Logic Summer Camp 2016

• Overview
• Participant Demographics
  • By school, grade level, gender
  • Why did they come?
• Teacher Training
• A Day at the Camp
• Participant feedback
• Follow up
Overview

• Logic is essential for some disciplines
  • STEM and especially computer science

• Logic is important for everyone
  • Critical thinking, everyday reasoning

• Goal is to make logic education available to schools across America
  • Initially, test out the material with high school students in a summer camp
Overview of Summer Camp

• The camp was aimed at high school students
  • Entering grades 9-12 in Fall 2016
  • Comfortable with symbolic manipulation as taught in Algebra I
  • Familiar with basic set theory including notation for intersection, union, etc.

• Covered propositional logic and relational logic
  • Based on Stanford under-graduate course on Logic

• Taught at Stanford by Chris Kuszmaul & Mike Genesereth
• Lasted two weeks (June 20\textsuperscript{th} – July 1\textsuperscript{st})
• Tuition of $2000 (1 financial aid award of $1000)
• 47 applied, 19 registered

More details: http://intrologic.stanford.edu/summercamp/
Participant Demographics

Schools Represented

Archbishop
Crystal Springs Upland
Gunn
Lynbrook High
Menlo (3)
Mission San Jose
Moreau Catholic
Mountain View
Palo Alto
Proof School
Saratoga (2)
Shanghai American
Summit Tahoma
Valley Christian (2)
Woodside Priory

Distribution by Grade Level

- Grade 9: 5%
- Grade 10: 16%
- Grade 11: 32%
- Grade 12: 47%

Distribution by Gender

- Female: 30%
- Male: 70%
Why did they come?

“Whether I am on a soccer field or at a robotics competition, I face a lot of situations where logic is necessary to make decisions”

“I have always loved puzzles and math and like to solve challenging problems“

“Math classes aren’t the only classes that require logic; In AP United States History I am often called upon to recognize patterns and cycles spanning over four centuries, while in English classes I need to write persuasive essays by reasoning through source material and supporting my theses.”

“I feel that this course in logic is appealing to me not only because it is fundamental to the field that I wish to pursue once I’m in college (i.e. computer science), but also because it appears to be oriented towards practical logic and reasoning.”
Teacher Training Format

• Held during the week prior to the summer camp (week of June 13th)
• Chris Kuszmaul delivered the material to the rest of the teachers
  • It was a fantastic dry-run experience before actually teaching the camp
  • Chris inter-mixed his teaching with meditation and Aikido
  • Chris received ample feedback from the group on how to refine the pedagogy
• Teachers worked through exercises in groups
# Teacher Training Attendees

<table>
<thead>
<tr>
<th>Person</th>
<th>Affiliation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chris Kuszmaul</td>
<td>Palo Alto High</td>
<td>Taught summer camp 2016</td>
</tr>
<tr>
<td>Michael Towne</td>
<td>Valverde High</td>
<td>Plans to offer Logic during Fall 2016</td>
</tr>
<tr>
<td>Akane Akaban</td>
<td>Fremont High</td>
<td>Plans to teach a logic module as part of Digital Design and Innovation Course during Fall 2016</td>
</tr>
<tr>
<td>David Thompson</td>
<td>Morris High</td>
<td>Plans to offer Logic as a self-study course during Fall 2016</td>
</tr>
<tr>
<td>Andy Bartolo</td>
<td>Stanford</td>
<td>Teaching assistant for summer camp 2016</td>
</tr>
<tr>
<td>David Wang</td>
<td>Stanford</td>
<td>Teaching assistant for summer camp 2016</td>
</tr>
<tr>
<td>Mike Genesereth</td>
<td>Stanford</td>
<td>Professor</td>
</tr>
<tr>
<td>Vinay K Chaudhri</td>
<td>Independent</td>
<td>Organized the summer camp 2016</td>
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A Day at the Camp

900-930  Mediation
930-1000  Aikido
1000-1100  Lecture
1100-1200  Exercises
1200-1300  Lunch
1300-1330  Aikido
1330-1430  Lecture
1430-1530  Walk
1530-1600  Wrapup
Samples of Student Work
Student Feedback

- Was the course challenging?
- Was the course enjoyable?
- Was the course interesting?
- Were the teachers/teaching assistants helpful?
Student Feedback

Would you recommend the course to others? (19 responses)

- Yes: 68.4%
- May be: 31.6%
- No: 0%
What did they get?

“I learned about the different systems of logical thought, such as propositional and Hebrand logic, as well as the Fitch rules and other rules for proving something to be true (or not).”

“I also learned about how logic pertains to circuit design and troubleshooting, as well as logic's applications in the legal system.”

“Having a new way to represent natural language in a logical format is definitely the most important skill I learned during the summer camp.”
What did they get?

“The puzzles were the most valuable assignment because they made me think really hard on the problem at hand. Some puzzles were easy other were challenging and it was the mix of hard and easy made it engaging and I didn't want to stop.”

“The most important ideas and skills I learned during the summer camp were how to talk intelligently and how to act in an environment of other intelligent people while talking about advanced topics.”

“The opportunity to interact with other people of my age who shared my interests and to be in an environment geared towards people of my interests (math, computer science, etc.) was very unique and I enjoyed it.”

“The walks with the instructors were extremely valuable for everyone! Walking with them gave us time to really talk in a more casual setting -- we got to know them and see them as people, instead of just instructors.”
Some Takeaways from the Summer Camp

• The material is indeed accessible to high school students, and can be made even more challenging than what we did in this initial offering
• It was possible to train a high school teacher to pick up the material in the current form and deliver it effectively
  • The process can be further eased by providing ready to use lecture notes
Follow up

• Fall 2016 offerings at Valverde, Morris and Fremont High School
• Explore partnering with Stanford Pre-collegiate and Online High Schools for their 2017 offerings
• Education research to better understand learning outcomes and better define its place in high school curriculum