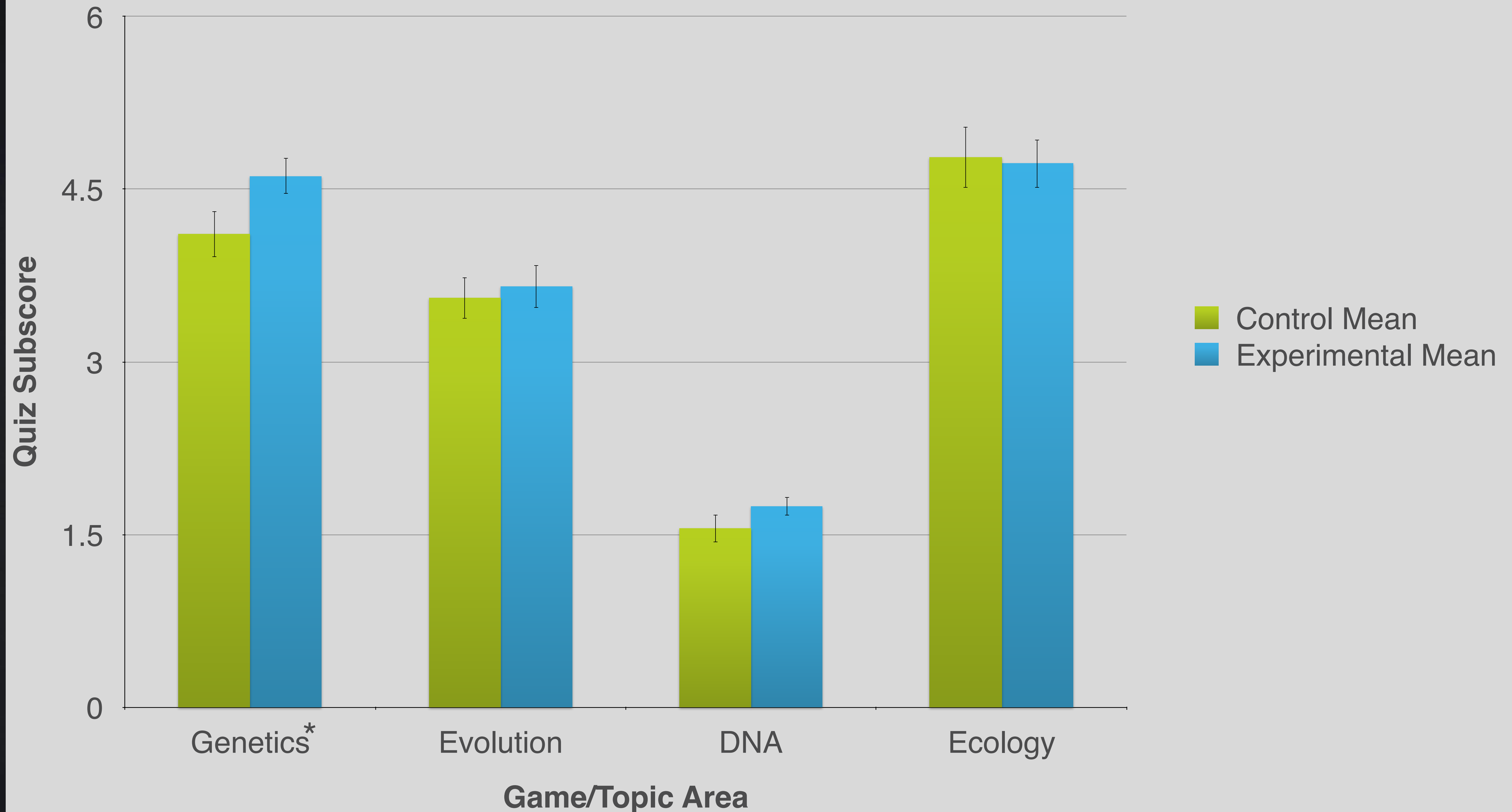
# Game Play by Gender





# Game Impact on Test Scores

Control vs Experimental Quiz Scores by Game





# Leveling Up?

- How is score on each section impacted by...
  - Time spent playing
  - Levels completed

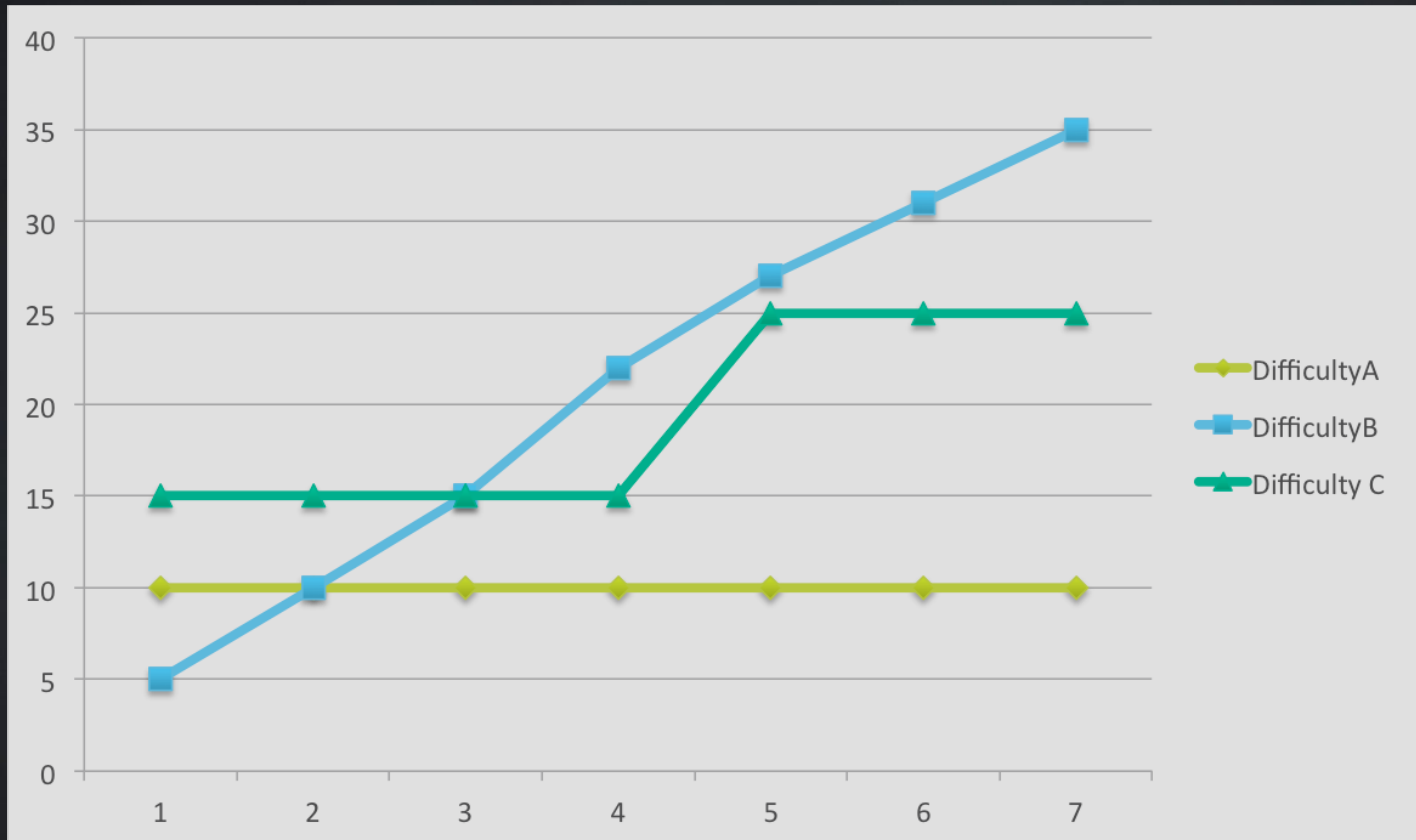
	Genetics	DNA	Evolution	Ecology
Time (10K)	-.039	.0647	-.223	x
Level	.245	x	.0138	x

???



# Do Games Work?

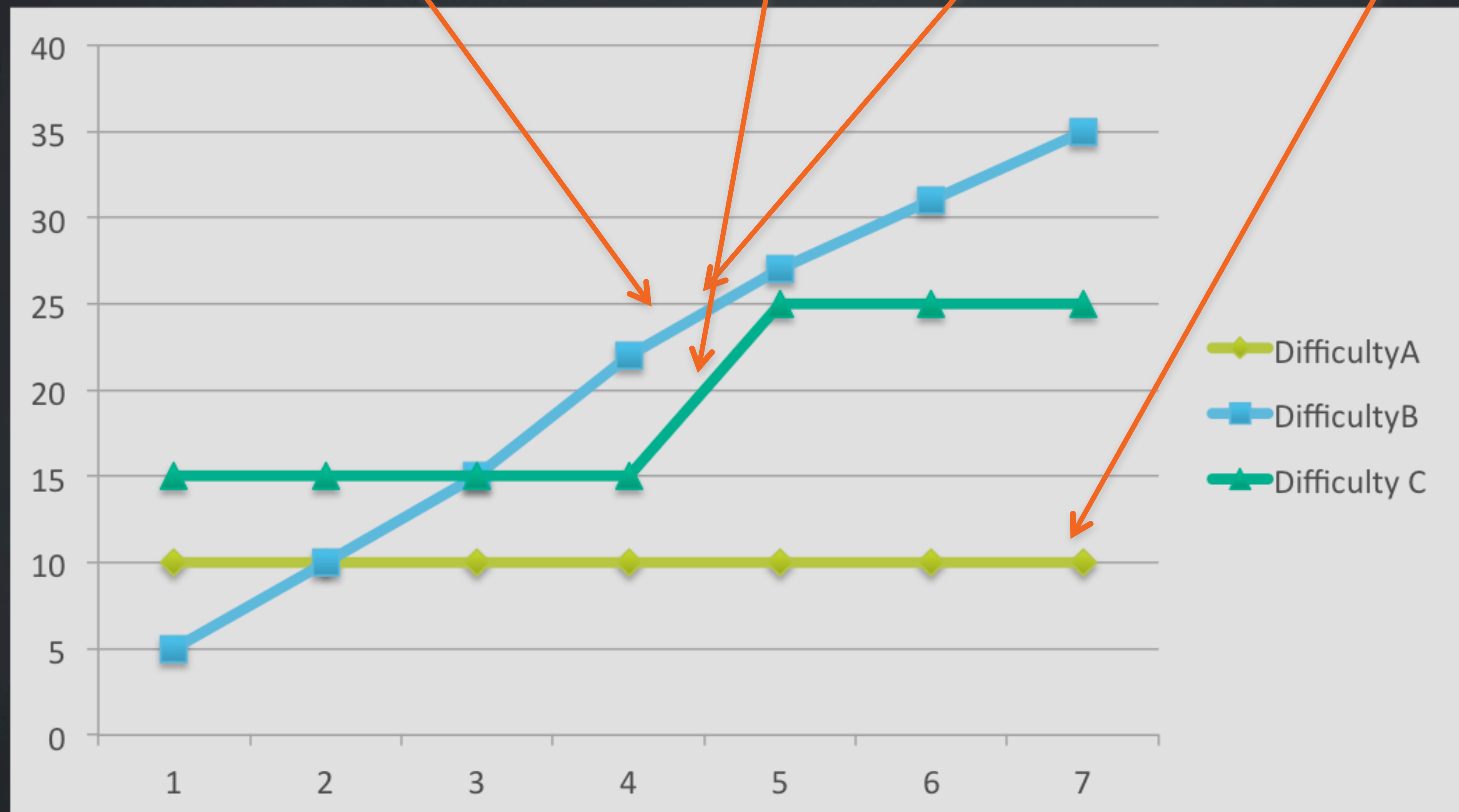
Not all games are the same





# What Makes Games Work?

	Genetics	DNA	Evolution	Ecology
Time (10K)	-.039	.0647	-.223	x
Level	.245	x	.0138	x





???

≡ SECTIONS

🏠 HOME

🔍 SEARCH

The New York Times



PARENTING

## Traditional Toys May Beat Gadgets in Language Development

By PAM BELLUCK   DECEMBER 23, 2015 9:43 PM   💬 133 Comments

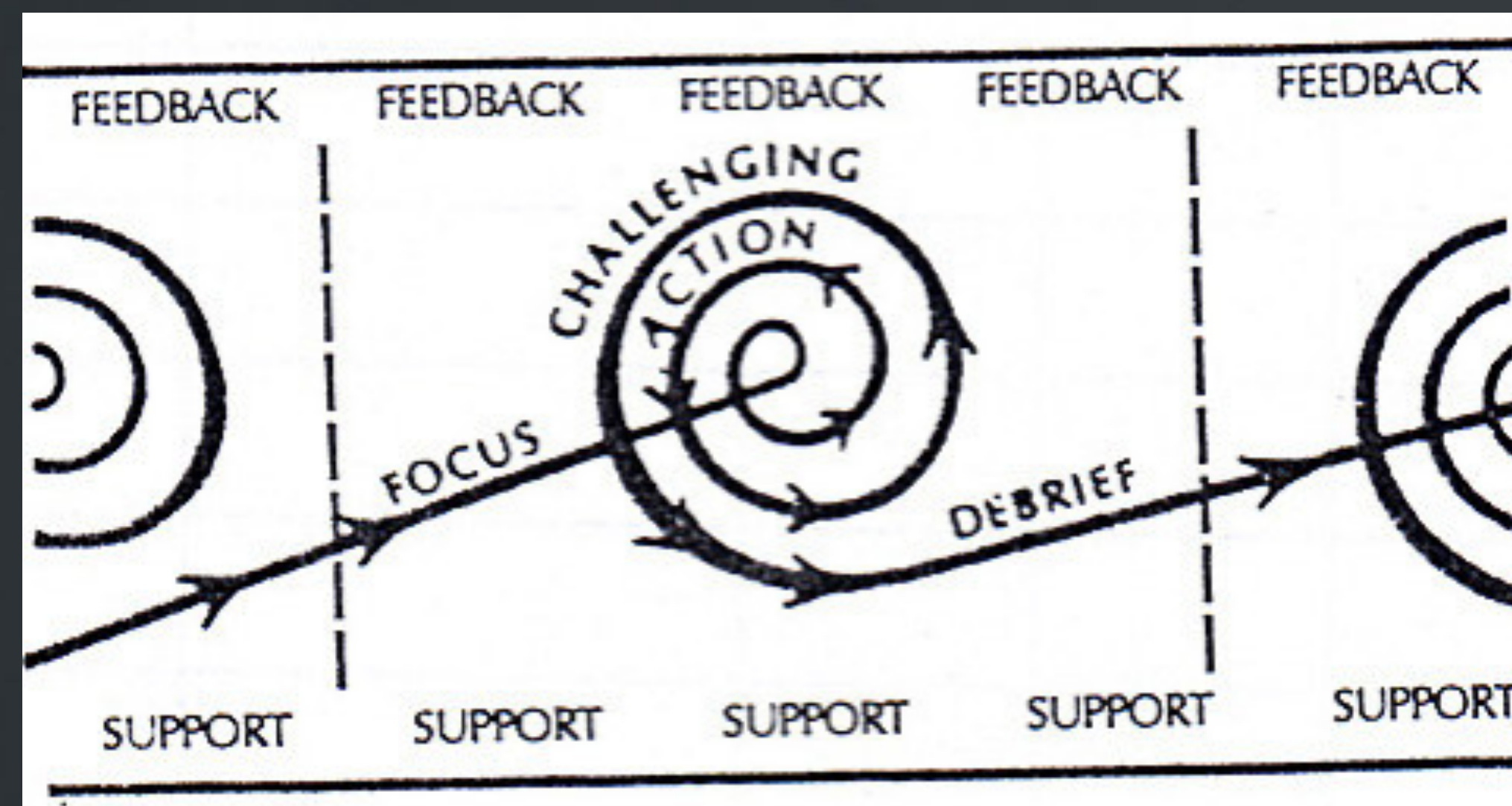




# Learning

## Action Reflection Cycle

**Experience**



**Resources**

**Reflection**





BILL & MELINDA  
GATES foundation



the education arcade





# MMOs and Learning


## Steinkuehler and Duncan 2008






# MMOs and Learning

## Steinkuehler and Duncan 2008


By **Binary** (2,587 – 1,13,26) on 2006/12/08 (Patch 2.0.1) 

Given by Sten Stoutarm at (29,71).

The highest concentration of wolves can be found directly south from the quest start.



By **Murloc69** (332 – 4) on 2008/03/12 (Patch 2.3.3) 

Given at [29,71] by Sten Stoutarm. Simple quest, just go kill the wolves just around the quest giver. Drop rate is high, takes about 9 kills.

By **Smokinncheb** (1,376 – 4,7) on 2009/06/10 (Patch 3.1.3) 

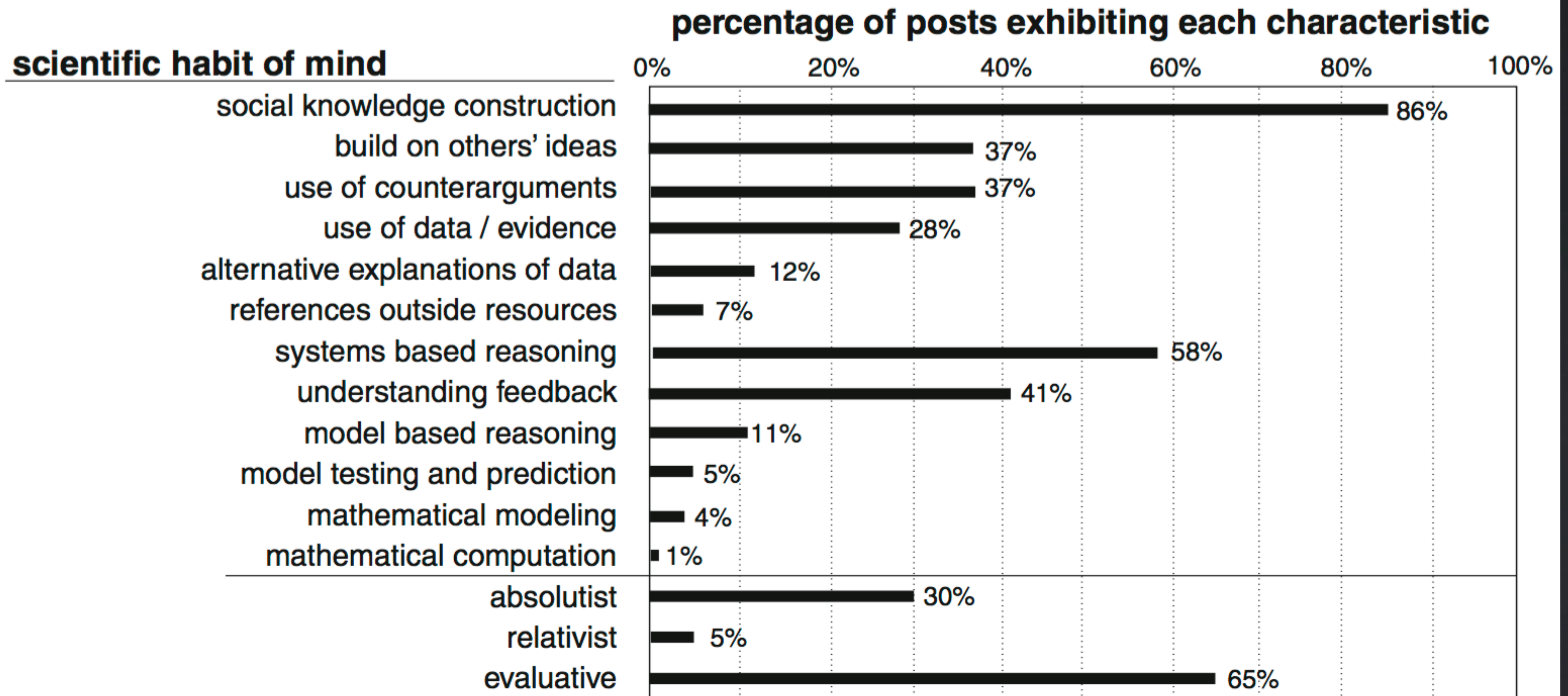
For those without co-ords, travel SSE of questgiver, staying south of road.

Slay Ragged Young Wolf mobs who drop the Tough Wolf Meat and who have a 66% droprate or Ragged Timber Wolf mobs who are more sparsely located SSW of the questgiver and have a 57% droprate.





# MMOs and Learning



•Steinkuehler and Duncan 2008



Pinetreeek

The

Endeavor



# Why an MMOG

## (Massively Multiplayer Online Game)

Self-directed  
Collaborative  
Role-playing  
Inquiry-based  
Contextual





# Quests and Tools





# Radix Demo





# Physical Models





# Biological Models

The screenshot displays a game interface with several key components:

- Inventory:** A grid-based inventory system with a search bar and sort options. It contains two small blue and purple creatures.
- Offspring Details:** A detailed view of a creature's offspring, showing its name, quantity, and various statistics.
- Area Chat:** A chat window at the bottom left showing messages from other players.
- Map:** A circular map at the bottom right showing the current location and a button to exit to the wilds.

**Offspring Details:**

**Toxicity**

	TT	Tt	tt
Ratio	1.0	1.6	0.0
Quantity	5	8	0
Percentage	38%	62%	0%

**Antenna Length**

	LL	LS	SS
Ratio	2.3	1.0	0.0
Quantity	9	4	0
Percentage	69%	31%	0%

**Area Chat:**

- You have entered Lednem Trail.
- You have entered Marrowglen.
- You have entered Lednem Crossing.
- You have entered Lednem Wilds.
- You have entered Lednem Crossing.

**Map:**

Exit to Lednem Wilds

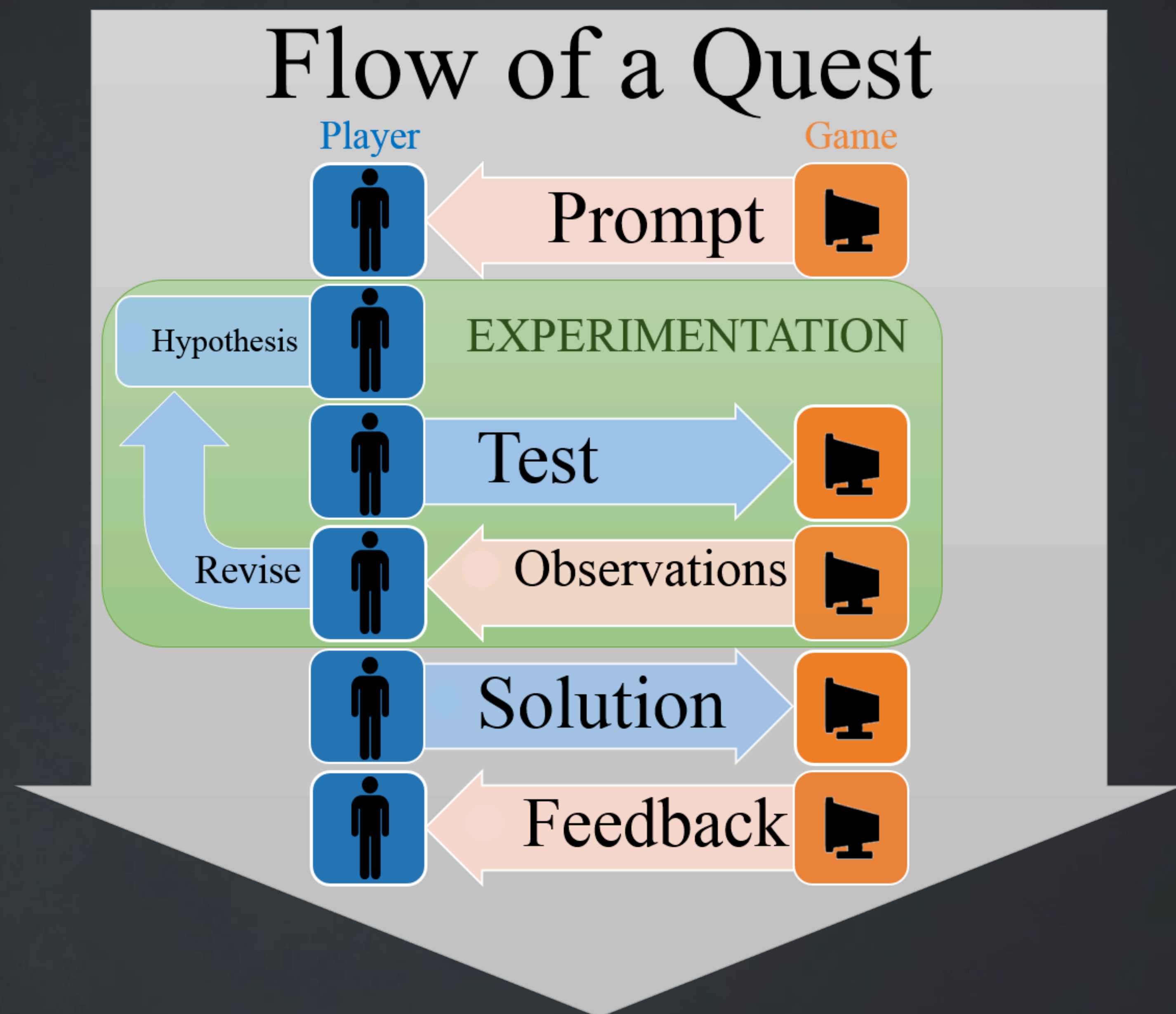


# Experiment Centered Design

Student model

Evidence model

Task model





# Community

## Parties - Data Sharing

The screenshot displays a game interface with several panels. At the top, there are icons for a magnifying glass, a notepad, a book, a calendar, and an envelope. Below these is a 'Data Library' panel with a 'Explore Menjies' button. It shows two entries for 'Menji' with attributes 'type: Menji', 'source: Forest', and 'claw length: Long'. A 'Copy to Field Notes' button is present. At the bottom of this panel is a 'Data Library Capacity' indicator showing 31/75 slots and a 'CLEAR' button. To the right is a 'Data Explorer' panel. It has 'Target Variable' (Claw Length) and 'Filter 1' (Source: Forest). The 'Operation' is set to 'Distribution'. 'Filter 2' is set to 'None'. A table shows the distribution of 'Claw Length' for 'Forest' source, with all values being 'Long'. A 'Sample Size' of 7 is indicated. A summary text states: 'The distribution of Claw Length for menjies is 100% Long, looking only at menjies with source: Forest.' A 'Create Data Summary' button is at the bottom. On the far right is a vertical toolbar with icons for a belt, a ruler, a tag, a tool, a cloud, a creature, a key, and a calendar. At the bottom left is an 'Area Chat' panel showing commands like 'teleport forest1' and 'advanceQuest EV1.1 1'. At the bottom right is a 'World Map' panel showing the 'Lednem Wilds' area with a 'Cane House' marker.

**Data Library**

Explore Menjies

type: Menji

source: Forest

claw length: Long

Copy to Field Notes

31/75 Data Library Capacity

This will remove all of your collected data. CLEAR

**Data Explorer**

Target Variable: Claw Length

Filter 1: Source Forest

Operation: Distribution

Filter 2: None

Source	Claw Length		
Forest	Long		
Forest	Long		
Forest	Long		
Forest	Long		
Forest	Long		

Sample Size: 7

The distribution of Claw Length for menjies is 100% Long, looking only at menjies with source: Forest.

Create Data Summary

**Area Chat**

Executing command: teleport forest1

Result: true

You have entered Lednem Wilds.

Executing command: advanceQuest EV1.1 1

Result: undefined

**World Map**

Lednem Wilds

Cane House



# Providing Formative Assessment and Data

Class Progress

Manage Classes

Create Class

Reserve Class Ses

Teacher Resource

Forums

My Account

Logout

Sp 2015 Individual Interviews

Failure Report for T Four

EV1.1

EV1.2

EV1.2 (2)

EV1.3

EV1.4

Student Response

▶ Menji

Taking the Trash Out Attempt 1

Students collect information about traits for a certain environment.

Learning Objectives:

Recognize species variation

Create data summary

Failure:

Student did not turn in the correct data summary or they turned in the wrong animal. There are 3 possible reasons why their data summary

Failure report

1.4

!

!

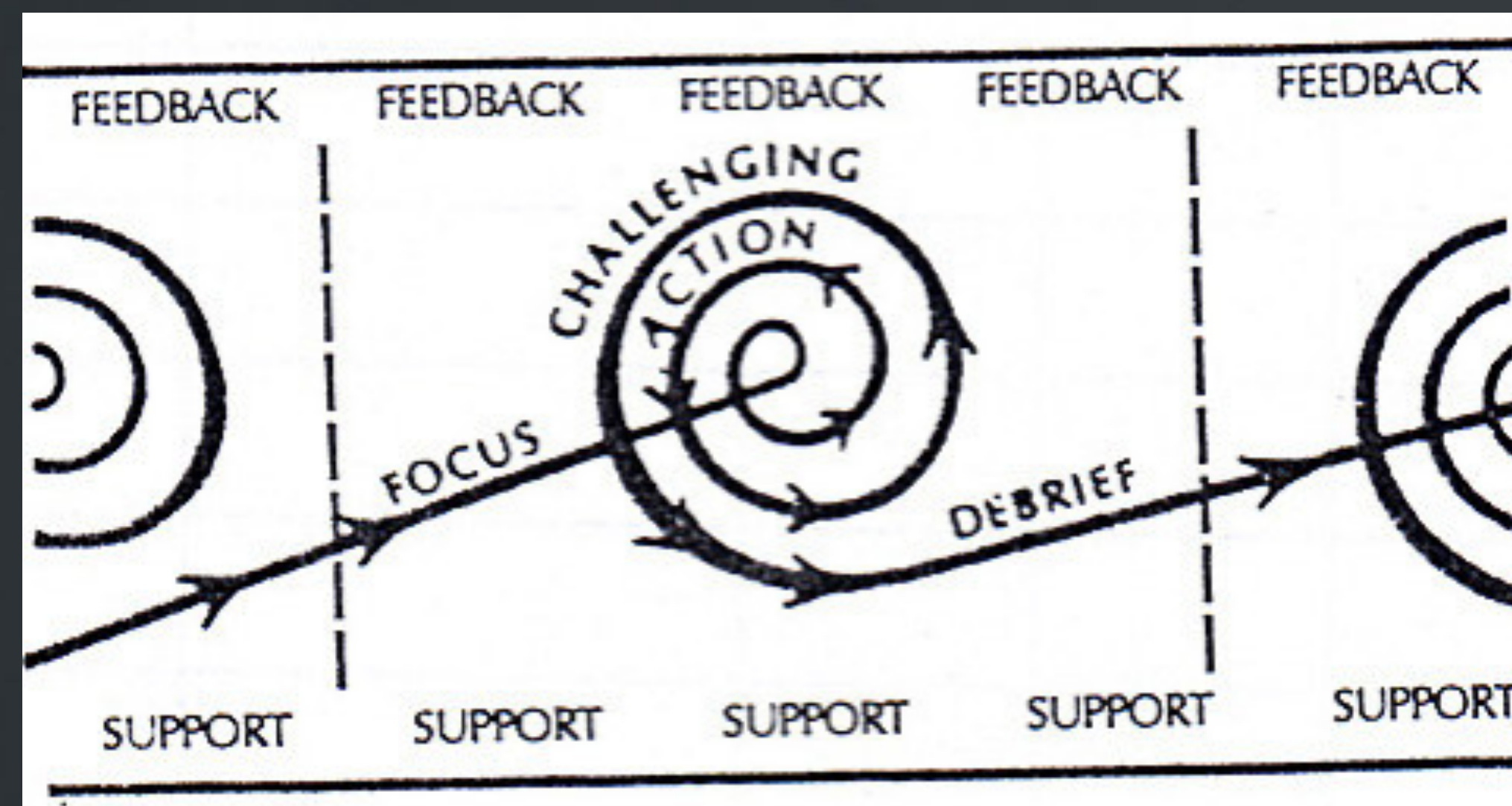
T Five				
T Six	!			
T Seven	!			!



# Learning

## Action Reflection Cycle

**Experience**



**Resources**

**Reflection**



# Radix Usage

Total Registrations

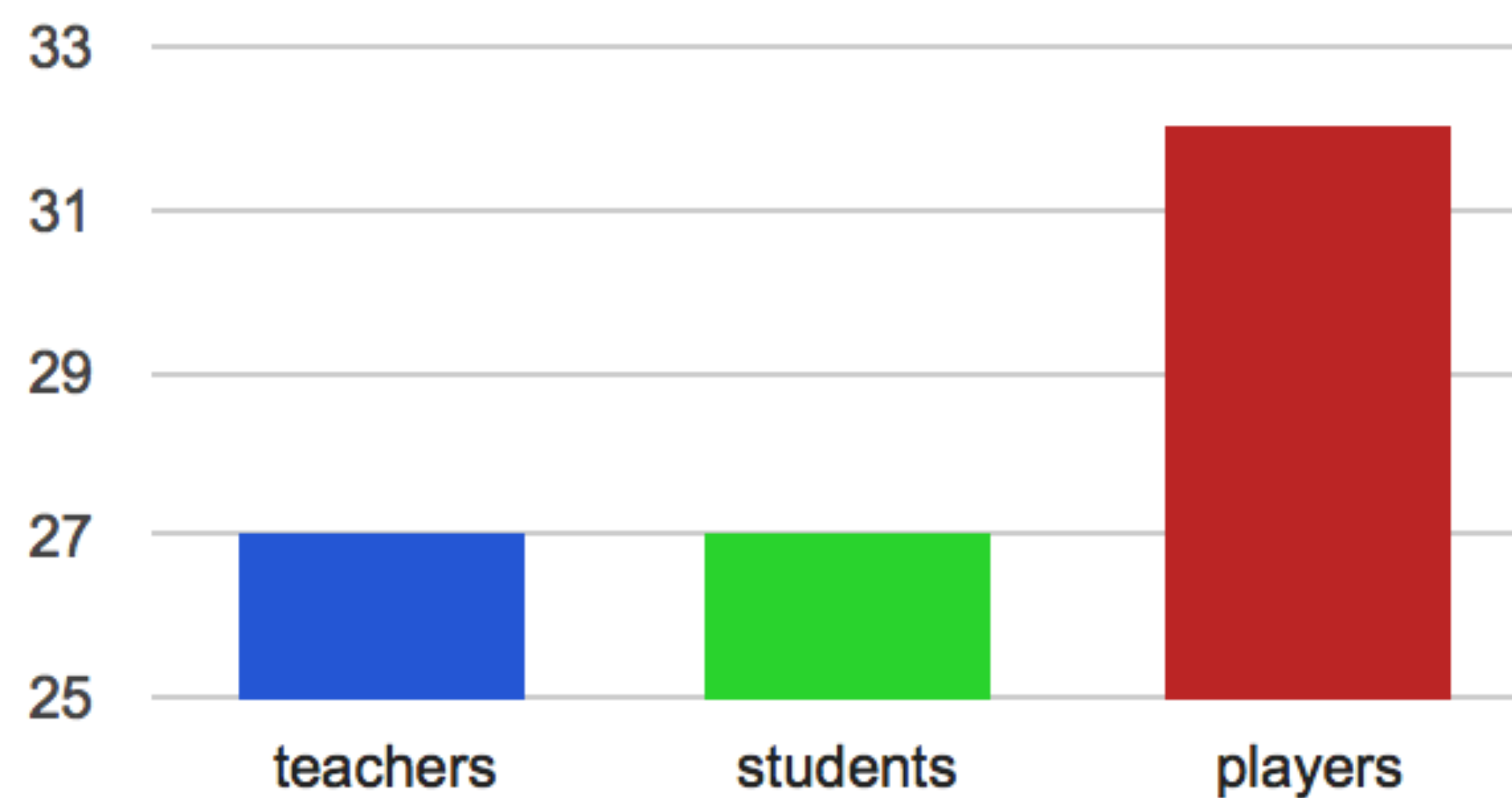
19178

Teachers  
**2323**

Students  
**13162**

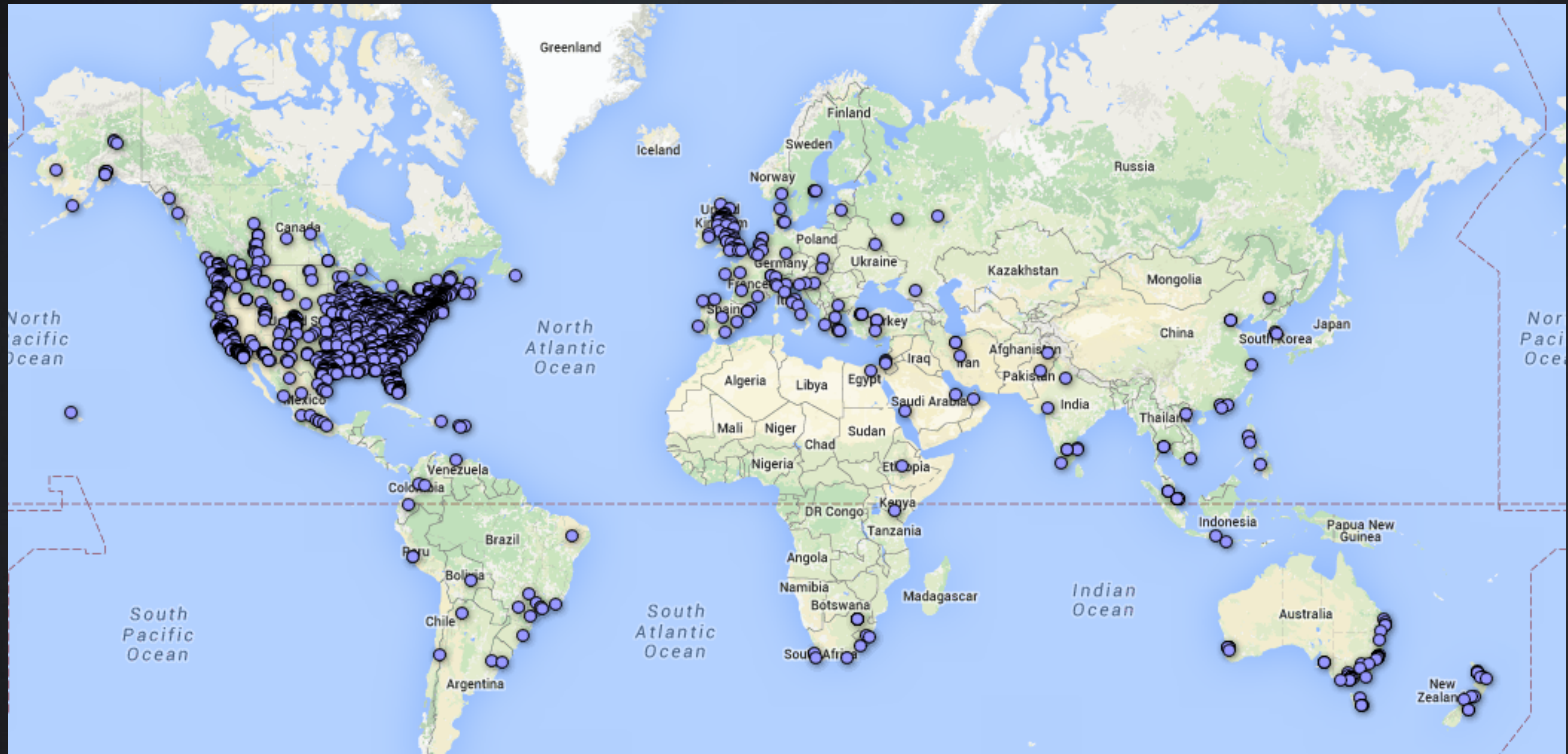
Players  
**3693**

Average Playtime





# Radix Usage



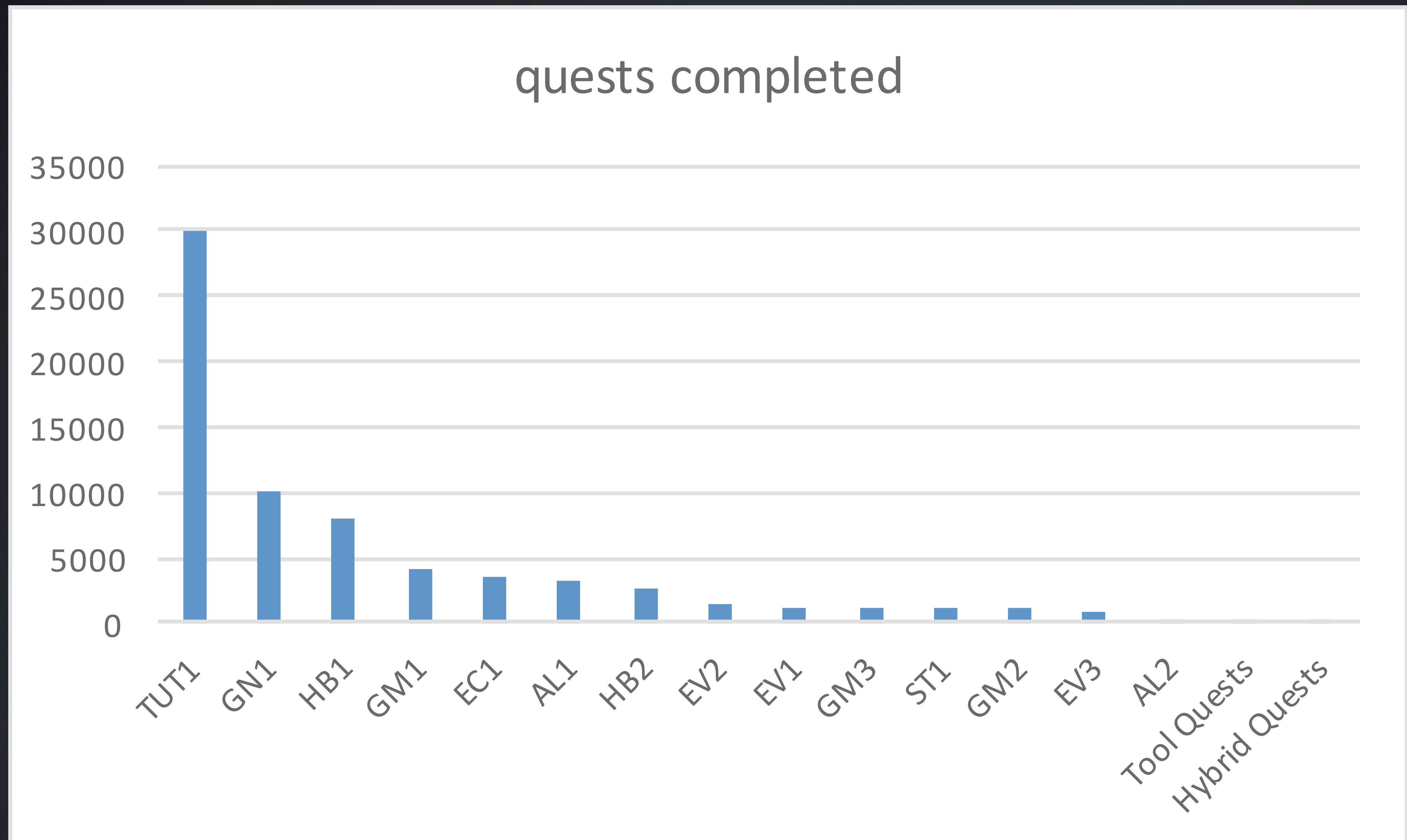


# Teacher Usage

	For all teachers that did this (n=~300 but varies)	For subset of teachers that also took the survey (n=32)
# of classes created (mean)	1.9	3.2
# questlines assigned (mean)	2.86	3.5
# students who completed a quest (mean)	20.75 (median=8)	49.7 (median=39)
time span of quest activity (in days, mean)	62 (median=16)	153.6
average session length (in minutes, mean)	28.3	28.1
total play time (in hours, mean)	4079	16683
total quests completed (mean)	218.9	770
quests per student (mean)	9.3	13.6



# Popular Quests



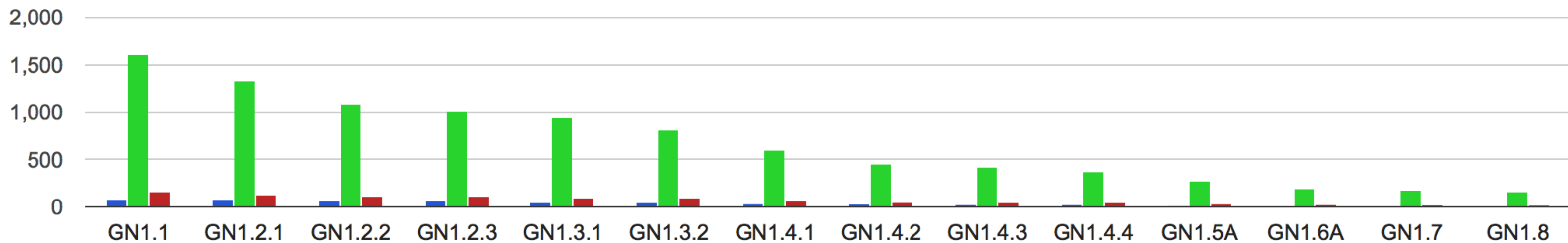


# Radix Quest Completion

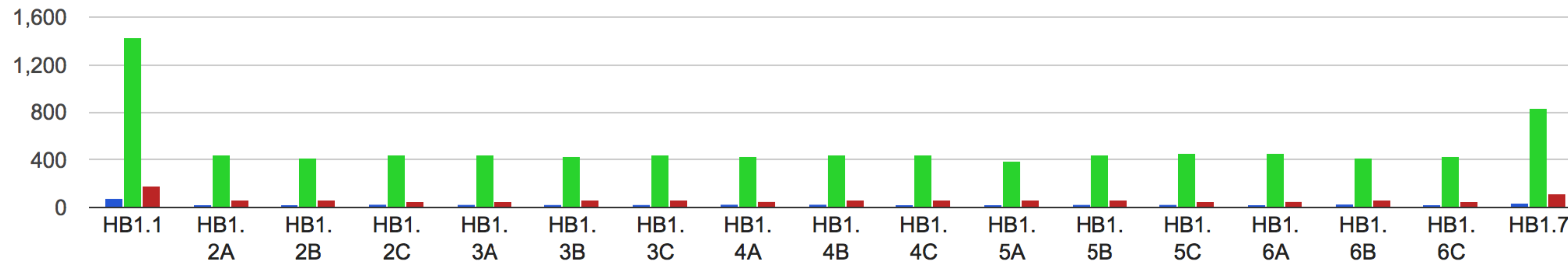
## Biology

### Quest Completion Totals

GN1 Genetics 1: Mendelian Genetics



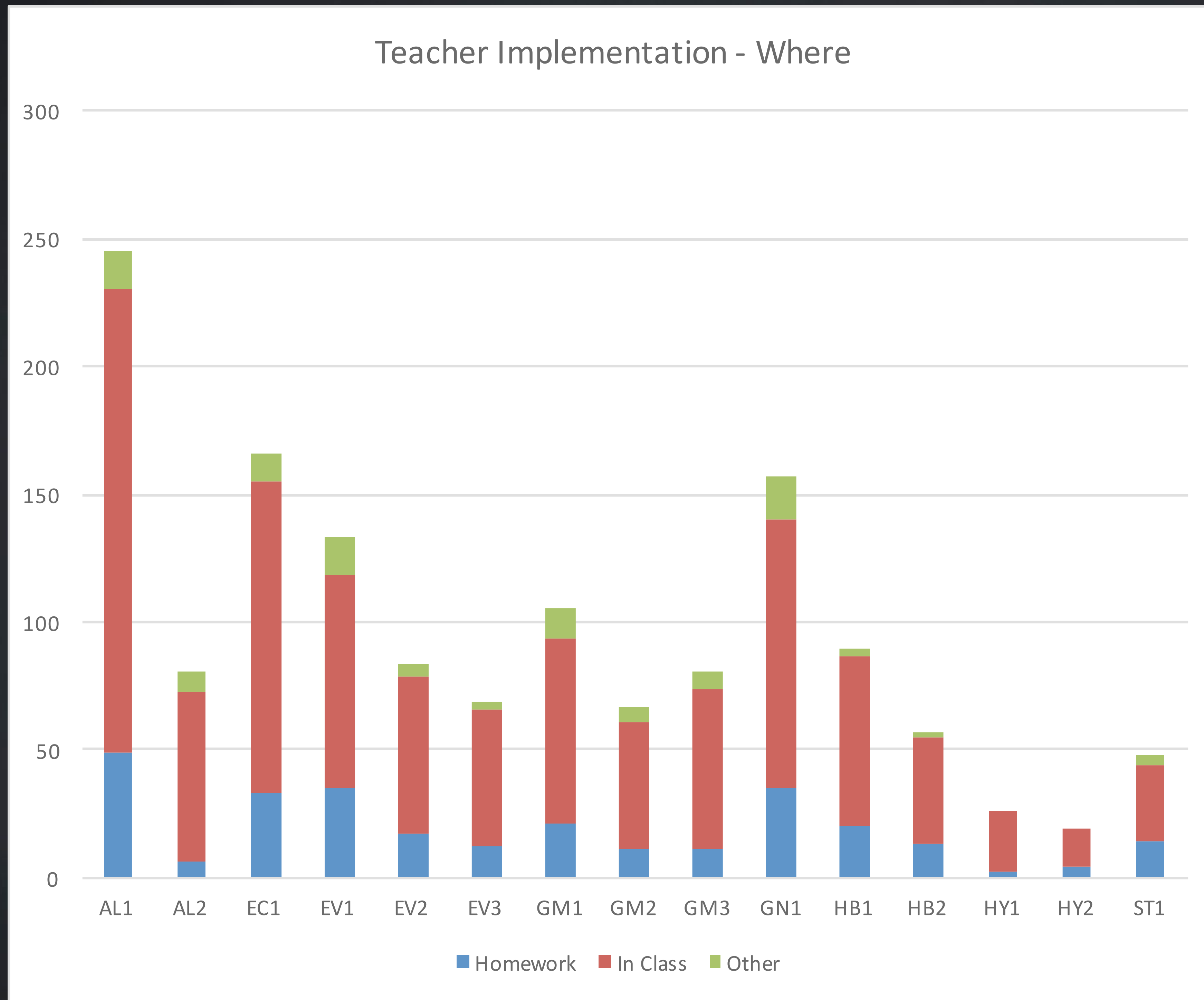
HB1 Human Body Systems 1: Identifying Symptoms and Systems





# Teacher Implementation

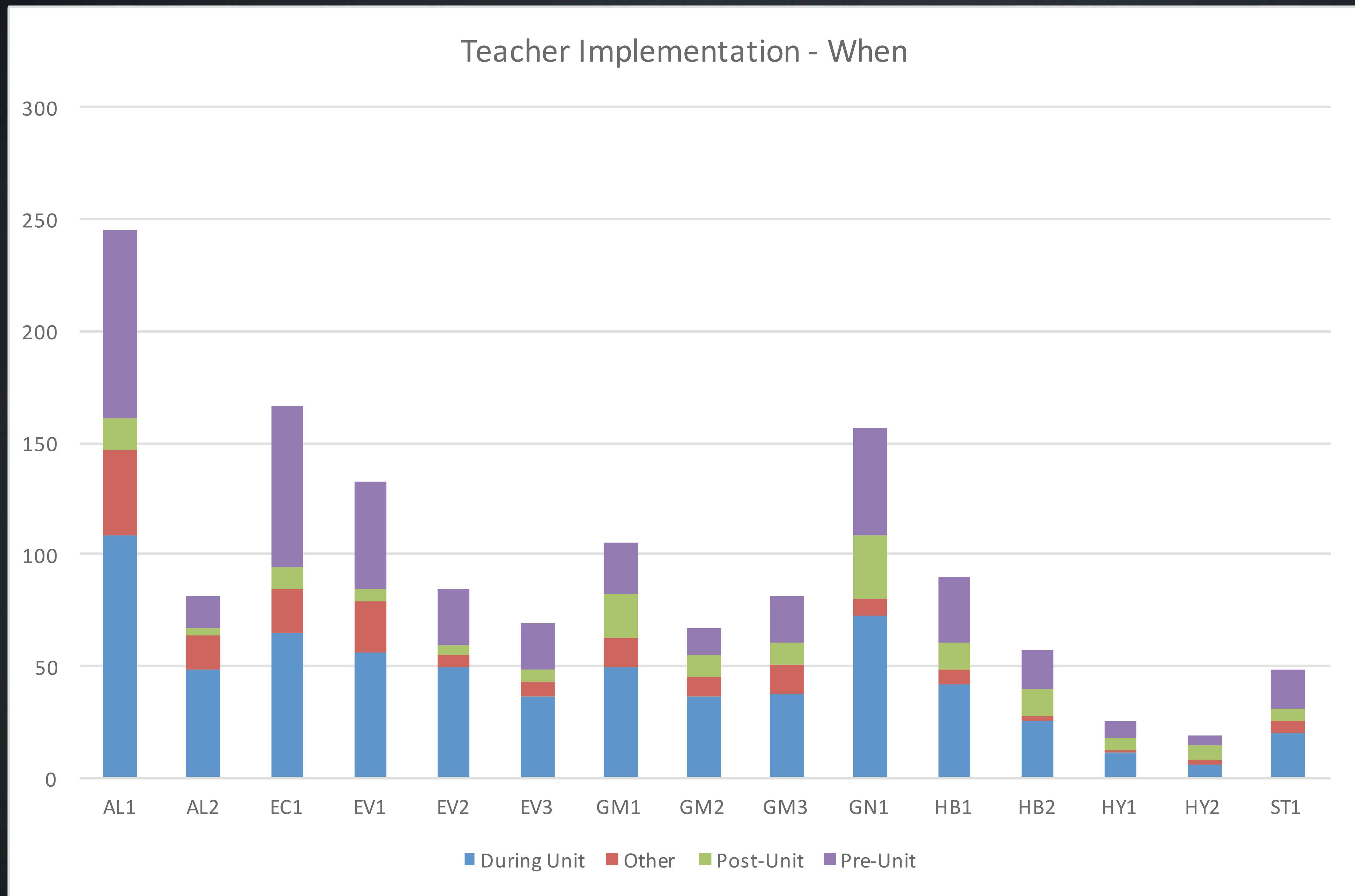
## Where





# Teacher Implementation

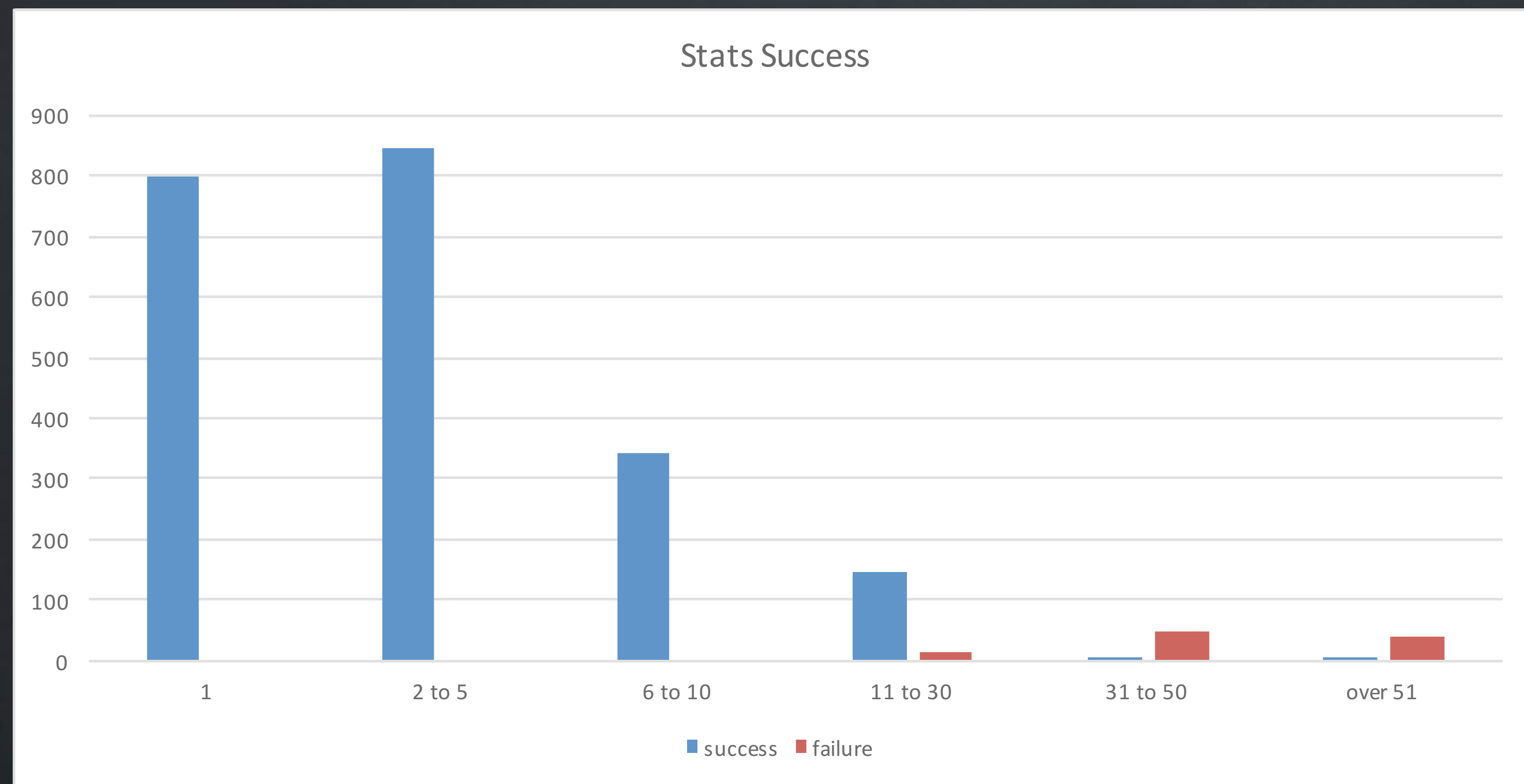
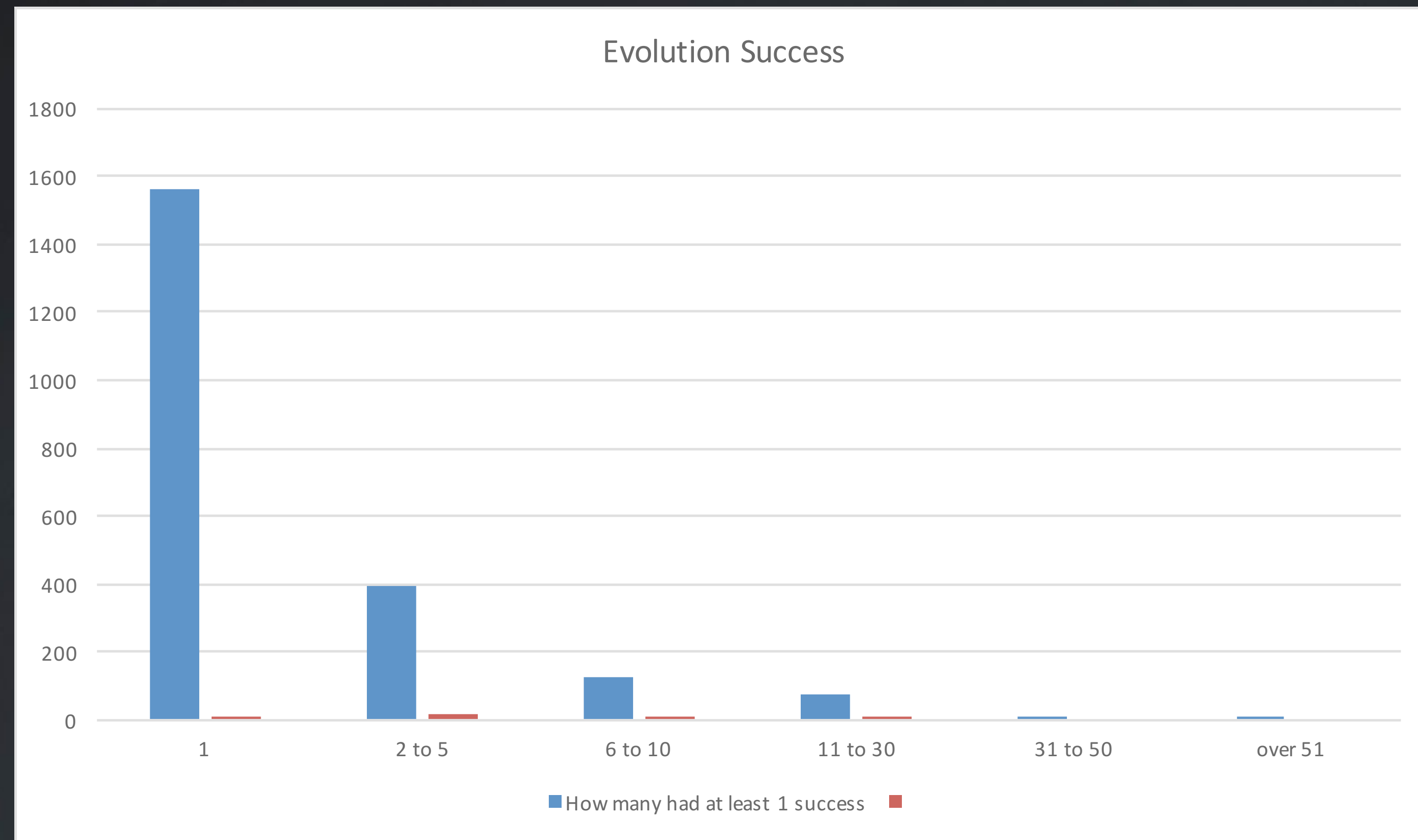
## When





# Success and Failure

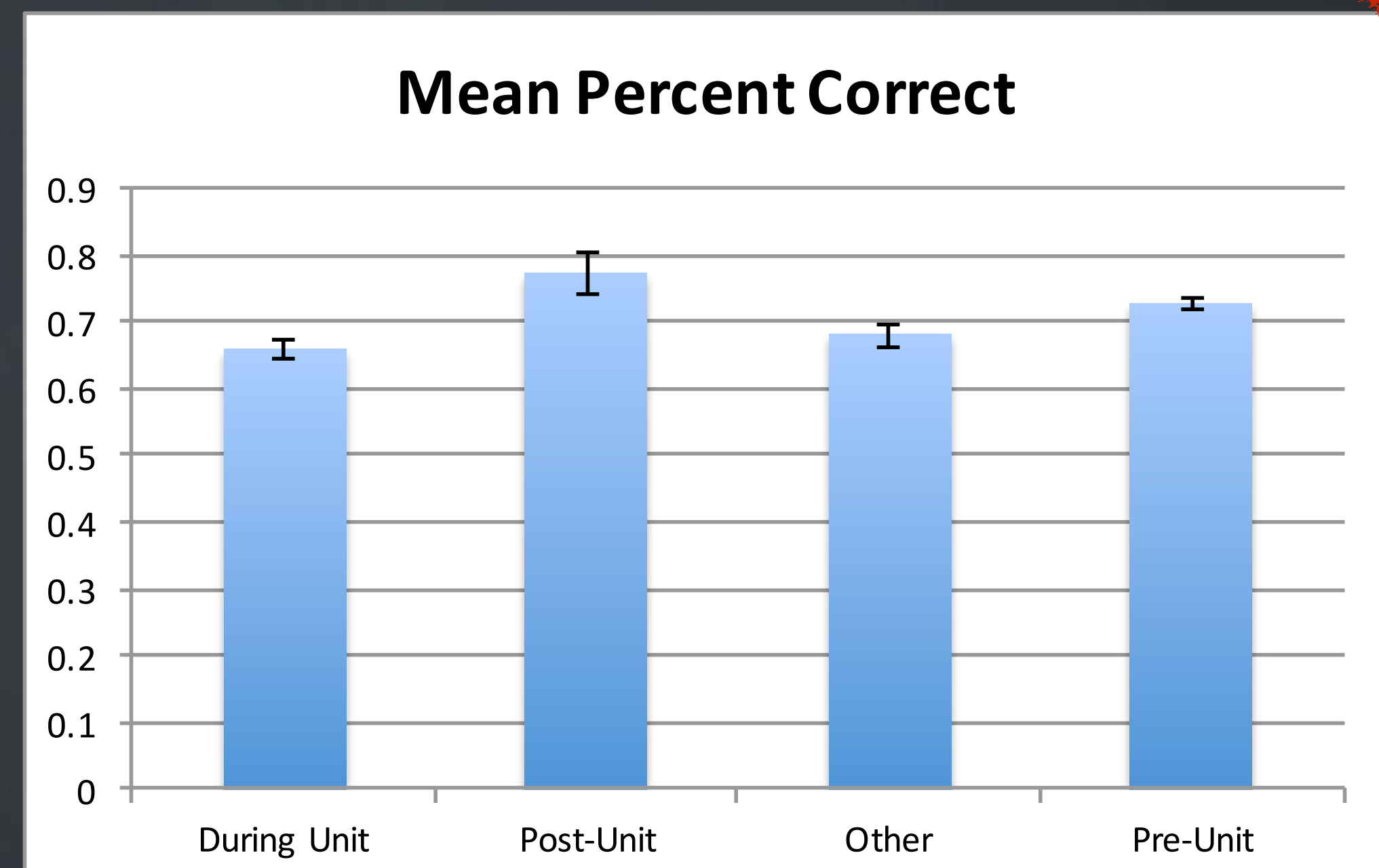
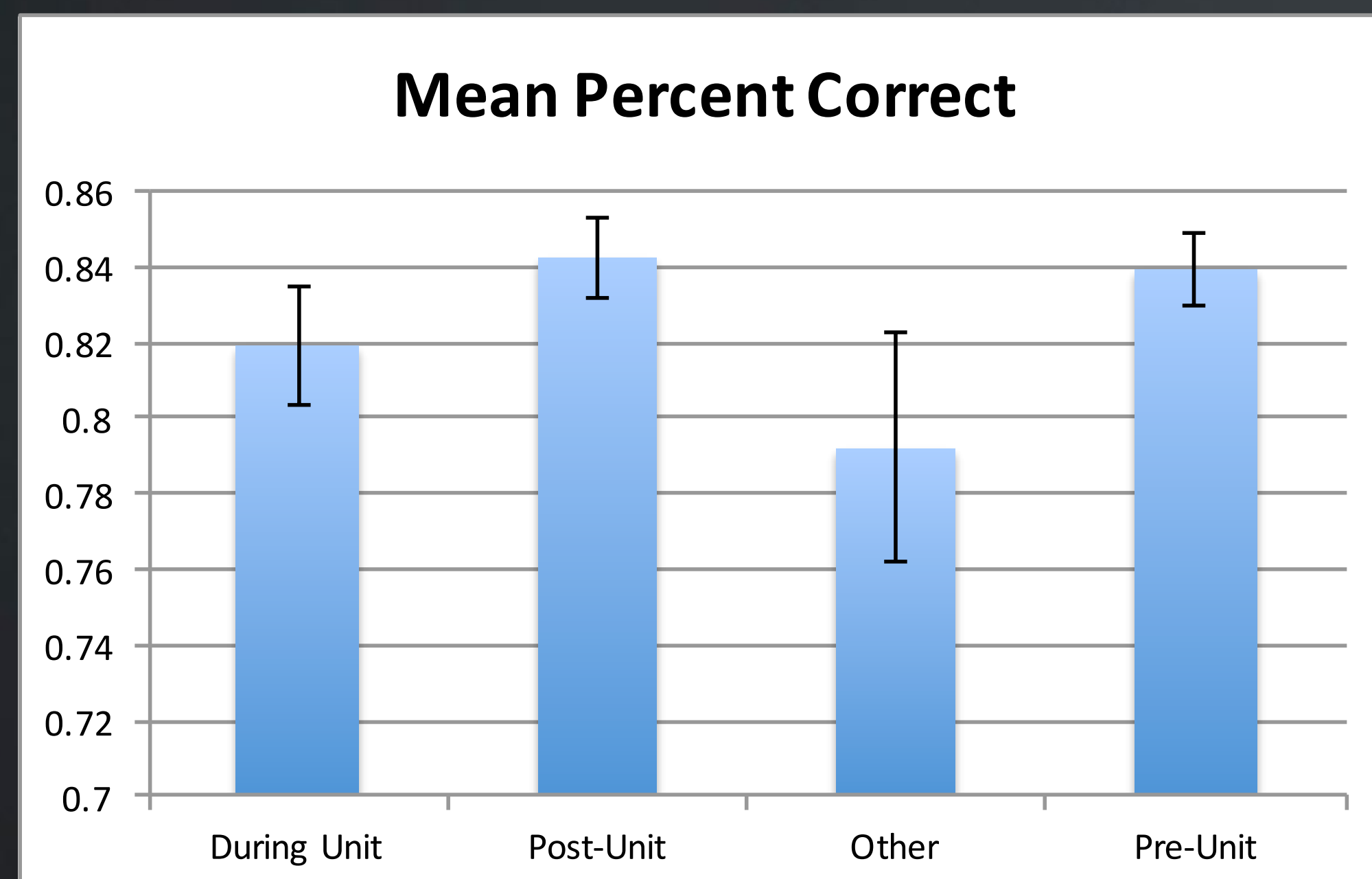
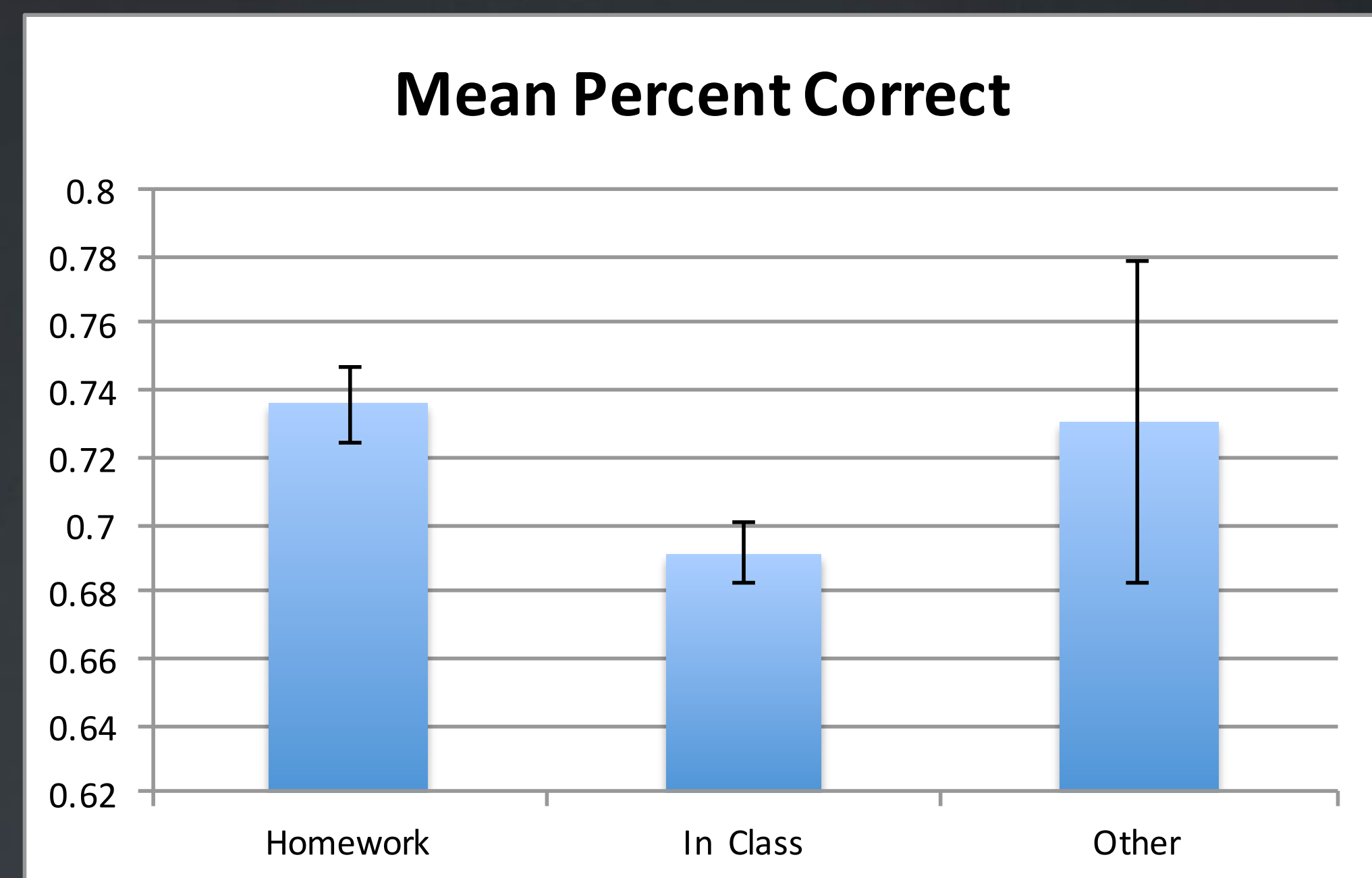
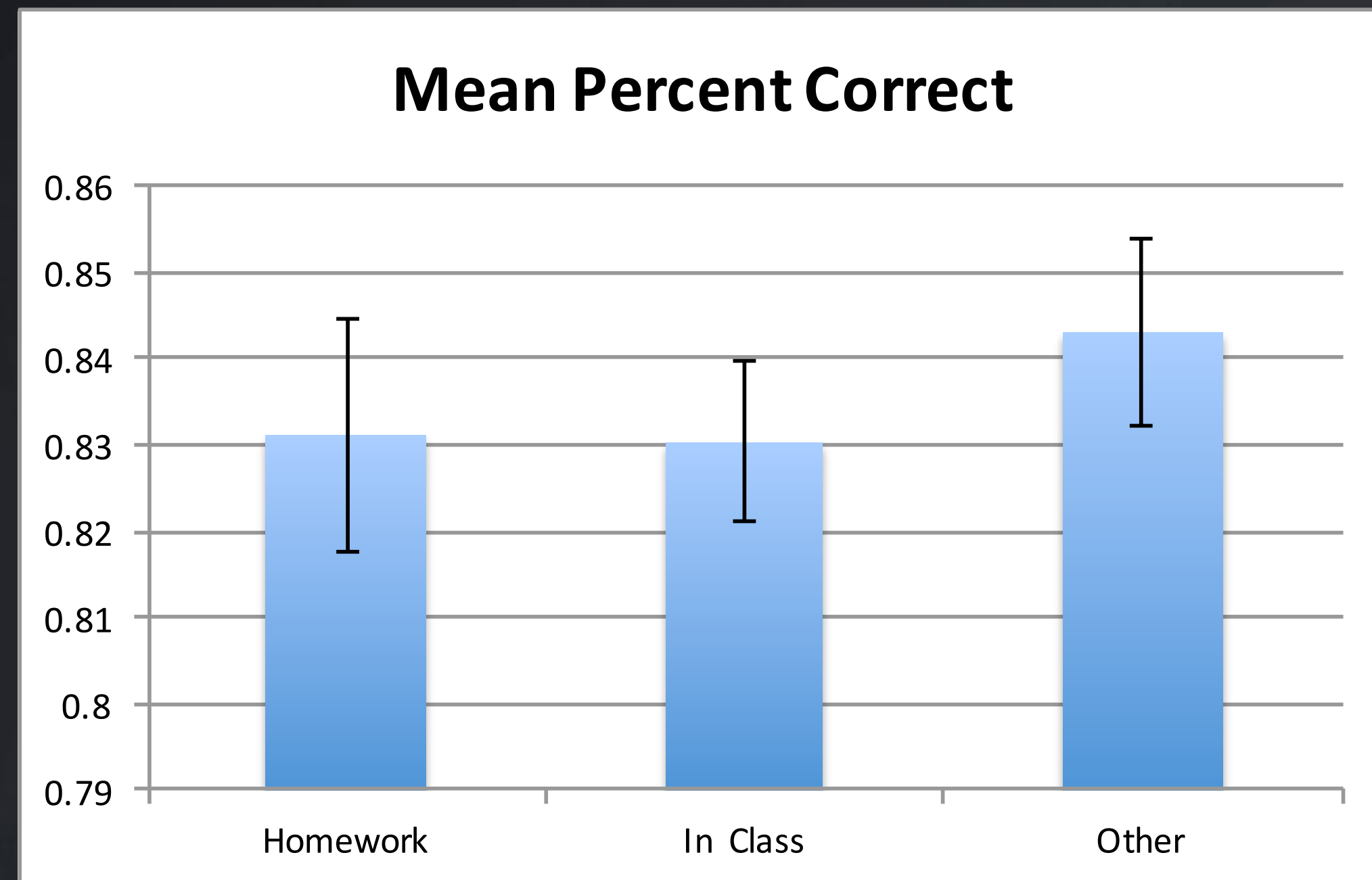
## Evolution vs Stats





# Where and When Are Successes

## Evolution and Statistics





# Pre-Post Results

## Biology

### Human Body Systems

T-test showed significant difference from pre to post  $t=3.803$ ,  $p=.000$ . Effect size=.49

### Genetics

T-test showed significant difference from pre to post  $t=6.878$ ,  $p=.000$ . Effect size=0.67

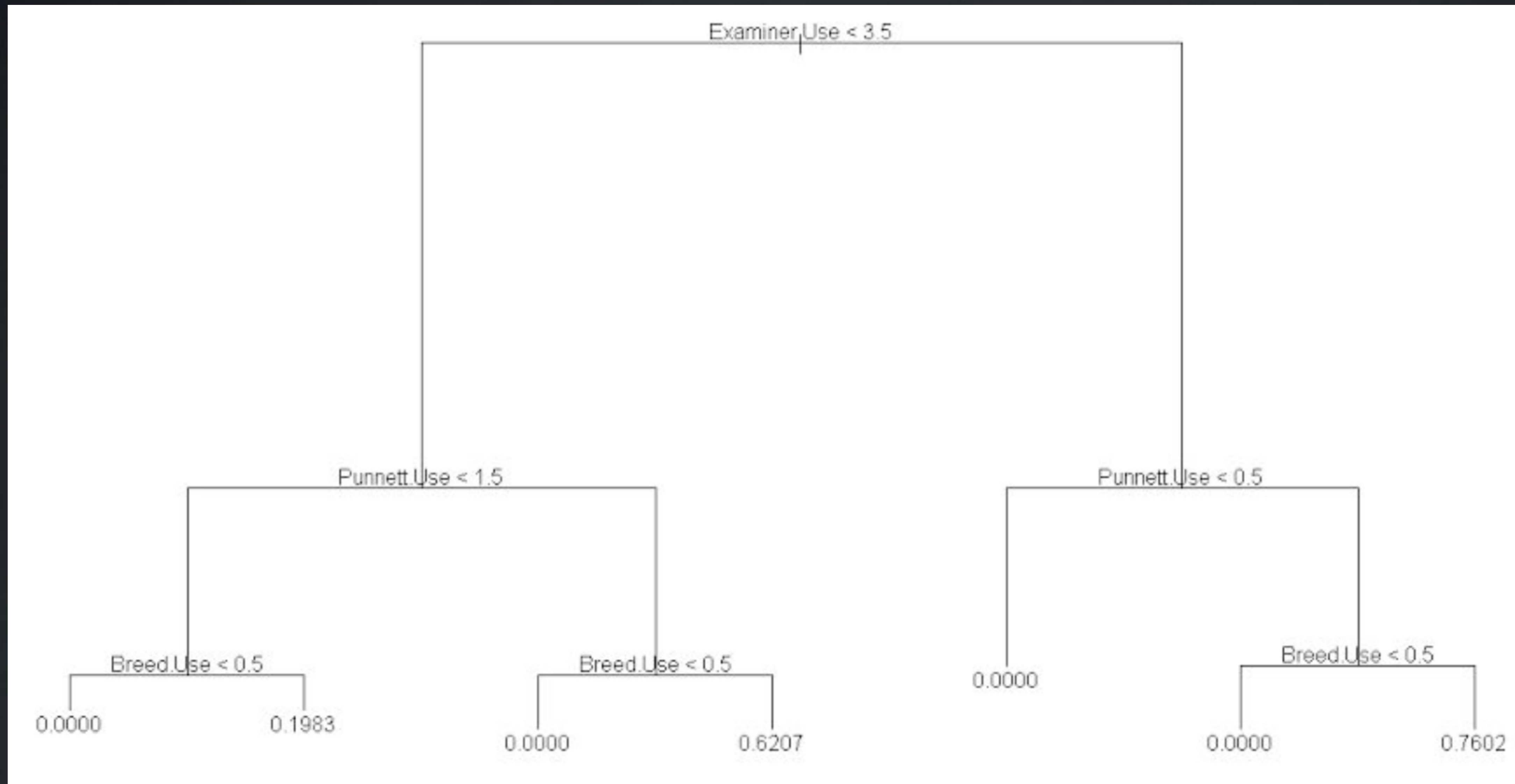
### Ecology

T-test showed significant difference from pre to post  $t=2.585$ ,  $p=.011$ . Effect size=.297



# Multiple Pathways to Success

c/o Montzy Cheng





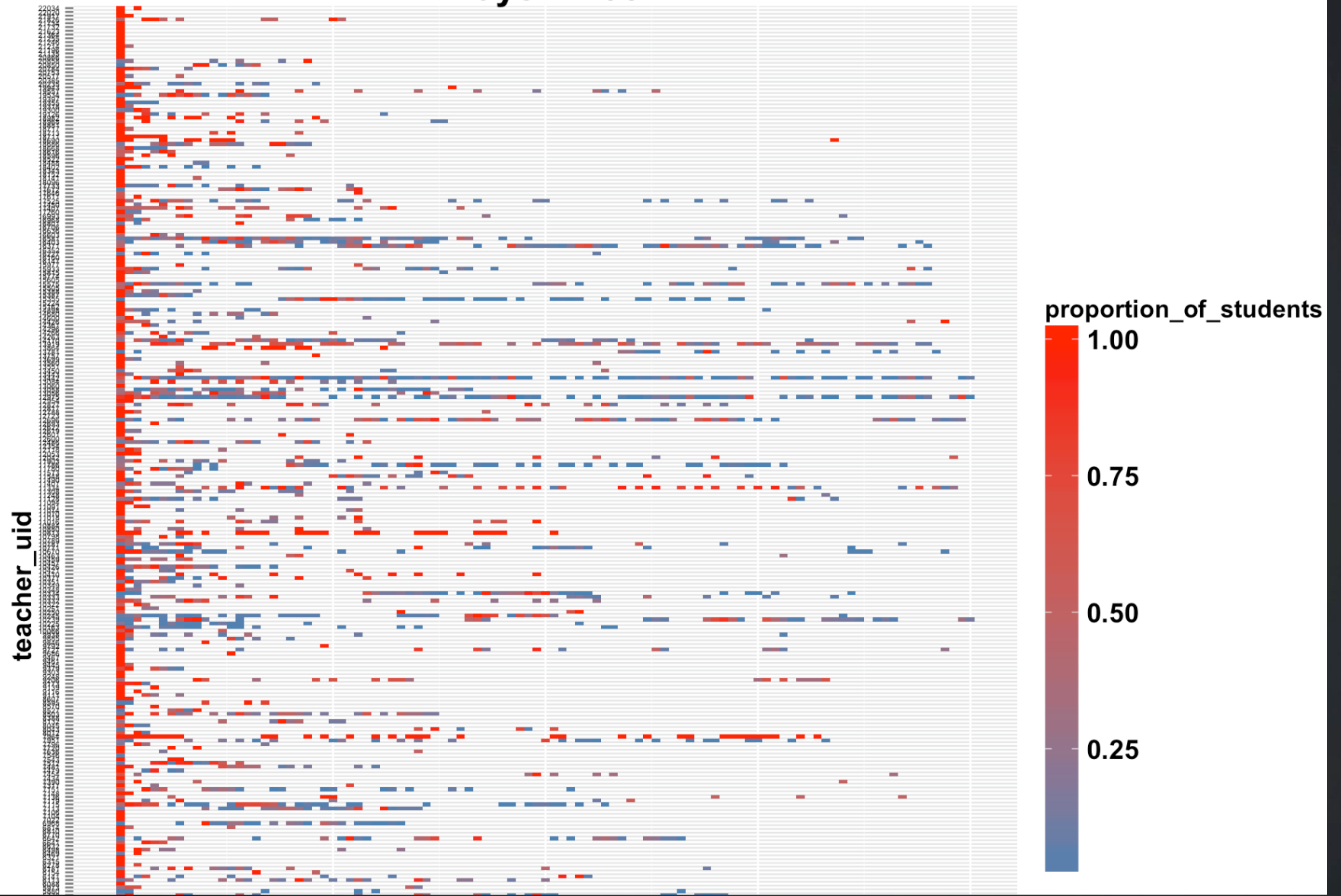
# Analyzing Failure

		Second Attempt					
		success	F0	F1	F2	FT	
1st Attempt Fail Code	NA	7	0	0	0	0	
	F0	46	11	4	14	56	
	F1	36	1	12	8	0	
	F2	69	4	8	22	8	
	FT	27	0	3	3	10	
- Percentage							
		Second Attempt					
		success	F0	F1	F2	FT	
1st Attempt Fail Code	NA	100	0	0	0	0	
	F0	35.1	8.4	3.1	10.7	42.7	
	F1	63.2	1.8	21.1	14	0	
	F2	62.2	3.6	7.2	19.8	7.2	
	FT	62.8	0	7	7	23.3	



# Effective Use Cases?

Proportion of Students using Radix  
by Teacher and Day  
Days 1-100





# Radix Endeavor

[radixendeavor.org](http://radixendeavor.org)



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## TEACH AND EXPAND

Integrate this STEM MMOG as supplemental curriculum into math and science classrooms and lessons.

A MASSIVELY MULTIPLAYER ONLINE GAME (MMOG) WITH SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) TOPICS FOR  
MIDDLE AND HIGH SCHOOL CURRICULUM.