

Elyate: A Real-Time Assistant for Students and Lecturers as Part of an Online CS Education Platform

Suin Kim, Jae Won Kim, Jungkook Park, Alice Oh, KAIST

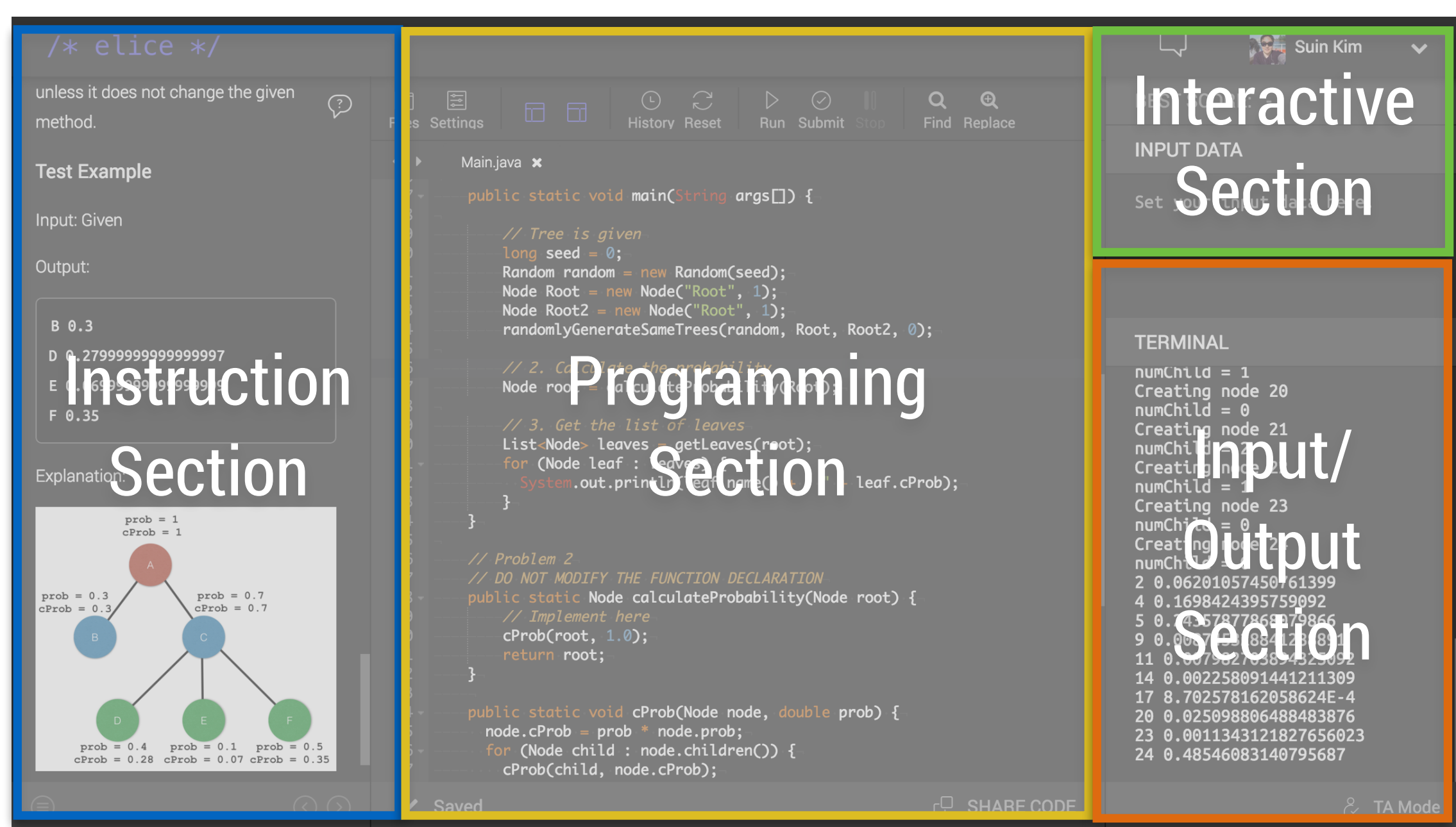
Elice: A Web-Based Programming Platform

- Elice is a web-based programming education platform allows students to code, chat, and view lecture videos
- We collected detailed student action logs with which we can identify each student's progress and strategically offer individualized help
- We studied machine learning summer camp where 1,000 students studied machine learning using the Elice

Contributions

- Mapping student actions to the educational taxonomy
 - Identified which actions should be mapped to which steps in the CS educational taxonomy
- Case study 1: How does TA's assistance affects students' traversal of the education taxonomy?
- Case study 2: Can we better predict students' future performance?

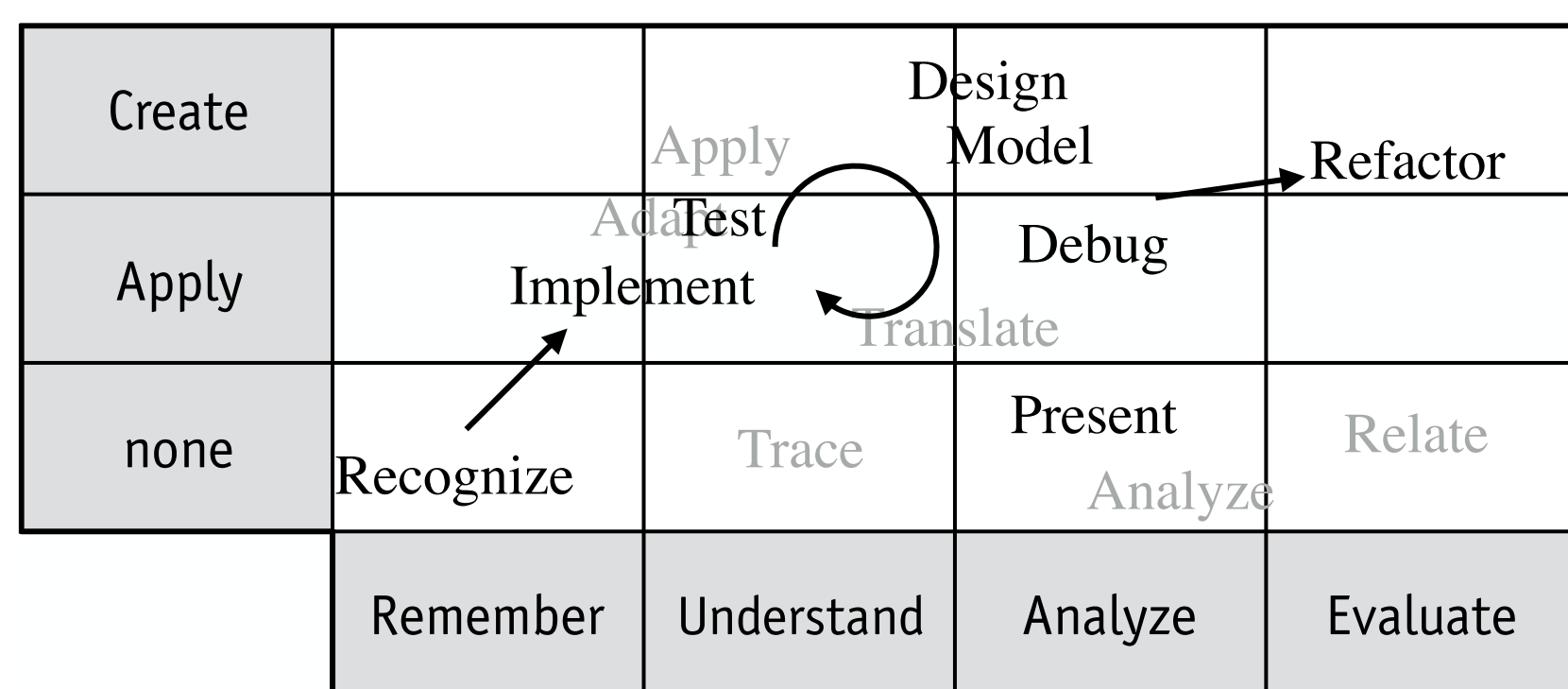
Elice and Machine Learning Summer Camp



- 4 weeks in August 2015
- Each week: Introductory lecture + 8-10 programming exercises (total 35)
- Bi-weekly online TA assistance
- 1,000 Students, 10 TAs, 1 Lecturer
 - 300 students in TA-Group
 - 490 students in No-TA-Group
 - 210 students in No-Group
- 24,437 chats, 350 posts, 893 comments
- 198,177 test runs
- 37,150 code submissions

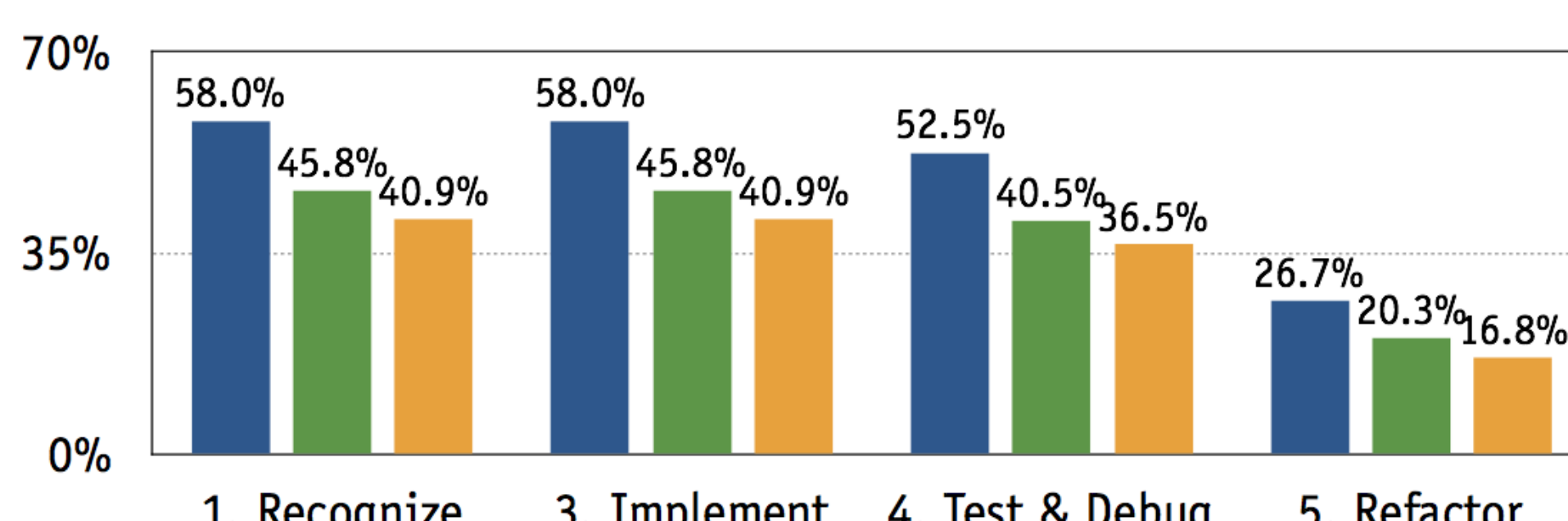
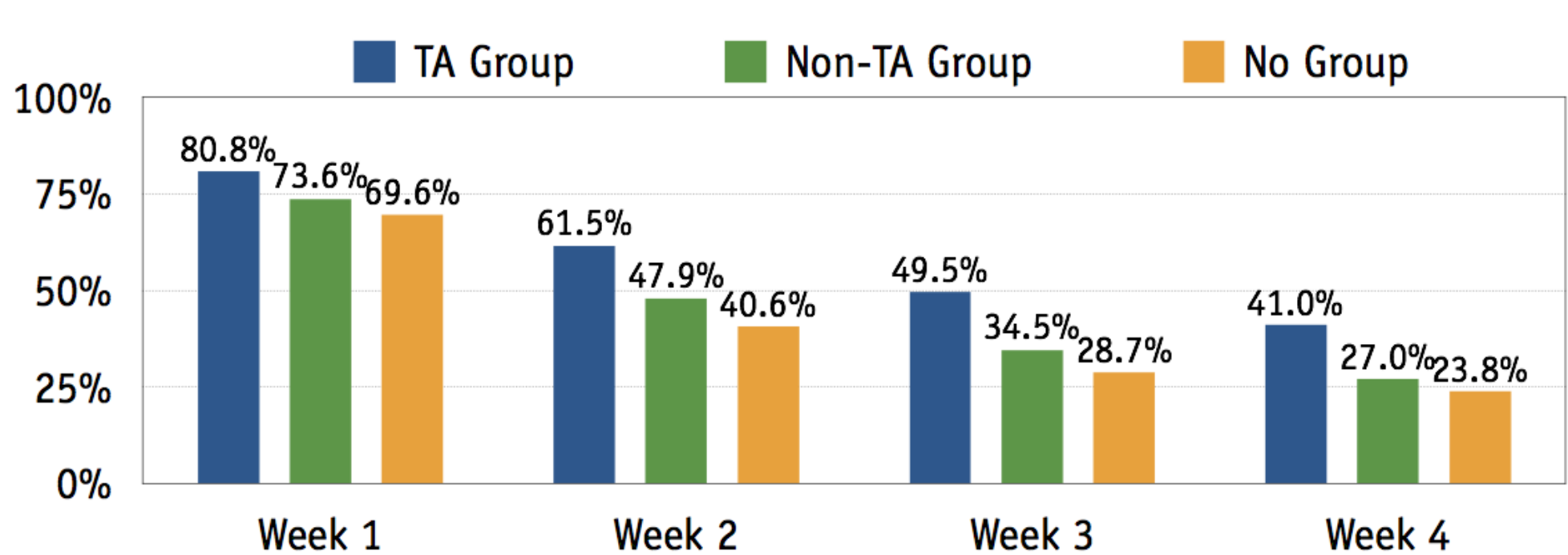
- Lectures Covered
 - Introduction to Web Programming
 - Probability and Regression
 - Dimensionality Reduction and Clustering
 - Classification and Text Analysis
- Student Demographics
 - Female 27%, Male 73%
 - 15-20 10%, 21-25 46%, 26-35 33%, 36- 10%

Fuller's CS-Specific Educational Taxonomy, Adopted to Elice



- Recognize:** Student reads the lecture material
- Design & Model:** Understand and design a new solution structure to solve the problem
- Implement:** Student translates the completed design to code
- Test & Debug:** Detect and correct flaws by applying test cases or submitting the code
- Refactor:** Submitting after getting a full credit
- Present:** Sharing the knowledge through the three channels – chat, tips, and board

Case Study 1: How does TA's assistance level affects students' traversal of the education taxonomy?

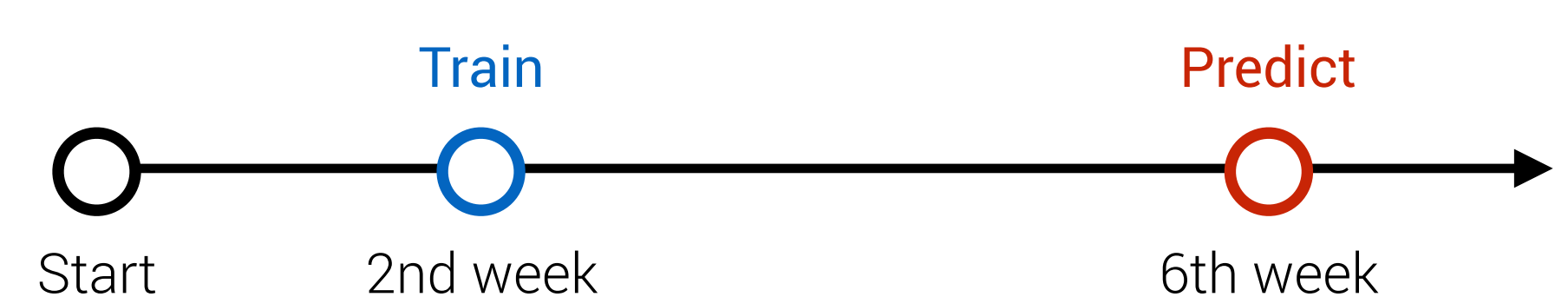
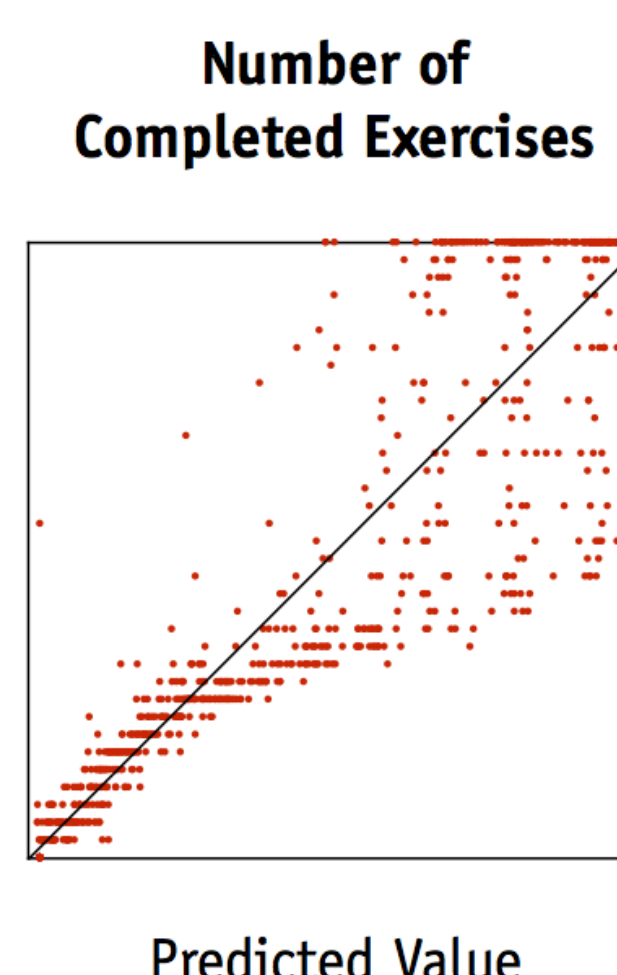
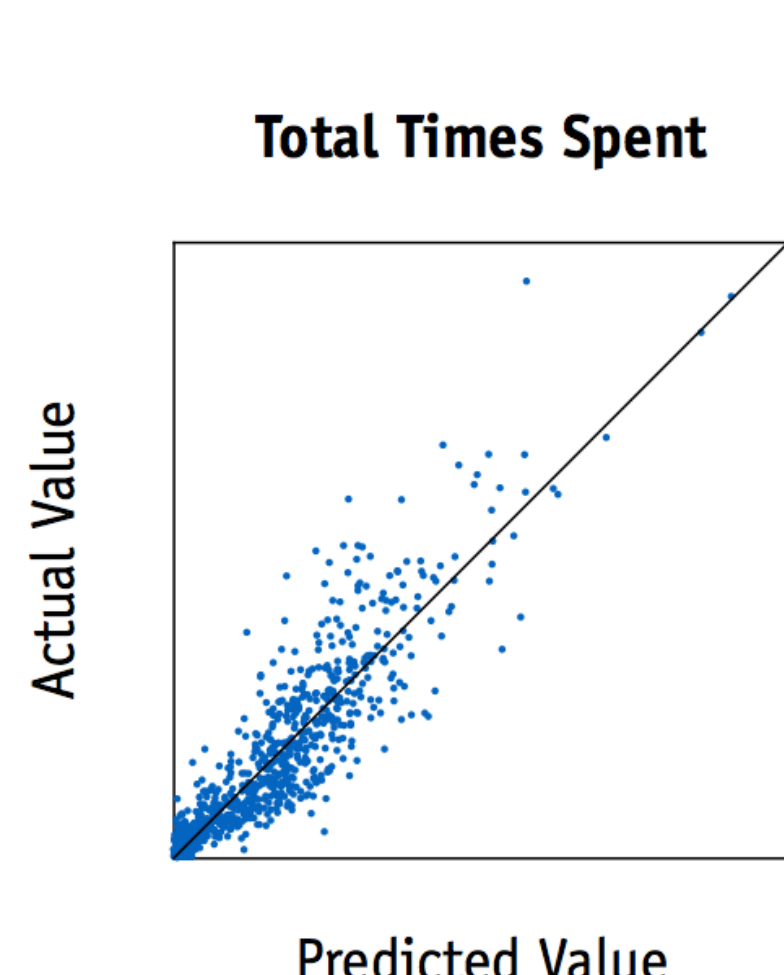


	Level 3 TA- GROUP	Level 2 No-TA- GROUP	Level 1 No GROUP
# Students	107	100	34
ALL EXERCISES			
# Cycles	***4.32	3.59	3.79
Time per cycle (min)	3.87	3.97	3.54
EXERCISE 7			
# Cycles	10.07	8.58	8.07
Time per cycle (min)	5.29	5.14	6.39

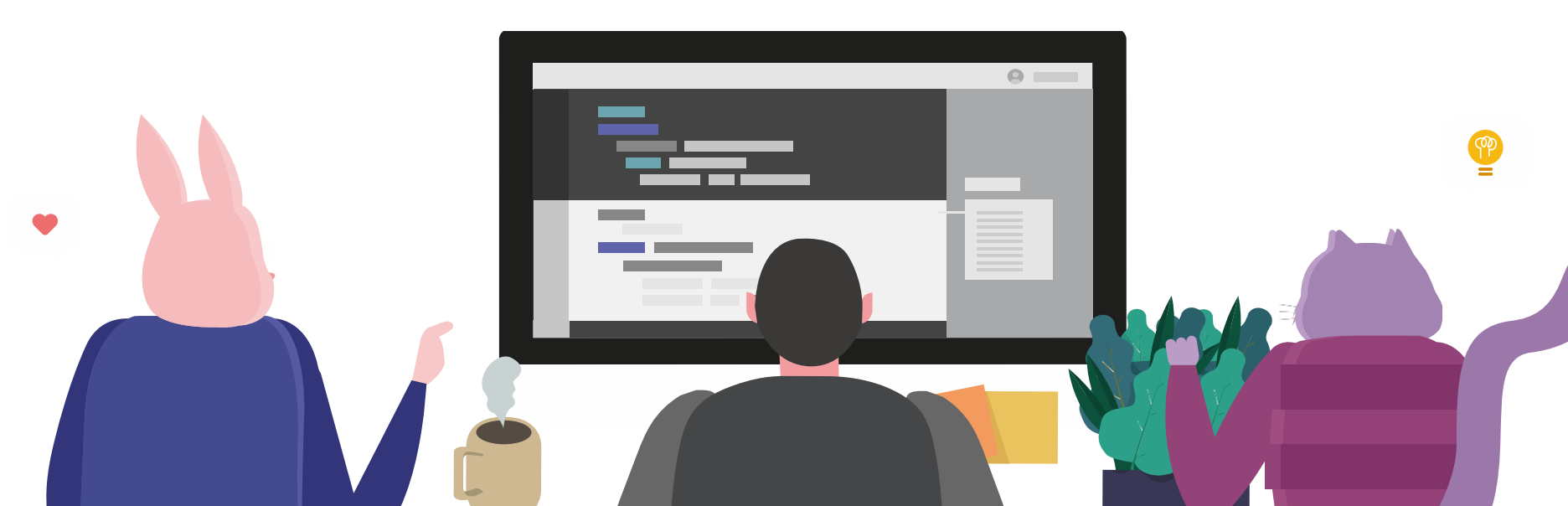
Implement-Debug Cycles

Case Study 2: Can we better predict students' future performance?

	Total Time Spent	# Exercises Solved
PROPOSED		
# Recognize	0.716	0.876
# Implement	0.763	0.574
# Test & Debug	0.783	0.601
# Iterations	0.683	0.452
# Refactor	0.539	0.361
CONVENTIONAL		
Scaffolding level	0.214	0.170
Time spent	0.754	0.454
Exercises solved	0.697	0.875



- Quadratic Linear Regression
 - 8 attributes (5 proposed, 3 conventional)
 - 2 performance indices



Pearson's r value that shows correlation of our proposed/conventional features and two student performance metrics