Educational Games and Data Hands On

ERIC KLOPFER

PROFESSOR/DIRECTOR

MIT SCHELLER TEACHER EDUCATION PROGRAM

THE EDUCATION ARCADE

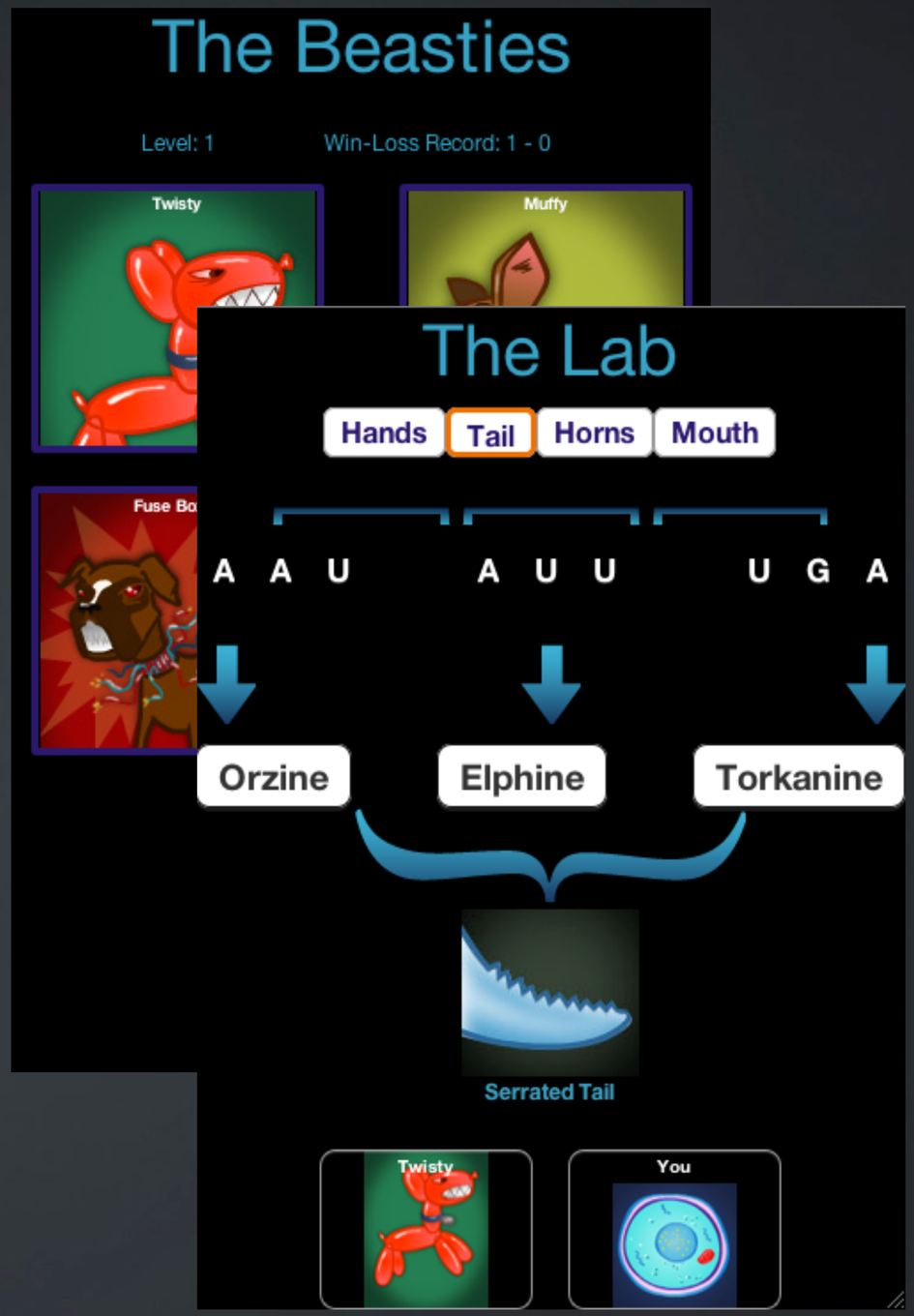
The Radix Endeavor

SCHELLER TEACHER EDUCATION PROGRAM

the education arcade

UbiqGames

- 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

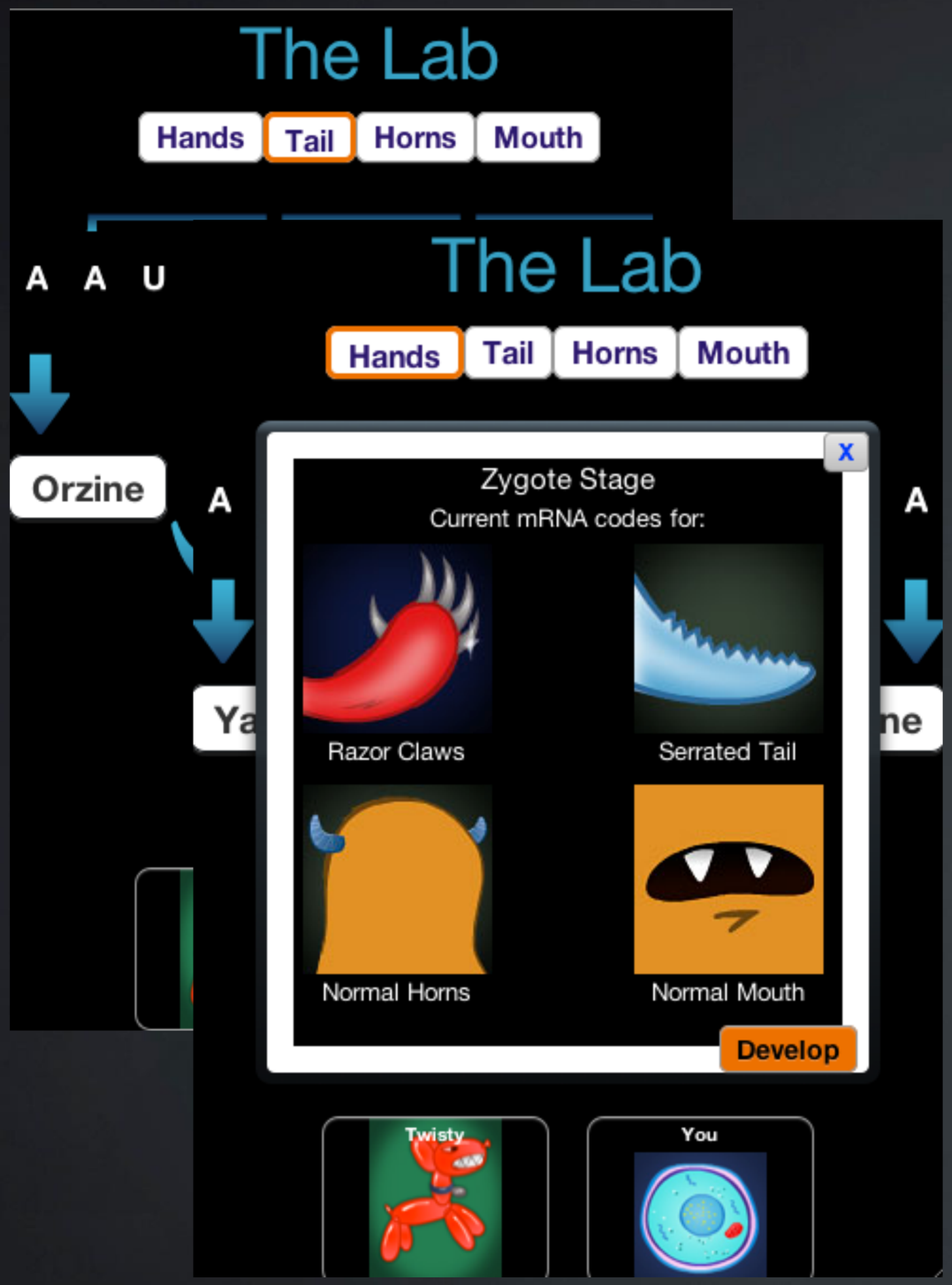


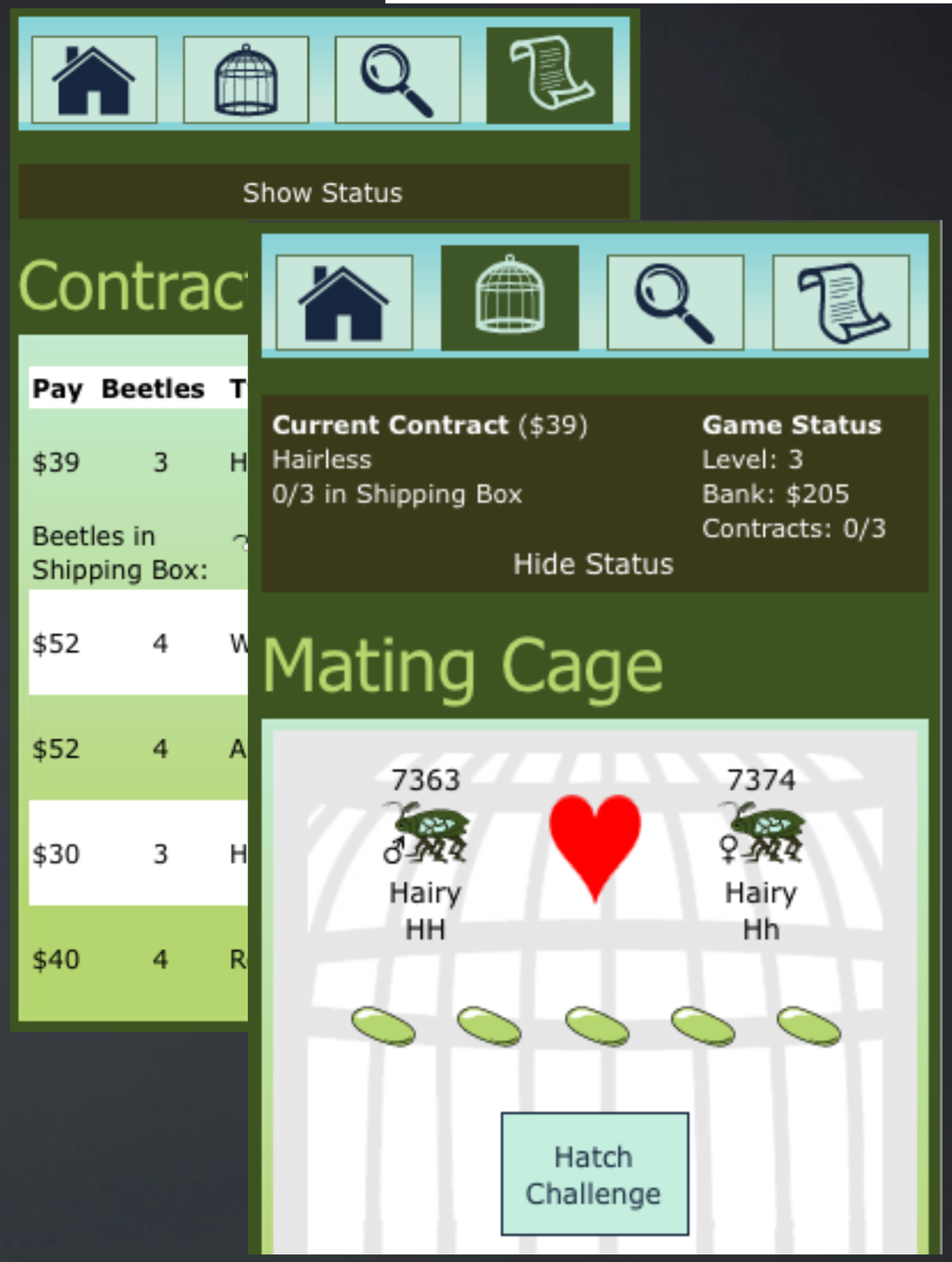
Mobile Social Games

UbiqBio

UbiqBio

mobile games for biology learning

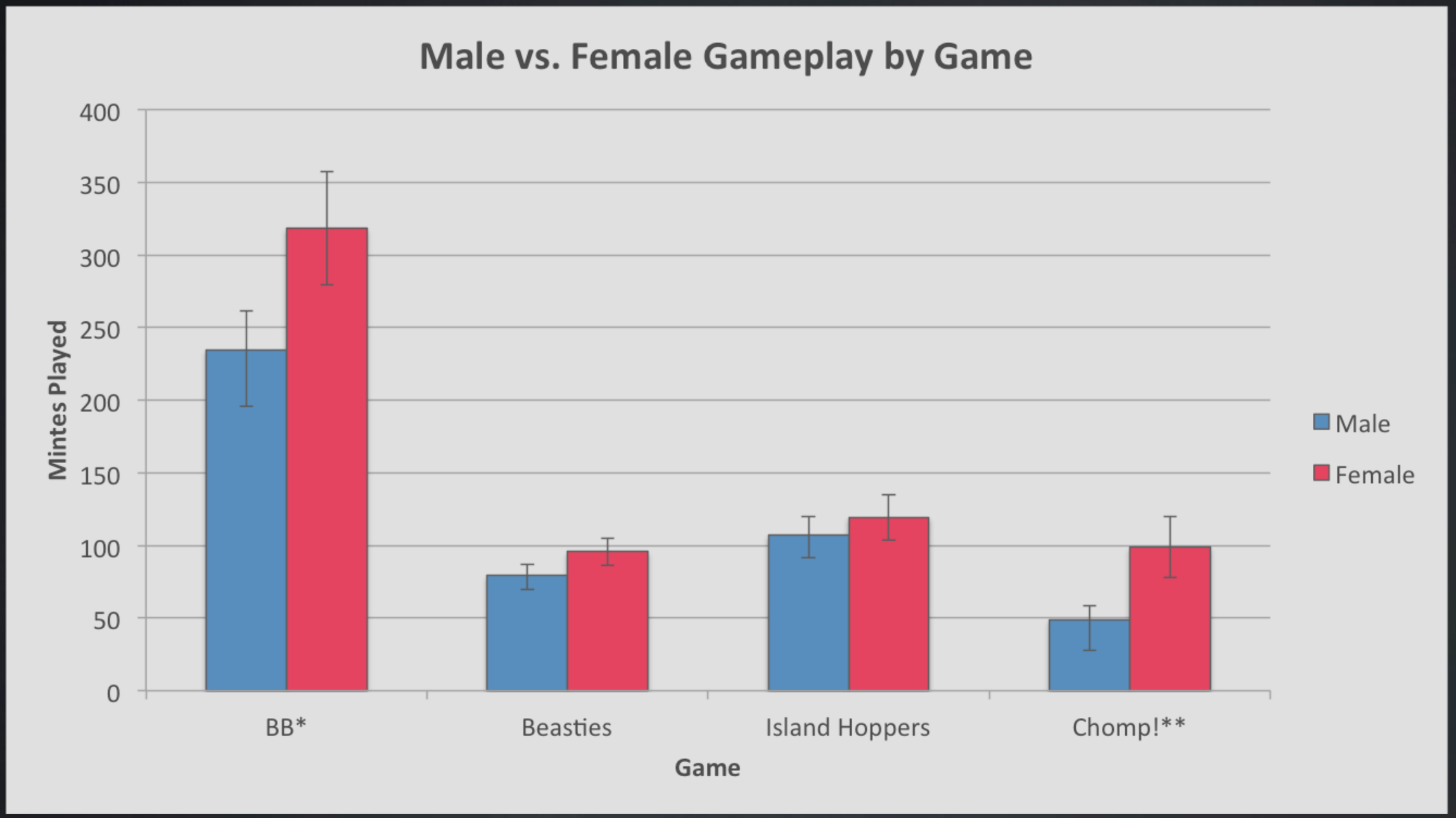




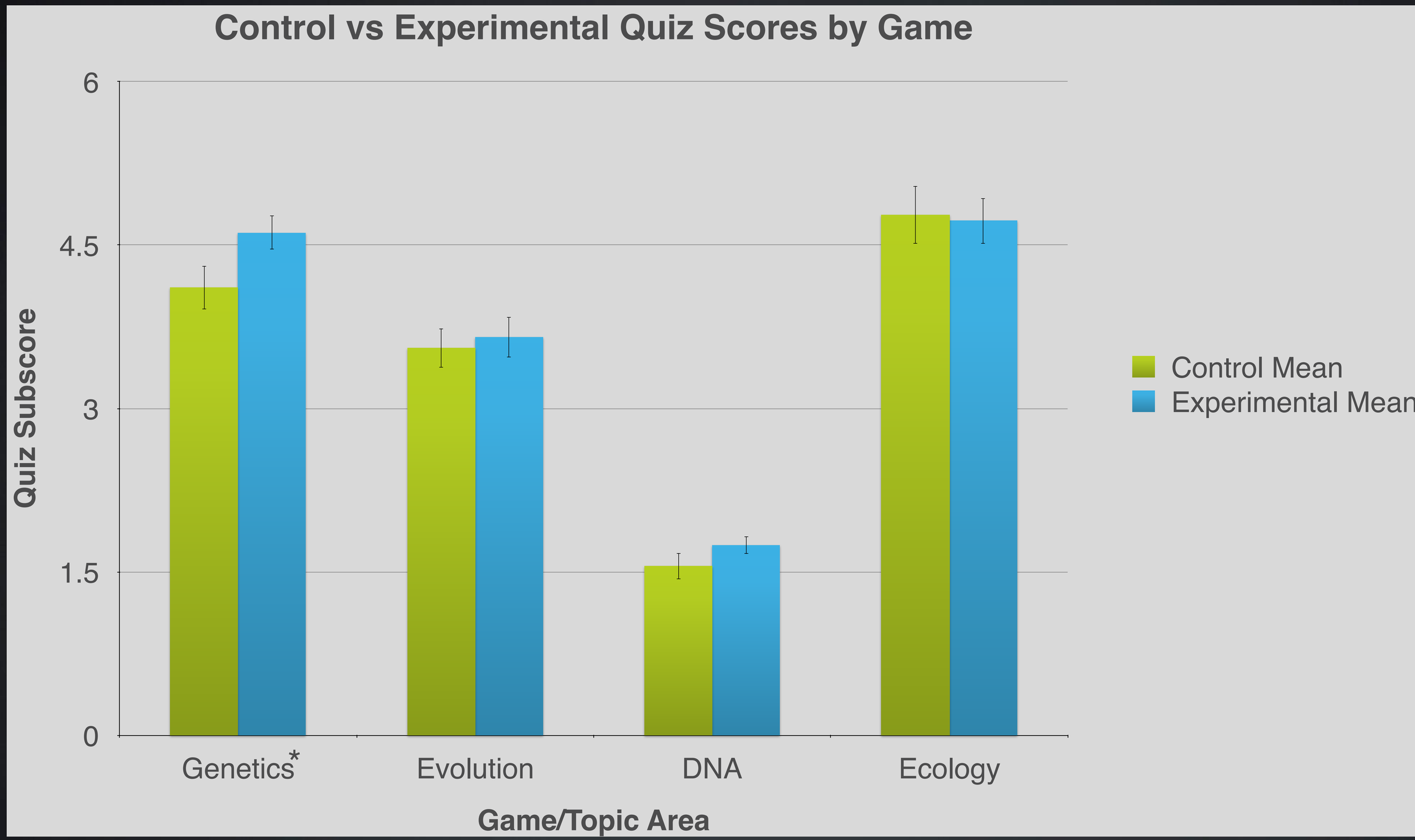
UbiqBio Research Study

- 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



Leveling Up?

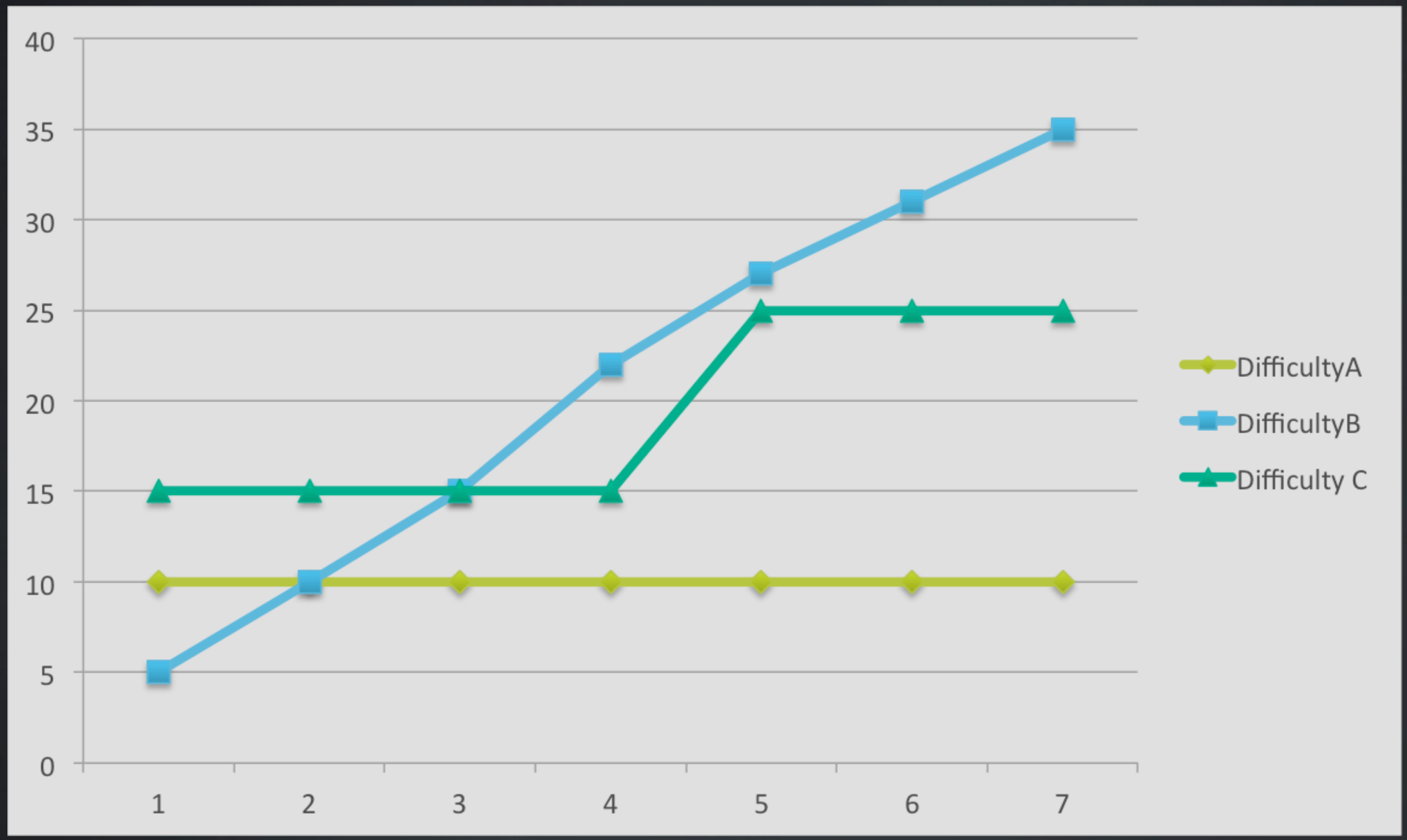
- How is score on each section impacted by…
  - Time spent playing
  - Levels completed

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

???

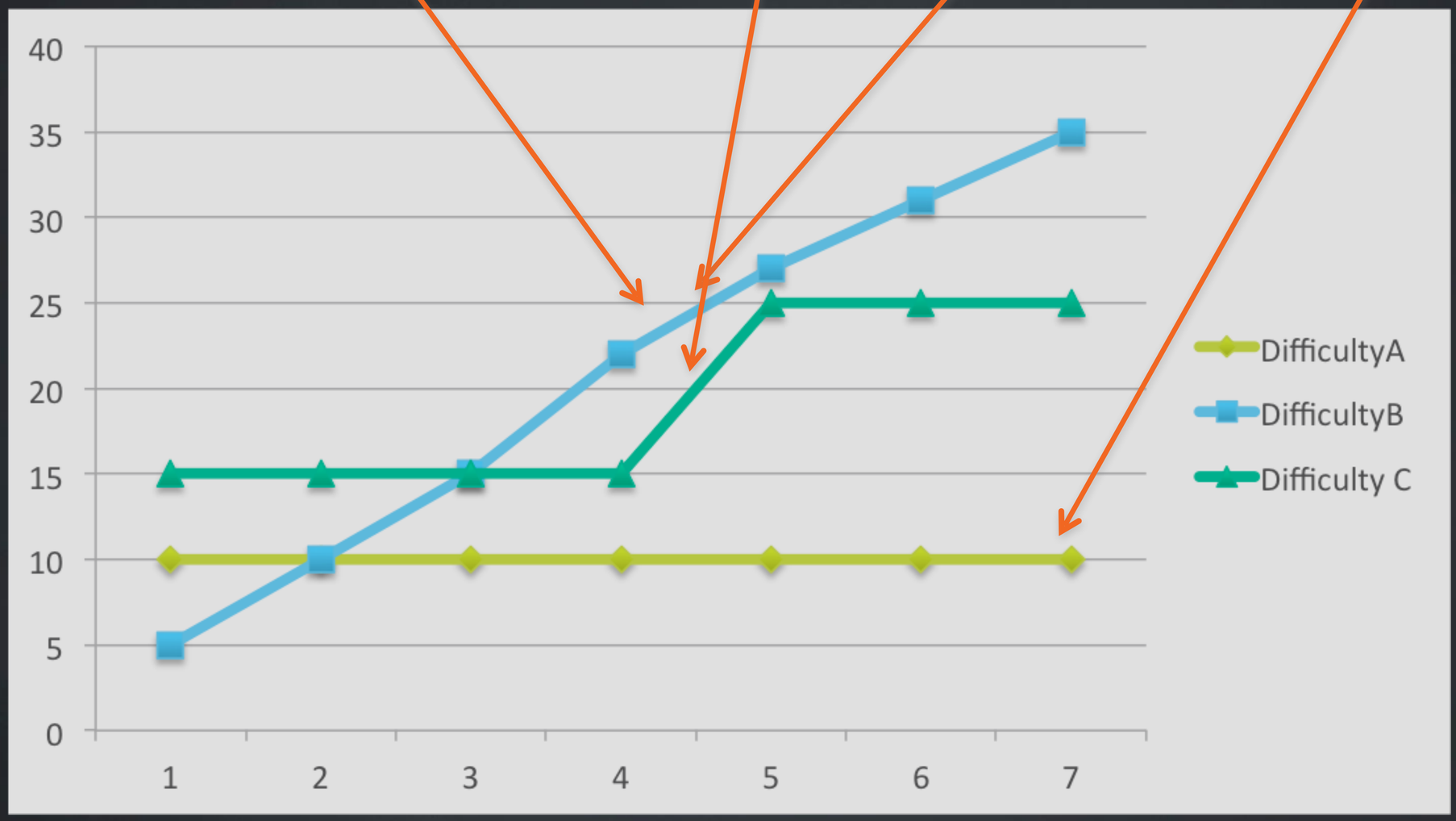
Do Games Work?

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

Well

PARENTING

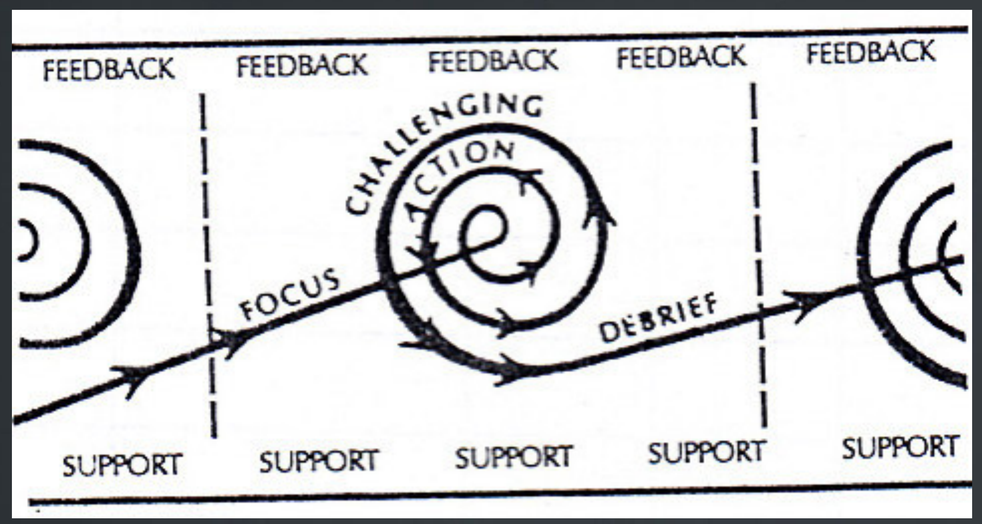
Traditional Toys May Beat Gadgets in Language Development

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

Learning

Action Reflection Cycle

Experience



Resources ⟷ **Reflection**

The Radix Endeavor

BILL & MELINDA GATES foundation

Massachusetts Institute of Technology

the education arcade

FILAMENTGAMES

MMOs and Learning

Steinkuehler and Duncan 2008

MMOs and Learning

Steinkuehler and Duncan 2008

3

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.

2

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.

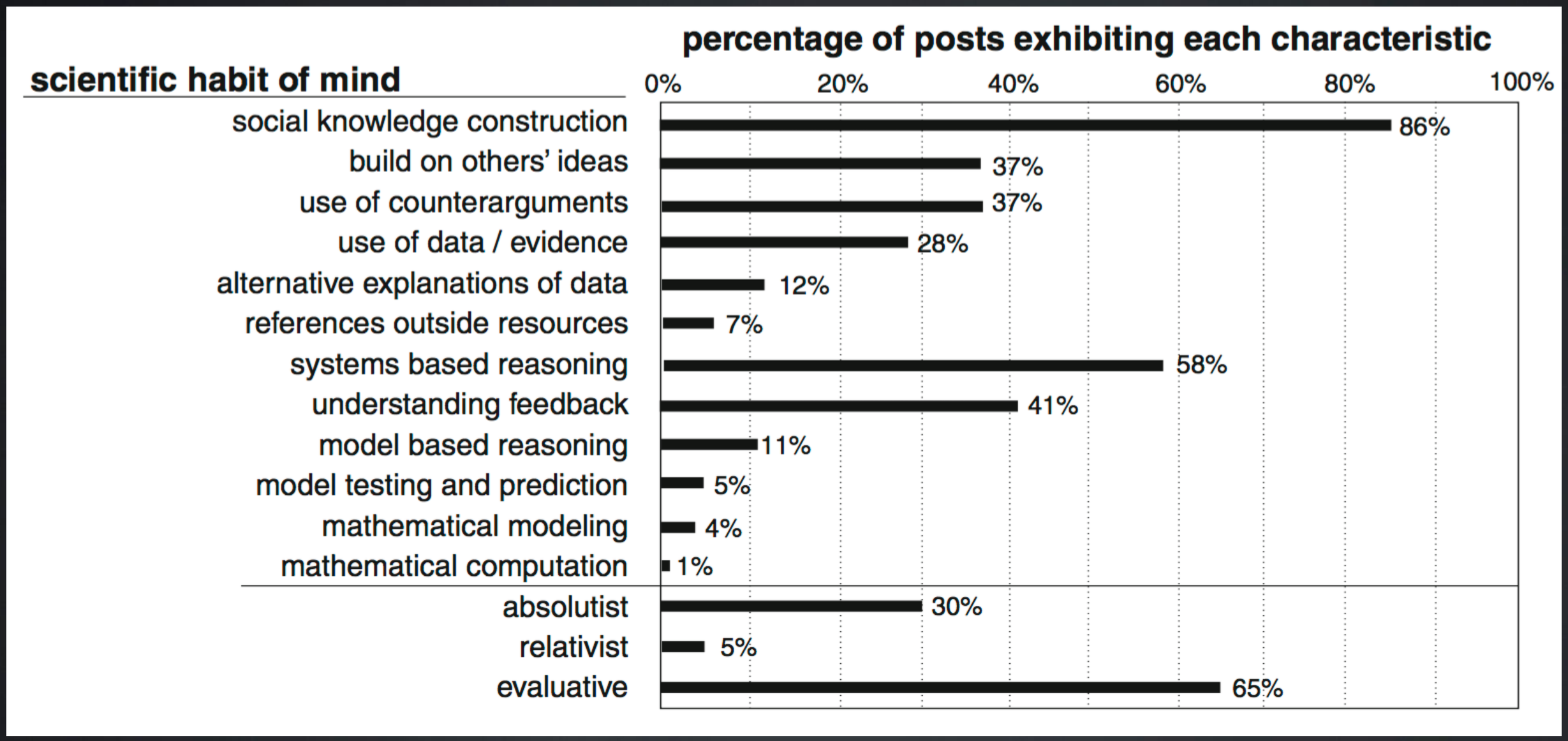
2

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

Pinetreek

The

Endeavor

Why an MMOG

(Massively Multiplayer Online Game)

Self-directed
Collaborative
Role-playing
Inquiry-based
Contextual

Quests and Tools

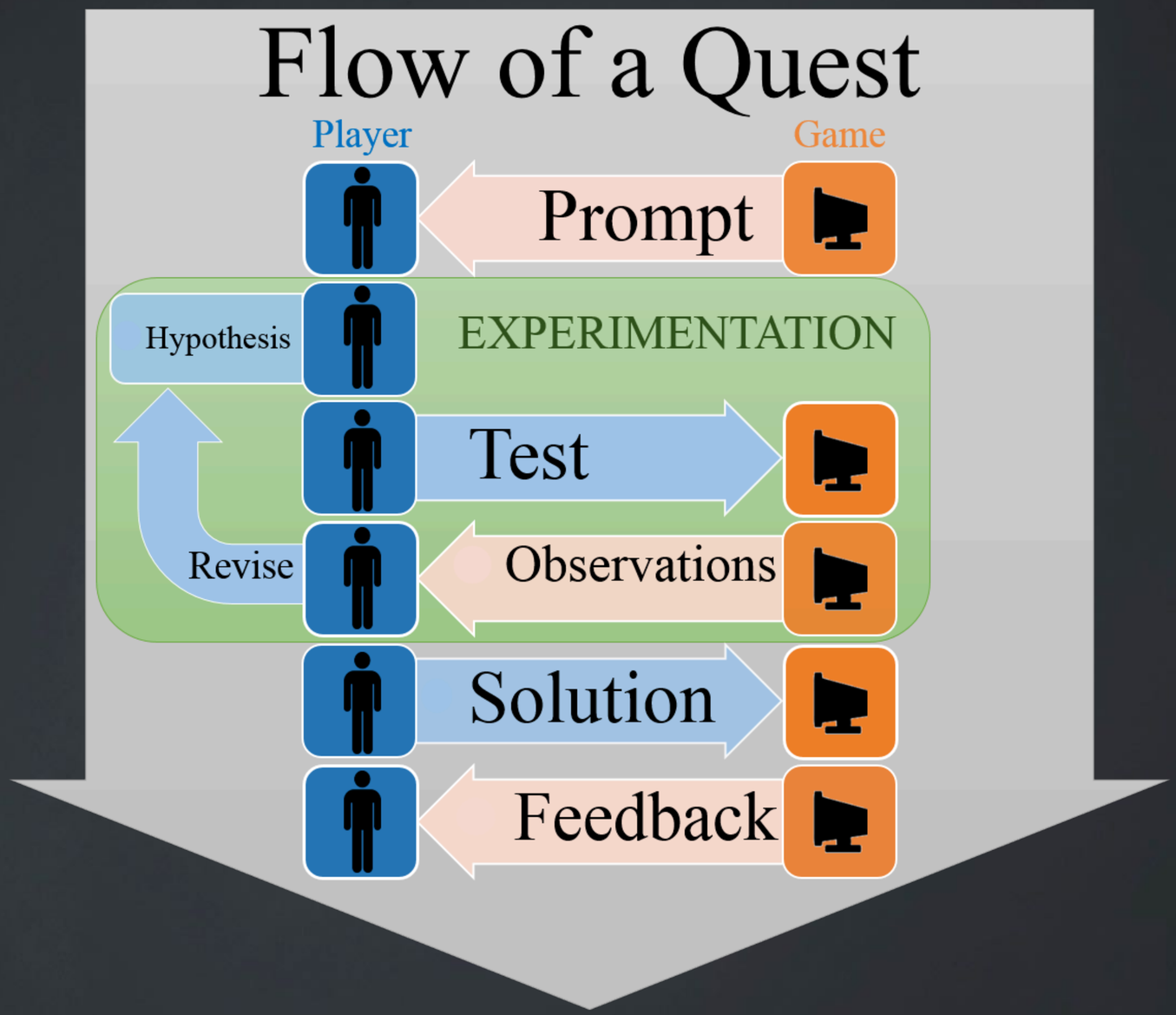
Radix Demo

Physical Models

Biological Models

Experiment Centered Design

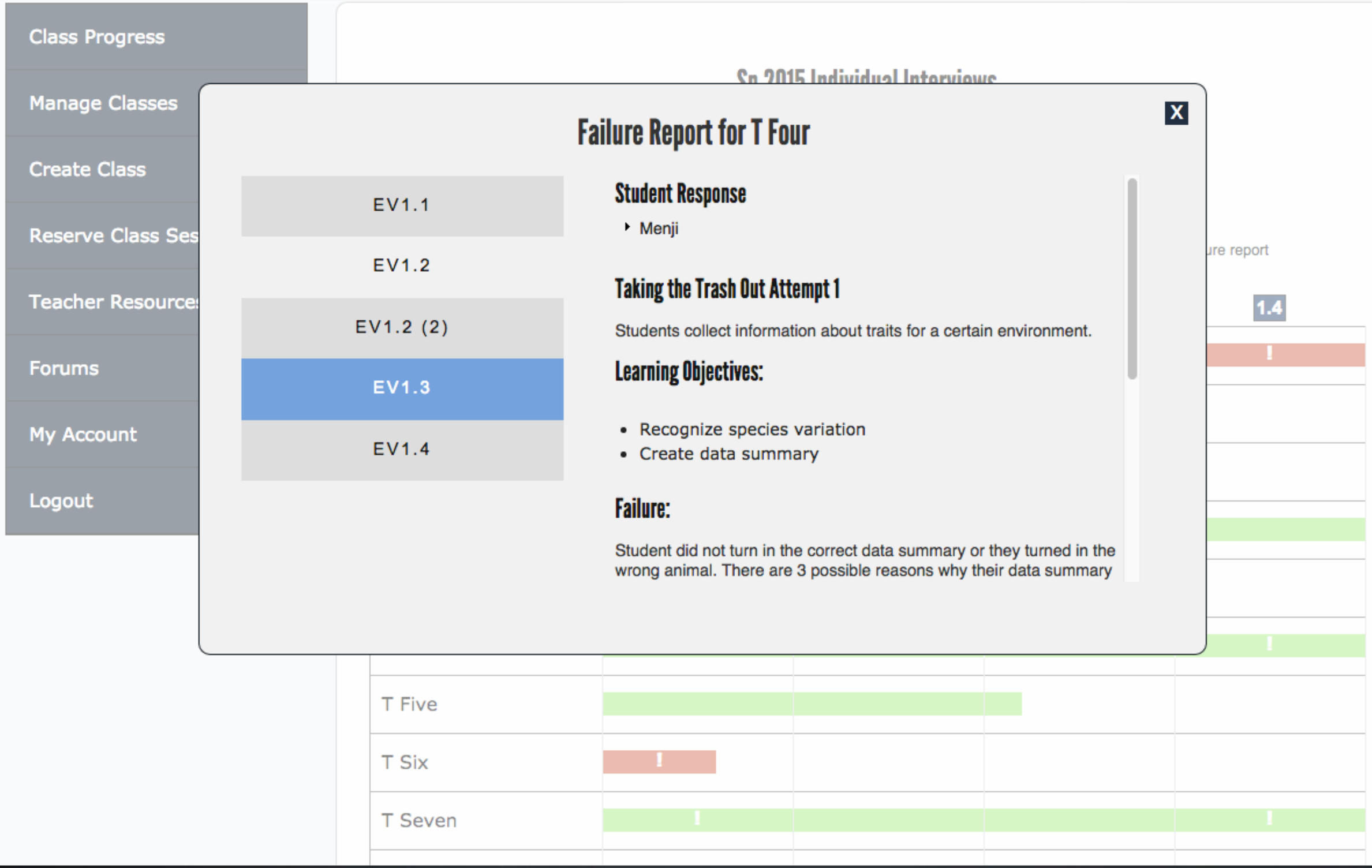
Student model
Evidence model
Task model



Community

Parties - Data Sharing

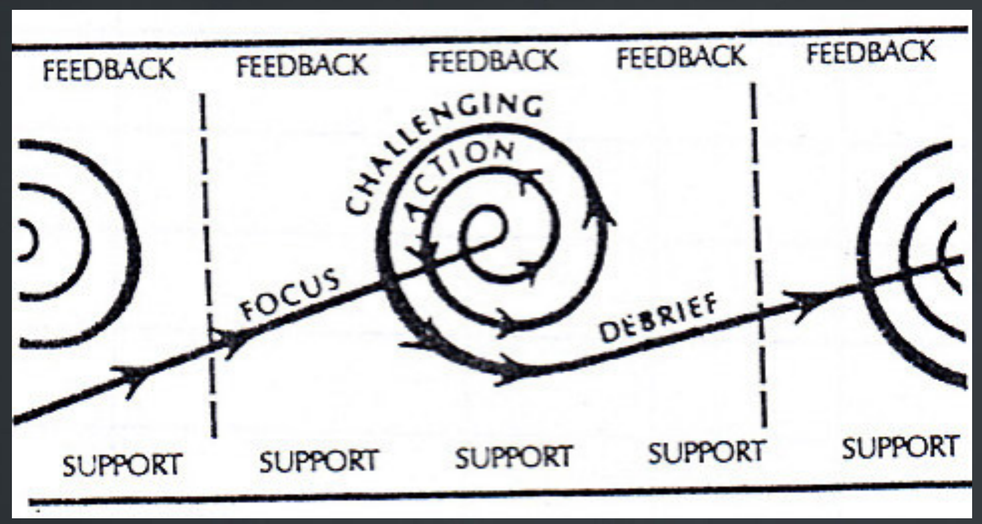
Providing Formative Assessment and Data



Learning

Action Reflection Cycle

Experience

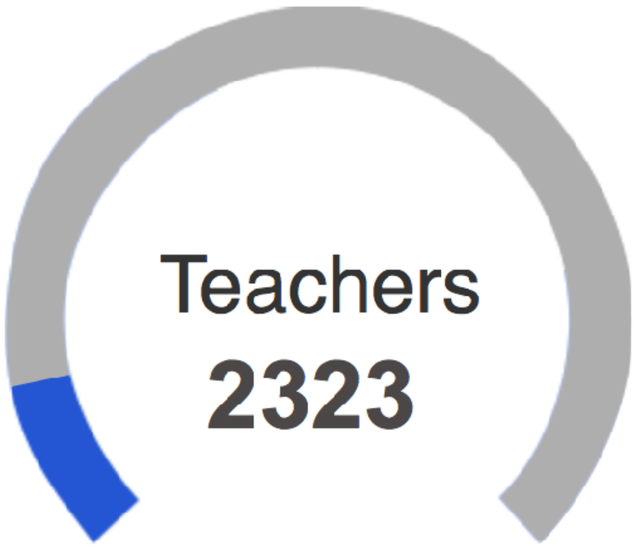


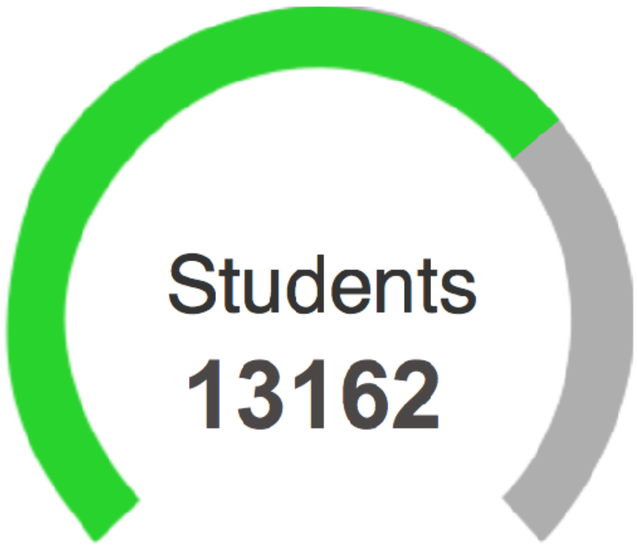
Resources ⟷ **Reflection**

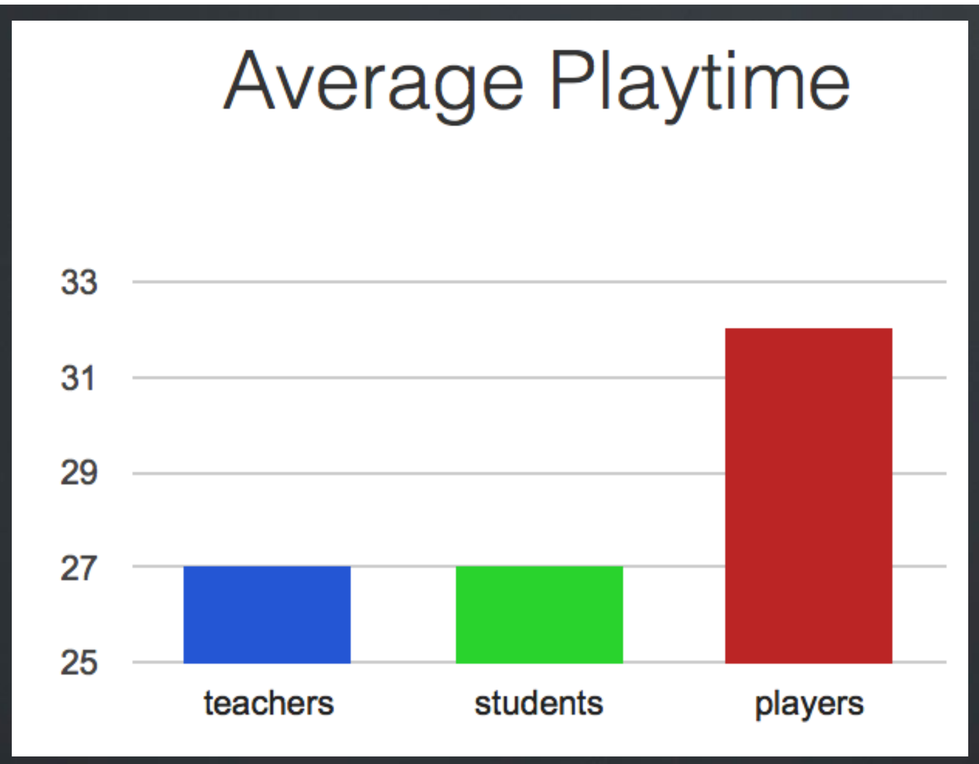
Radix Usage

Total Registrations

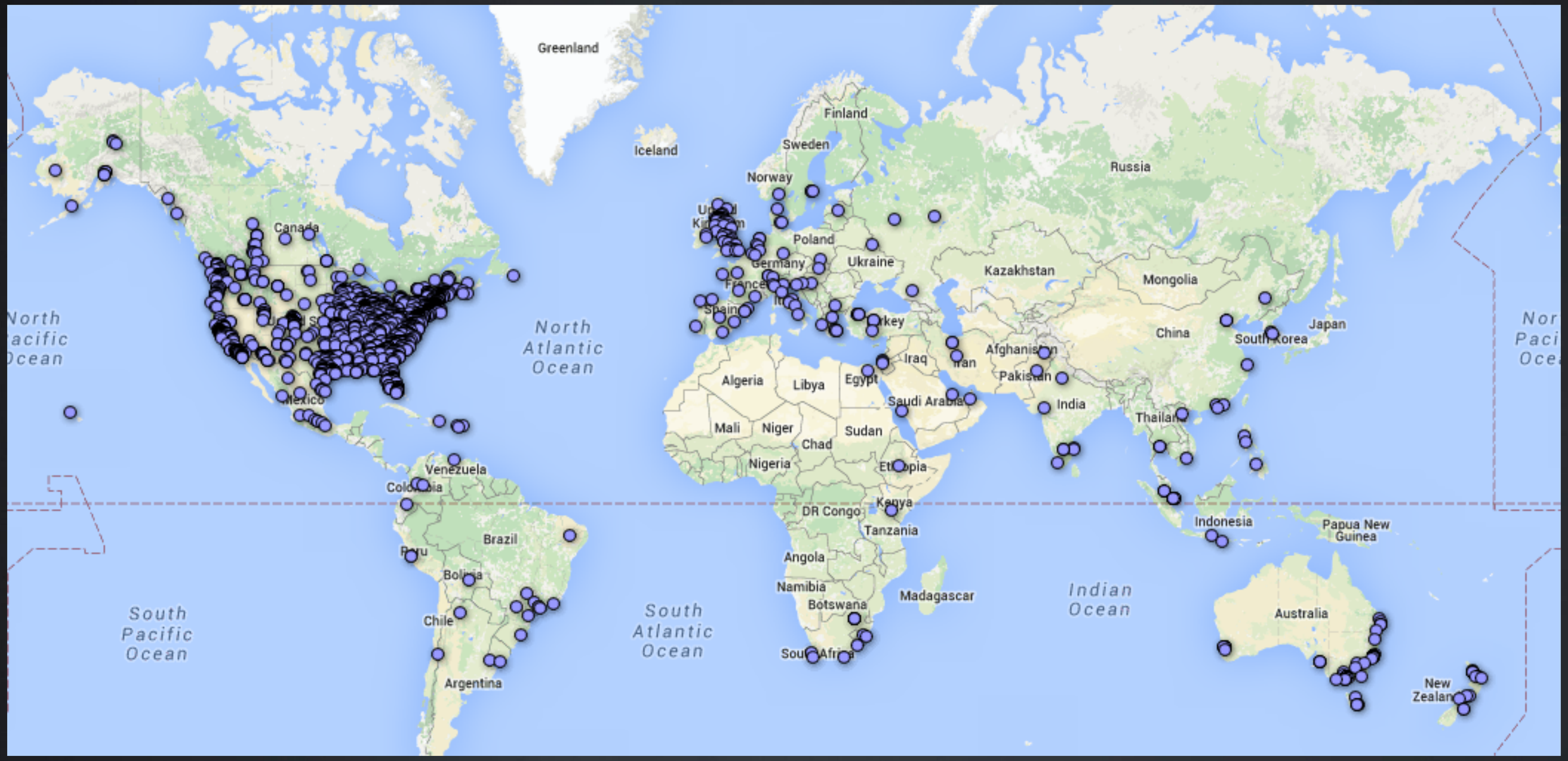
19178







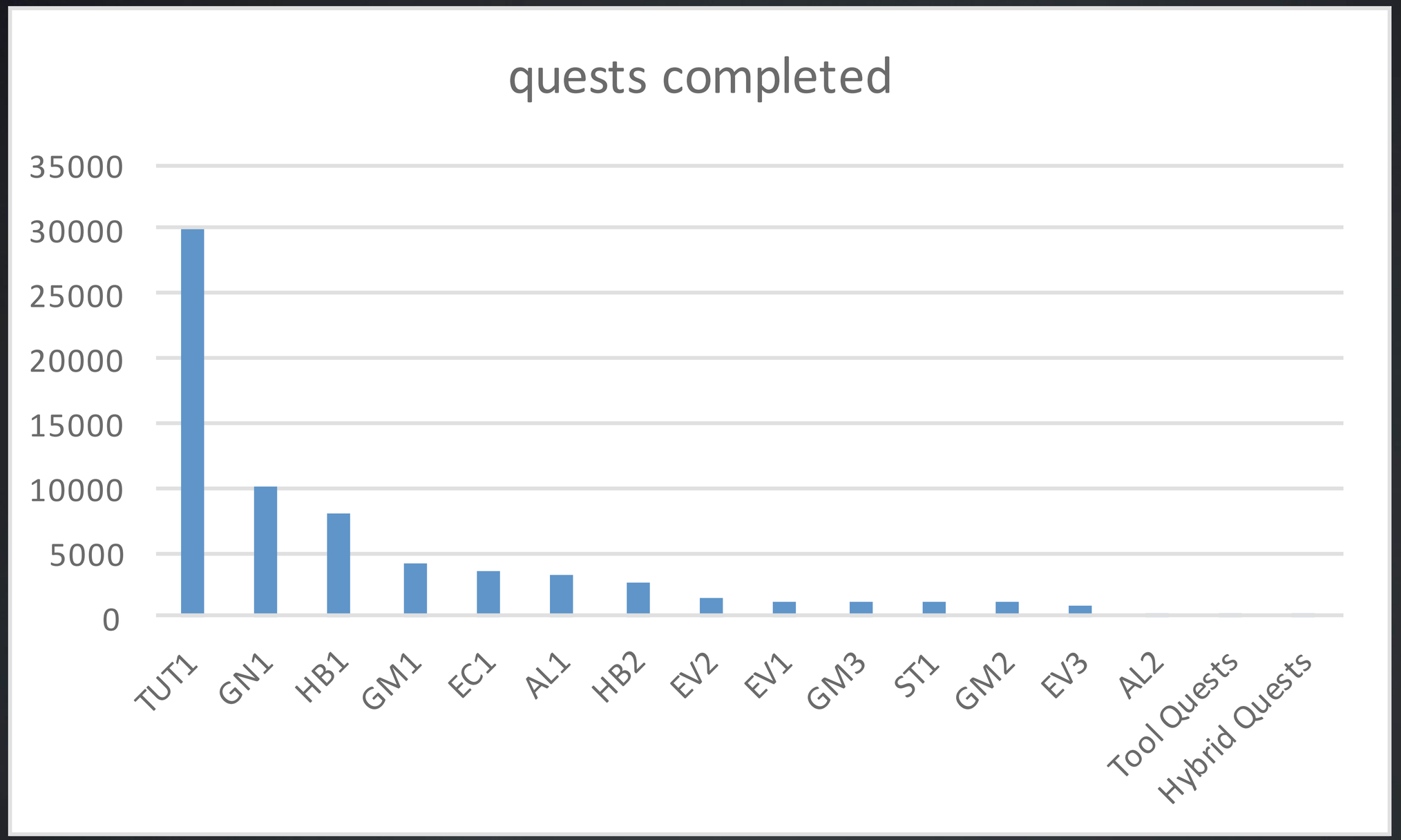
Radix Usage


Greenland
Iceland
Finland
Sweden
Norway
Russia
Canada
Poland
Germany
Ukraine
France
Spain
Kazakhstan
Mongolia
China
South Korea
Japan
Afghanistan
Pakistan
India
Iraq
Iran
Algeria
Libya
Egypt
Saudi Arabia
Mali
Niger
Sudan
Chad
Nigeria
Kenya
DR Congo
Tanzania
Angola
Namibia
Botswana
Madagascar
Indonesia
Papua New Guinea
Australia
New Zealand
Venezuela
Brazil
Peru
Bolivia
Chile
Argentina
North Atlantic Ocean
South Atlantic Ocean
Indian Ocean
South Pacific Ocean

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

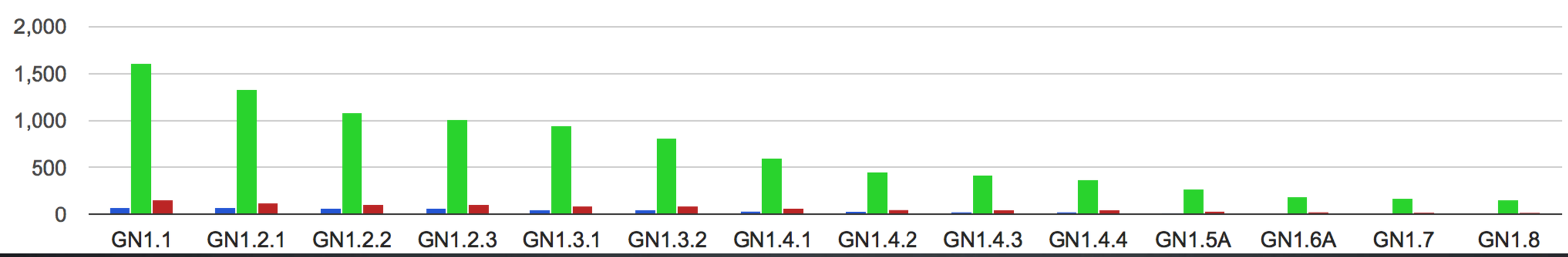


Radix Quest Completion

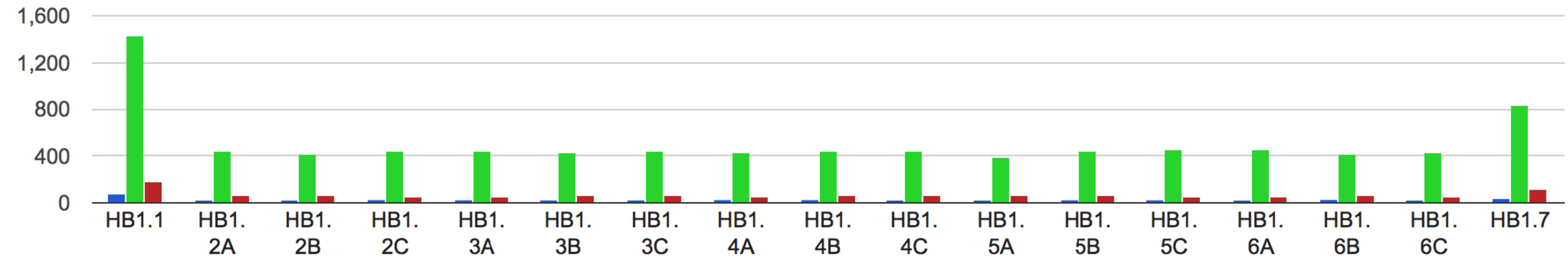
Biology

Quest Completion Totals

GN1 Genetics 1: Mendelian Genetics

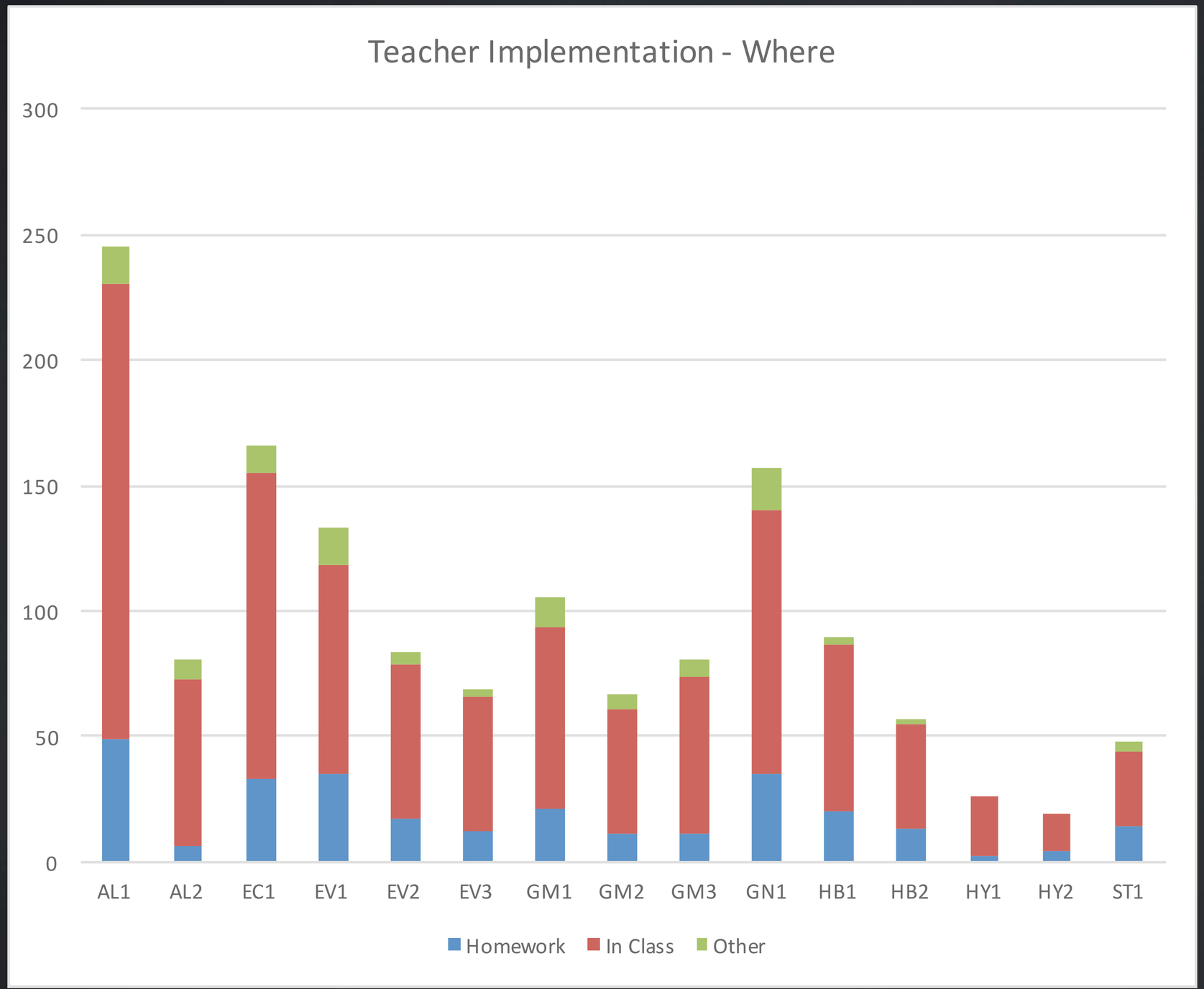


HB1 Human Body Systems 1: Identifying Symptoms and Systems



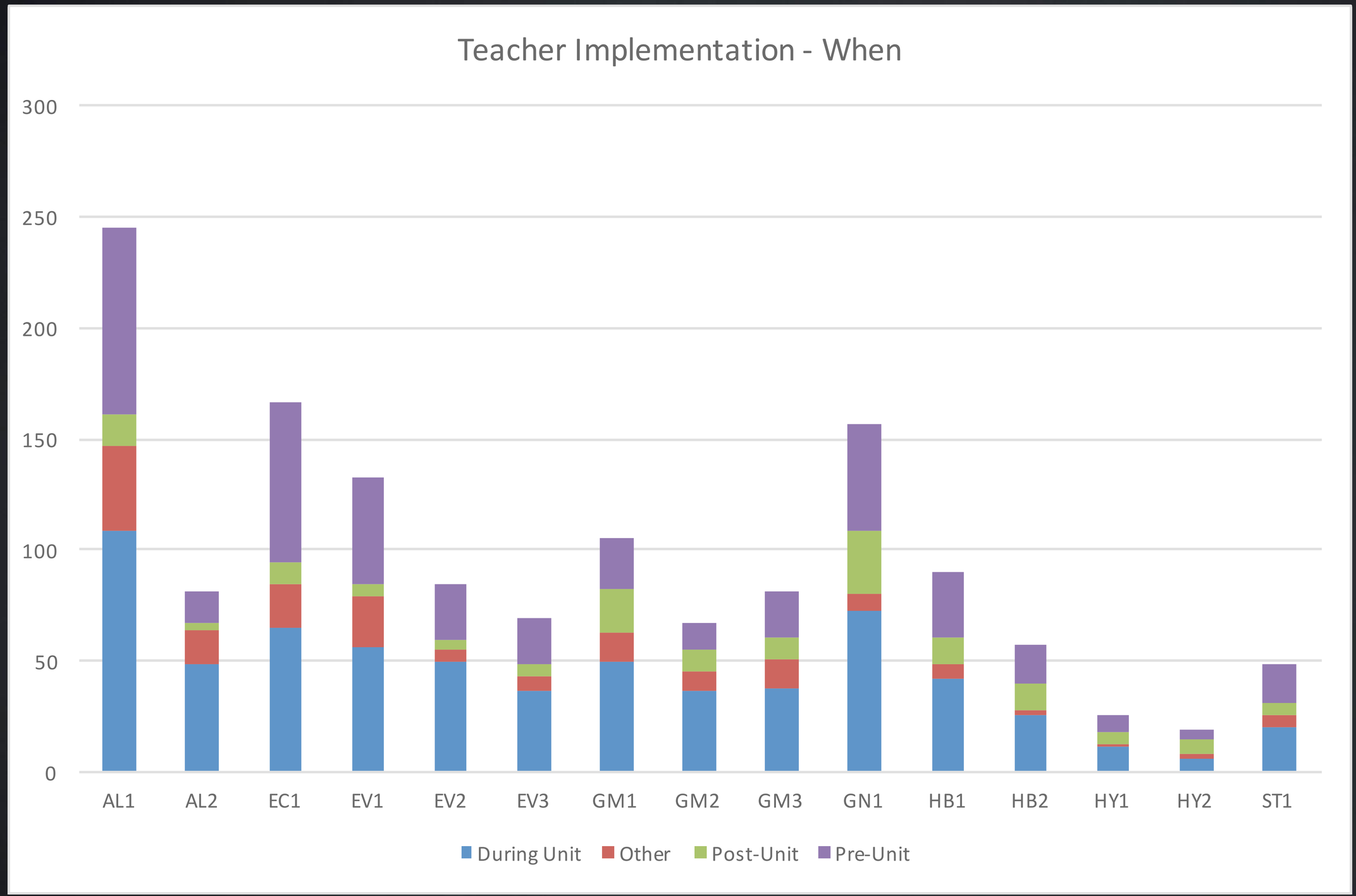
Teacher Implementation

Where



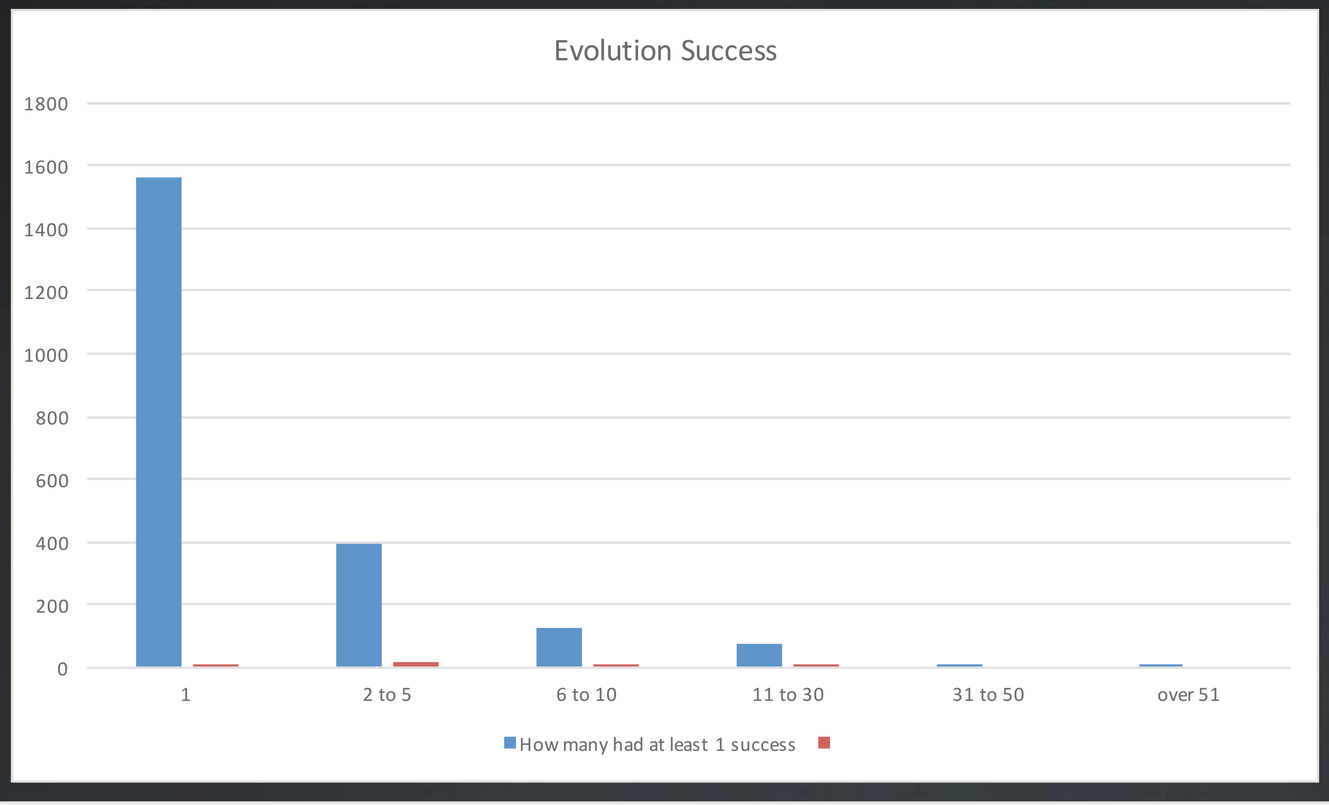
Teacher Implementation

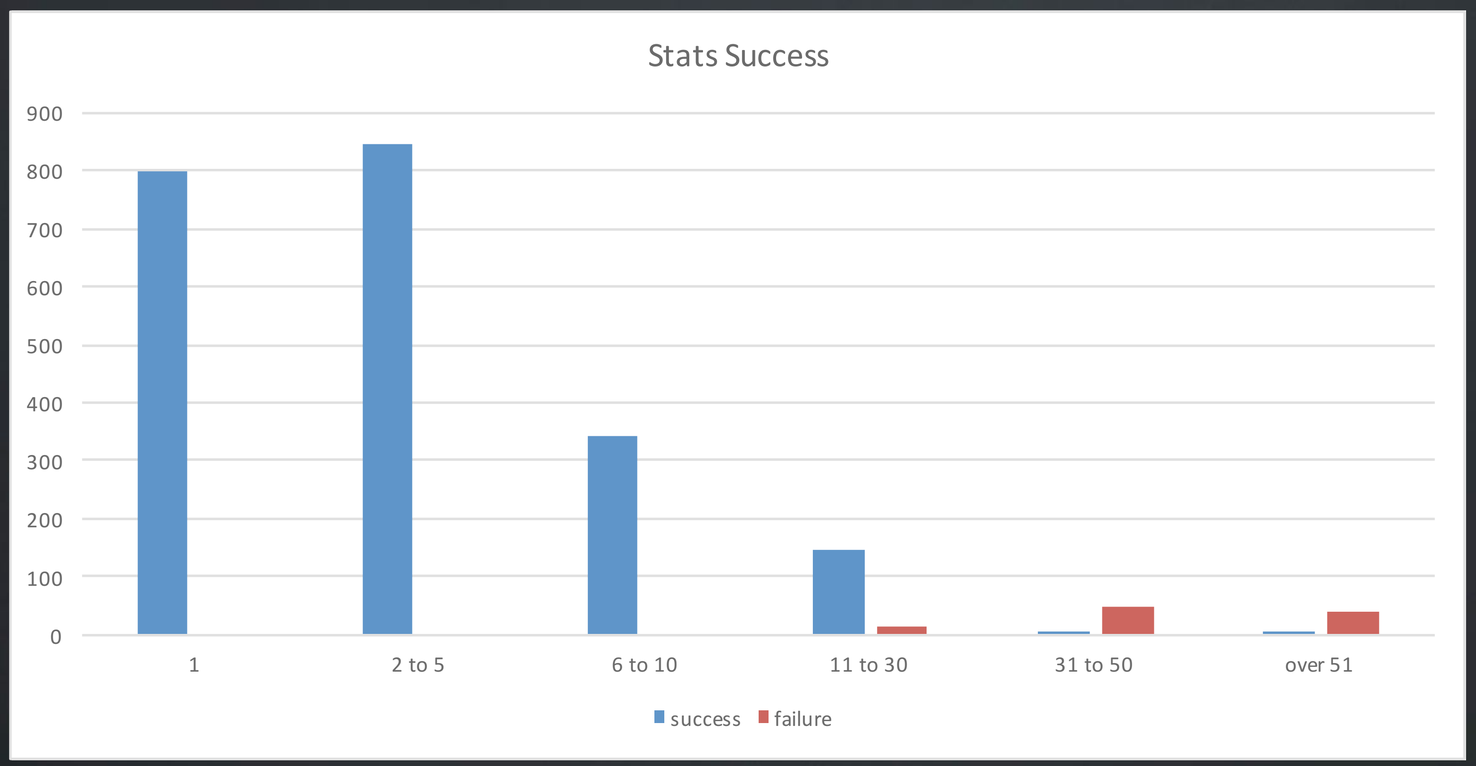
When



Success and Failure

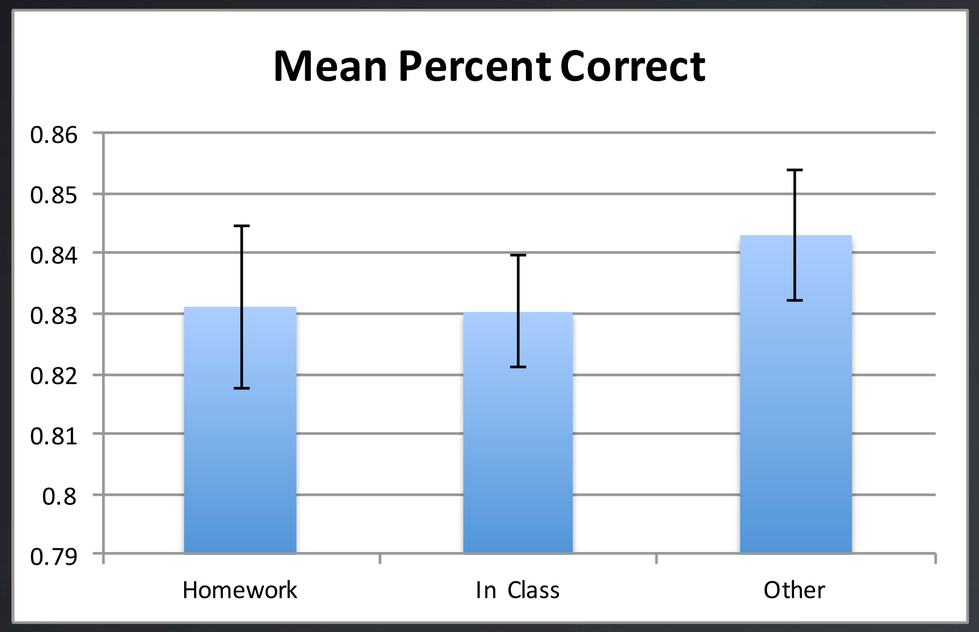
Evolution vs Stats

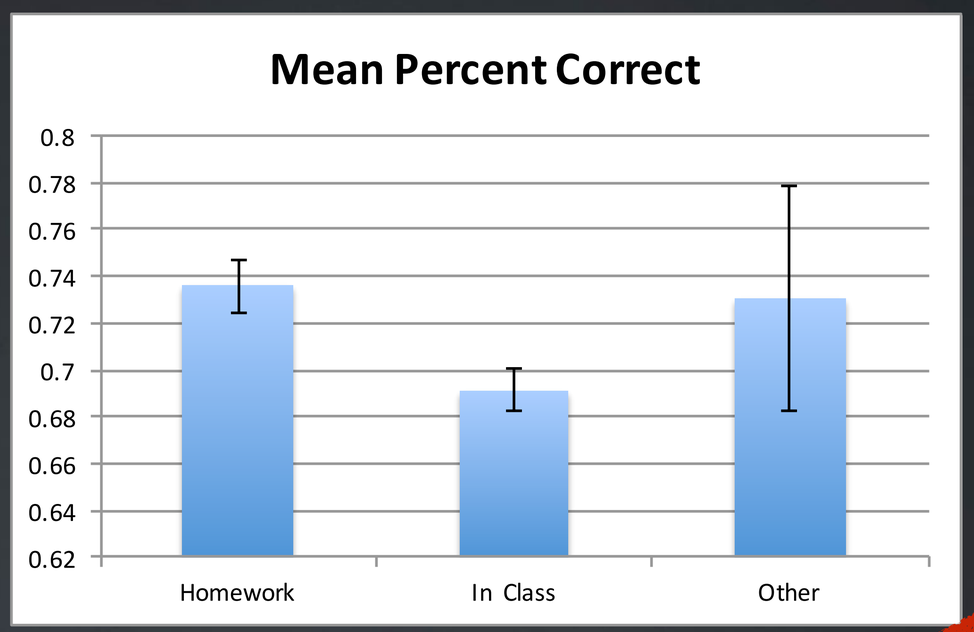


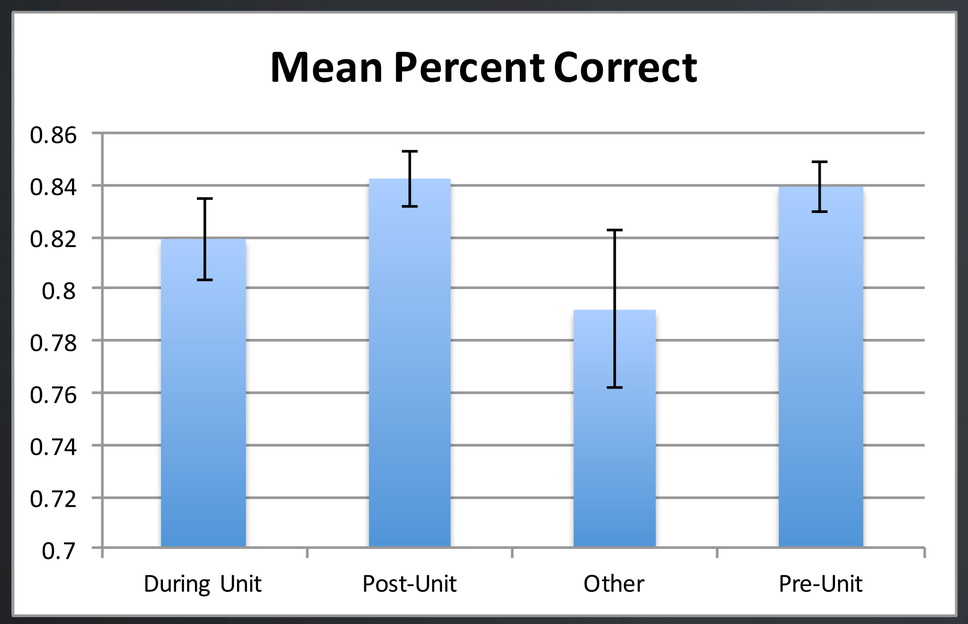


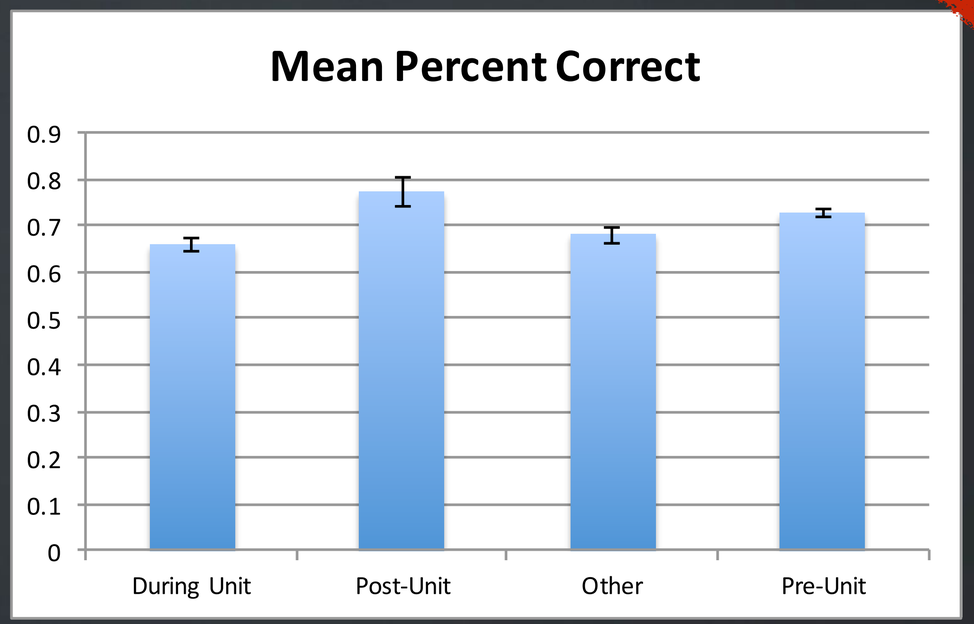
Where and When Are Successes

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

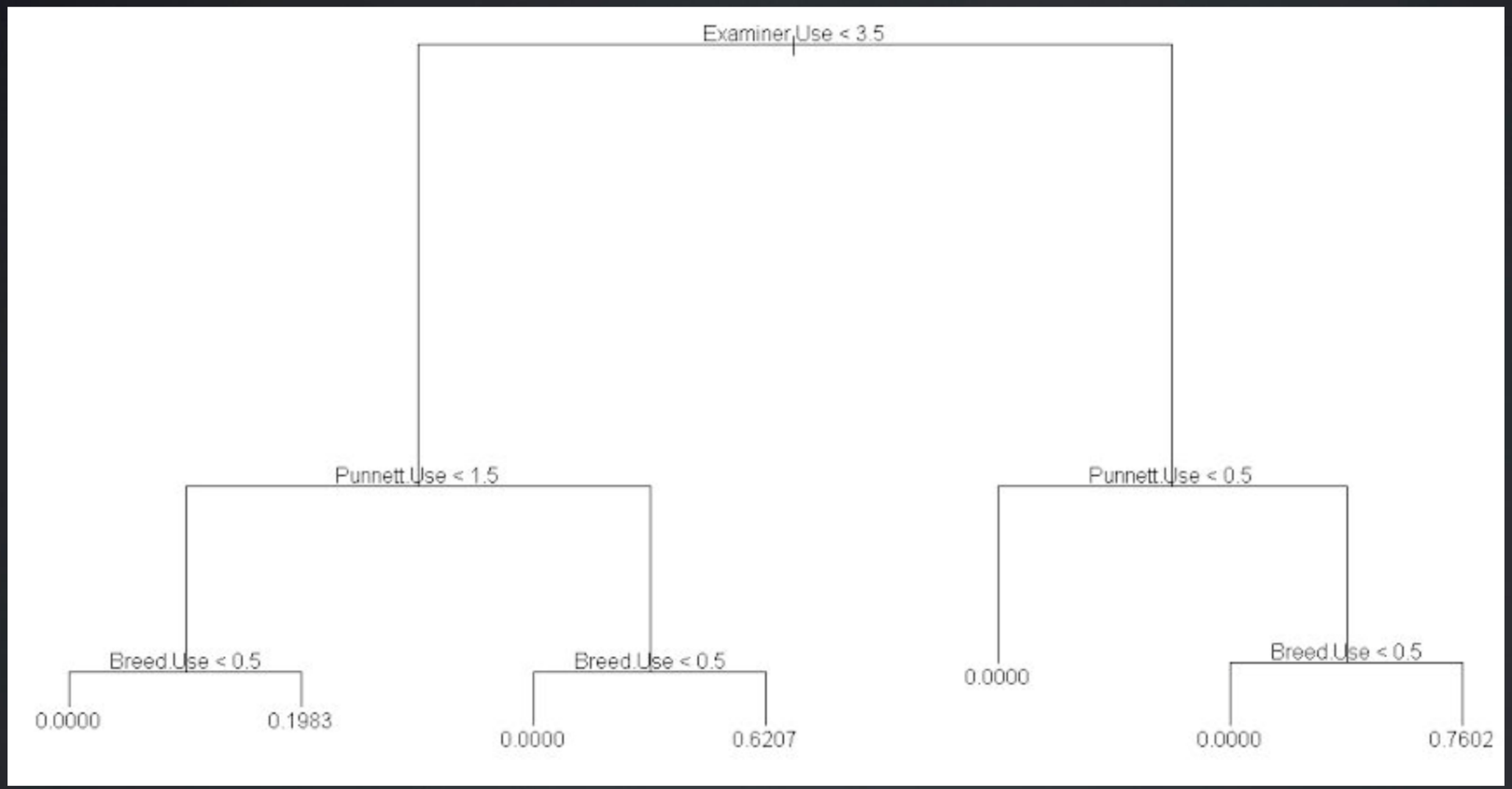
T-test showed significant difference from pre to post t=6.878, p=.000. Effect size=0.67

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

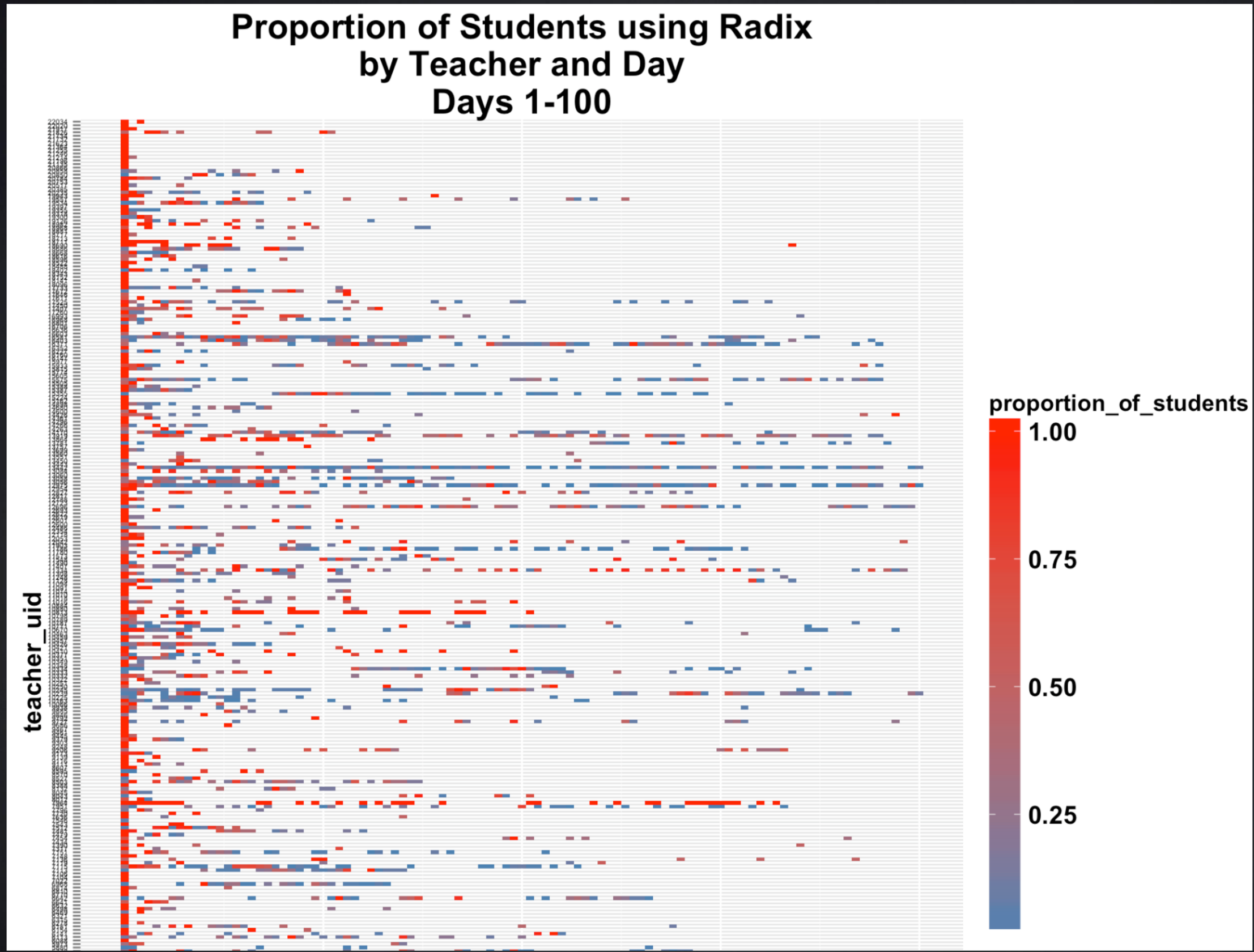
- Frequency

		Second Attempt success	F0	F1	F2	FT
	NA	7	0	0	0	0
1st	F0	46	11	4	14	56
Attempt	F1	36	1	12	8	0
Fail Code	F2	69	4	8	22	8
	FT	27	0	3	3	10

- Percentage

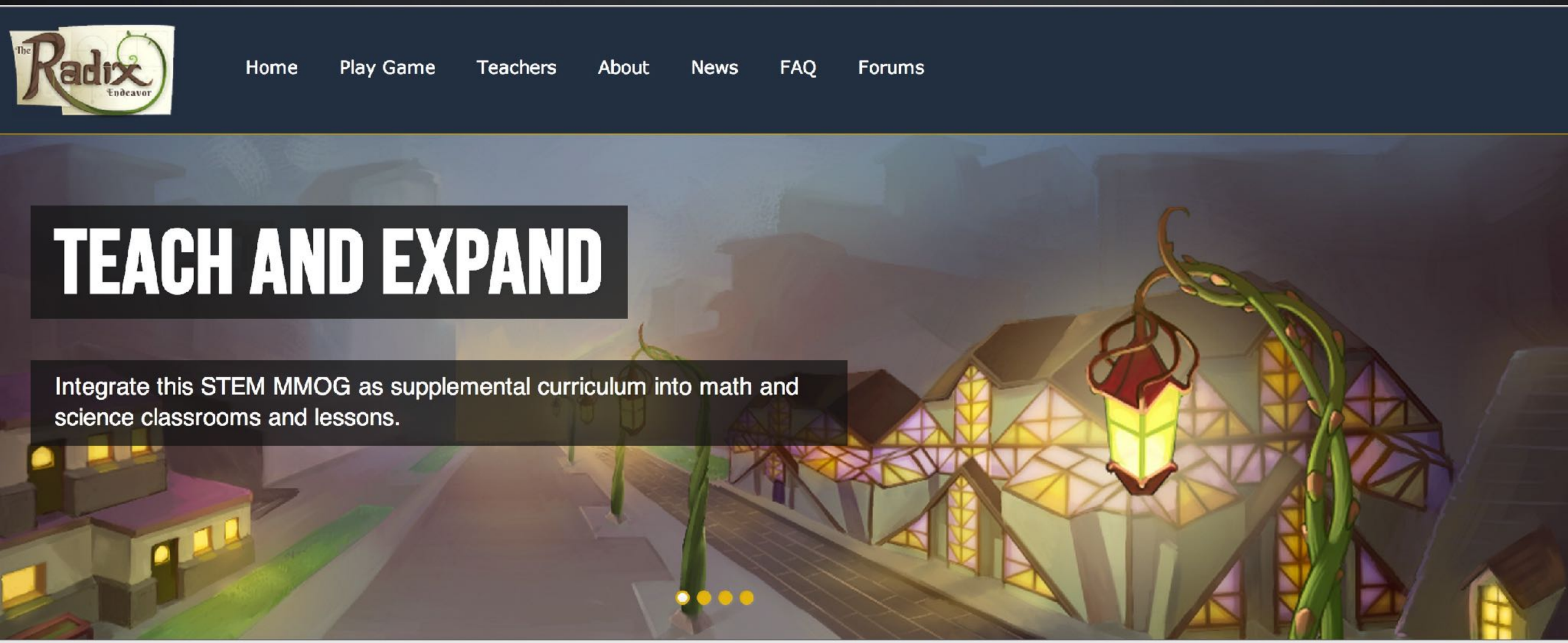
		Second Attempt success	F0	F1	F2	FT
	NA	100	0	0	0	0
1st	F0	35.1	8.4	3.1	10.7	42.7
Attempt	F1	63.2	1.8	21.1	14	0
Fail Code	F2	62.2	3.6	7.2	19.8	7.2
	FT	62.8	0	7	7	23.3

Effective Use Cases?



Radix Endeavor

radixendeavor.org



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