Learning through scientific discovery

Zoran Popović
95%
Top 20 game-based experts

Prior knowledge of biochemistry

- None
- High school / Basic
- One undergraduate course
- Majored in biology or similar
- PhD in chemistry or organic chemistry
- PhD in biochemistry 30 years ago
- Professionally involved
Foldit Video Gamers Join the Fight Against Ebola Virus

Several vaccines are already in the pipeline to counter the devastating threat posed by the Ebola virus in Africa, but game players are using a collaborative puzzle program called Foldit to help look for new treatments. The online game, which was created by University of Washington researchers in 2008, enlists players to find the best ways to twist virtual protein molecules into the desired shapes.
Neuron Reconstruction
Scientific-discovery for high school

- Biochemistry
- Synthetic biology
- Neuroscience
Enlearn platform

• Infinitely variable content
• Optimal pathway discovery
  – Student groups
  – Teacher
• Optimize for mastery and engagement
Mastery

3 equations without errors with behaviors that indicate fluency

\[ ax + b = \frac{c + d}{e} \]

\[ \frac{abx}{bc} + c + 0 = d + yz \]

\[ \frac{b - c}{x} = c + d - c \]
WASHINGTON STATE ALGEBRA CHALLENGE 2015

We did it!

EQUATIONS: 390,935

TOTAL EFFORT: 6 months 28 days 2 hours

KIDS ARE STILL PLAYING: 429,053

Winners Announced!

This year's Washington State Algebra Challenge was a fantastic success. Not only did we exceed our original goal of 250,000 equations, but we had participation from a total of 4,192 students representing public and private schools, homeschool programs, and after school groups. Check out the winners by clicking the button below!

VIEW WINNERS!
1.5 Hours of Play / Percent Achieved Mastery

- Kindergarten (K)
- 1st Grade
- 2nd Grade
- 3rd Grade
- 4th Grade
- 5th Grade
- 6th Grade
- 7th Grade
- 8th Grade
- 9th Grade
- 10th Grade
- 11th Grade
- 12th Grade
- Higher Education
- Unspecified

The graph shows the percent achieved mastery across different grades, with the highest percentage for Kindergarten (K) and the lowest for 1st Grade.
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We did it!

EQUATIONS: 644,936

TOTAL EFFORT: 9 months 29 days 22 hours

KIDS ARE STILL PLAYING: 697,292

Congratulations!

Over 6000 students completed over 600,000 equations – most of those during the first 5 days! Total student playing time reached almost 10 full months (24 hour per day)!! An amazing effort by all. Quite a few classrooms achieved over 95% mastery and all the students were exposed to (and hopefully excited by) the conceptual ideas involved in solving algebraic equations. Thanks to all who participated.
Word Problem Solving
The aliens are having a contest. 134 Martians and 119 Zephlopods played at the gathering. How many Aliens played at the gathering?
Future challenges

• Word problem solving challenges
• National event
Teacher Effects
Student Effects
The chart shows the percentage of students by the number of problems solved. The categories are marked as follows:

- **Paper (avg. 45.1)**: The group with the highest percentage of students, represented by the green bars.
- **EnLearn (avg. 202.0)**: The group with the second highest percentage, represented by the orange bars.

The chart indicates that most students fall within the 50 to 100 problems solved category for both groups. The key takeaway is marked by the yellow box stating **4.5x**, which likely refers to the ratio or improvement in performance between the two groups.
95%