7.00x Introduction to Biology: A Year Post-MOOC Development, Residential Applications at MIT and the University of Massachusetts, Boston

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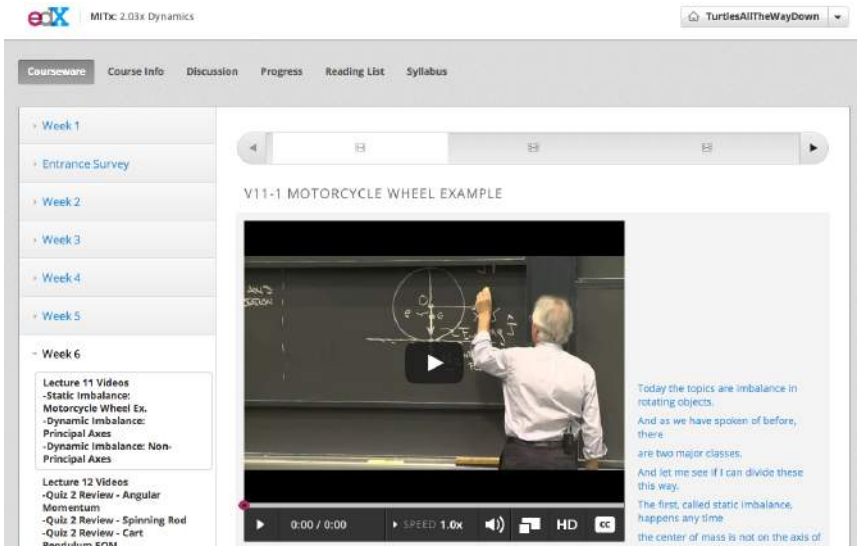
edX

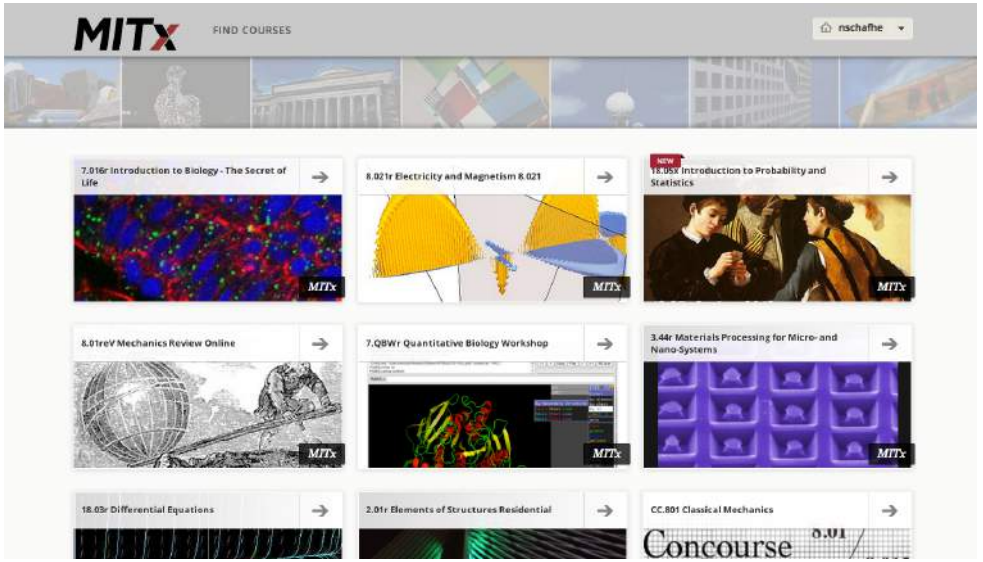
- A non-profit multi-university consortium started by MIT and Harvard
  - MIT and Harvard founding members

- An online course platform and associated course-creation tool
  - 150+



MITx

- A branch of ODL (Office of Digital Learning) that manages the edX and residential course sites
- The MIT residential iteration of the edX course platform, hosting just MIT course sites for students at MIT

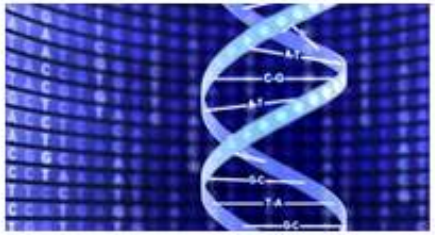


https://lms.mitx.mit.edu/
MIT certificate required

MOOCs

MITx Biology courses available to the world through edX

First Release March 2013



MITx

Course Completed - Jun 06, 2013

7.00x Introduction to Biology - The Secret of Life

Second Release September 2013

MITx

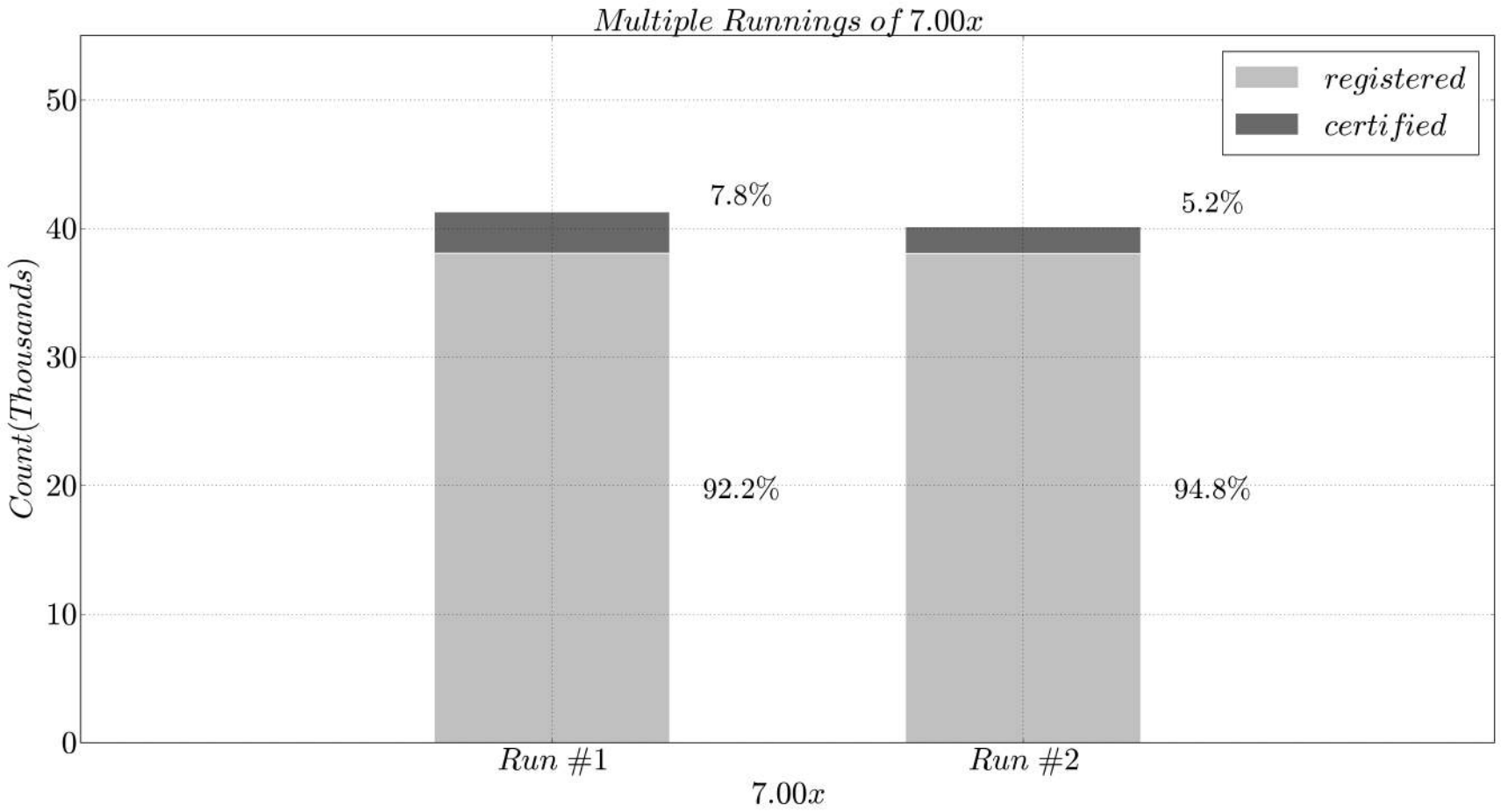
Course Completed - Dec 18, 2013

7.00x Introduction to Biology - The Secret of Life

Third Release **June 2014**

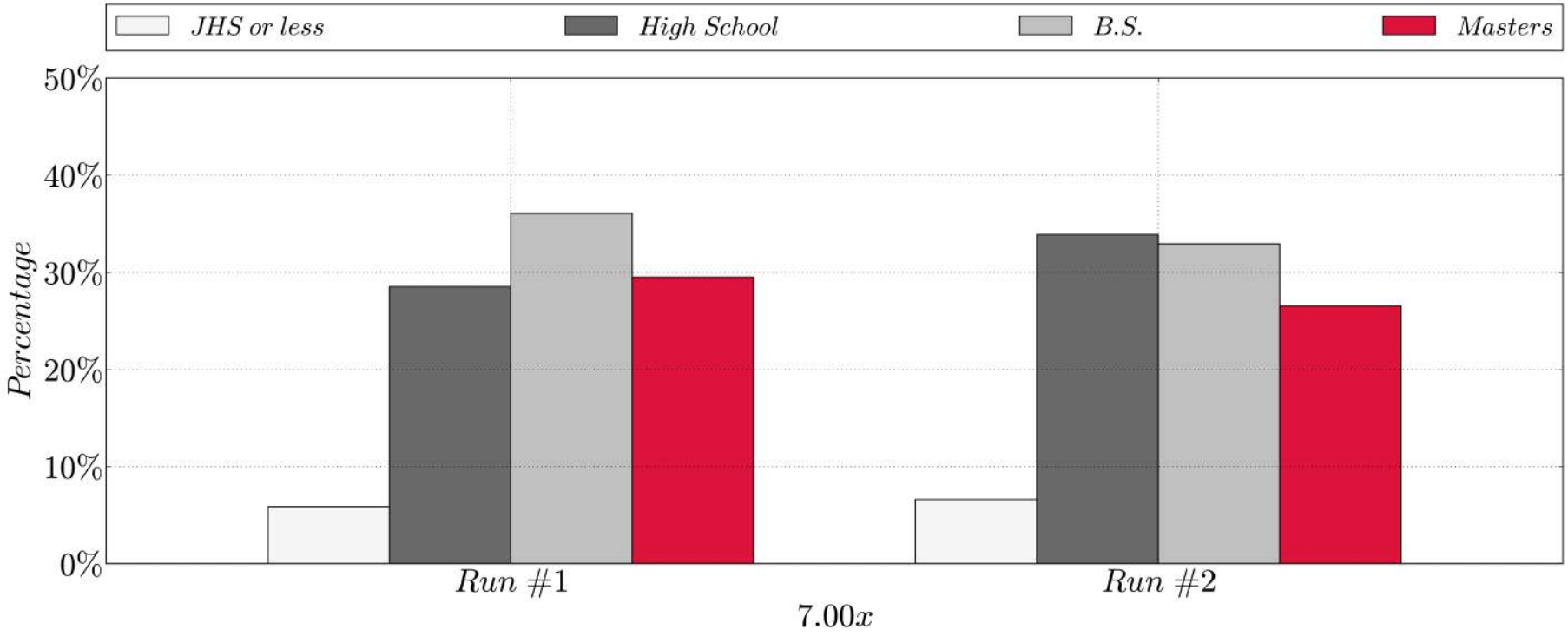
Register at www.700x.org

7.00x Secret of Life



Thank you to Daniel Seaton and Jon Daries for this data.

7.00x
Secret of Life



26% teachers (measured across 7 other MITx courses)

More Information on MITx MOOCs

11 course reports (including 7.00x) and 1 joint report with HarvardX

http://odl.mit.edu/mitx-working-papers/

Do edX students like 7.00x?

A Sincere Thank You

+ 4

about a month ago

I would like to thank Prof Lander and his staff for their efforts in making this a truly wonderful experience. It's a great opportunity for students contemplating a career but it's also a chance for us older (ex) scientists to keep abreast of what's happening. I worked with Irving London years ago but had to give up my career for family reasons. Courses like these give me a chance to experience the incredible new discoveries. I hope there will be more to come. Again, thank you!

It was great

+ 2

about a month ago

I had a enormous pleasure to follow this course. As well the videos where the enthusiasm of prof Eric Lander was so present as the problems set so instructive and amazing. The 7.00x course was not only a marvelous opening on Biology but also a lesson of scientific methodology (and researcher responsibility). Thank professor and thank to all the staff. Thanks also to the MIT. I wish you soon will offer a follow-up, or a next step course ! Let me know. (PS: I hope we can find the problem sets software on the web for more use).

edX Student Review of 7.00x

by student - reviewed on CourseTalk ★★★★★ Completed 33 days ago

This was my first formal exposure to biology or genetics, although I had read widely in these areas out of personal interest.

The course was extremely effective in conveying both the wonder and excitement of the field, and the sometimes difficult technical details. I have taken a number of MOOCs, and this course is way ahead of anything else I've seen.

In part, this is due to Professor Lander's great skill and gift for teaching and his position at the leading edge of research in the field. I came away from each lecture feeling inspired and energized - something I haven't encountered since my time at MIT in the late 70s. The excellence of the course is also due to the quality of the supplementary materials, especially the explanatory videos by graduate students and the lab demonstrations. But most surprising to me was how well the online medium has been harnessed in providing tools for learning and skill development as well as in testing in the homework assignments, midterms and final exam. I wonder at the amount of thought and effort that has gone into producing the course.

7.00x demands demands substantial effort and time input, and for someone new to the field, it is difficult. But it delivers the authentic MIT experience.

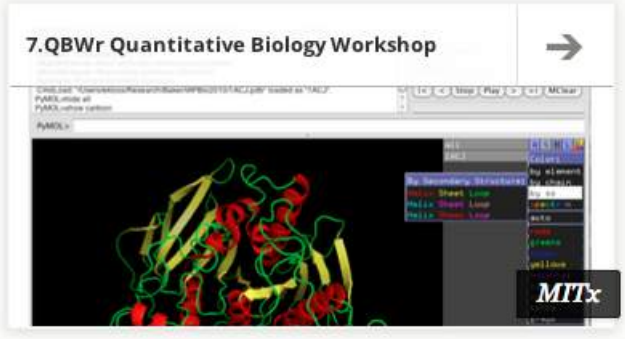
Residential Use of MITx in Biology

Nine courses hosting content on MITx sites from September 2013 to August 2014

Fall 2013

Introduction to Biology
7.012 – all 7.00x materials
7.016 – selected videos
(Requirement for all MIT students)

January 2014



For Outreach Students

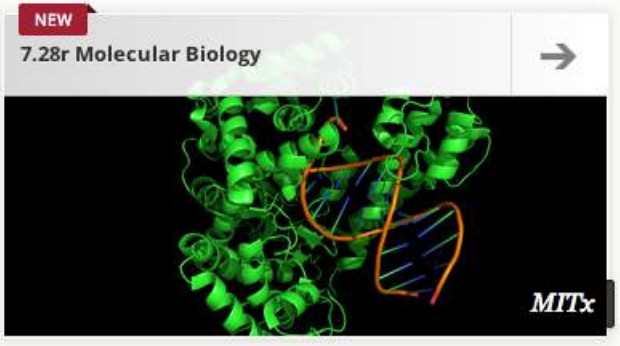
Residential Use of MITx in Biology

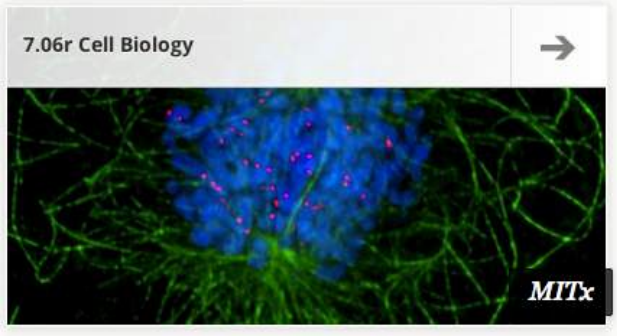
Spring 2014

Introduction to Biology

7.013 – selected videos

7.014 – OCW and 7.00x content integrated into class time



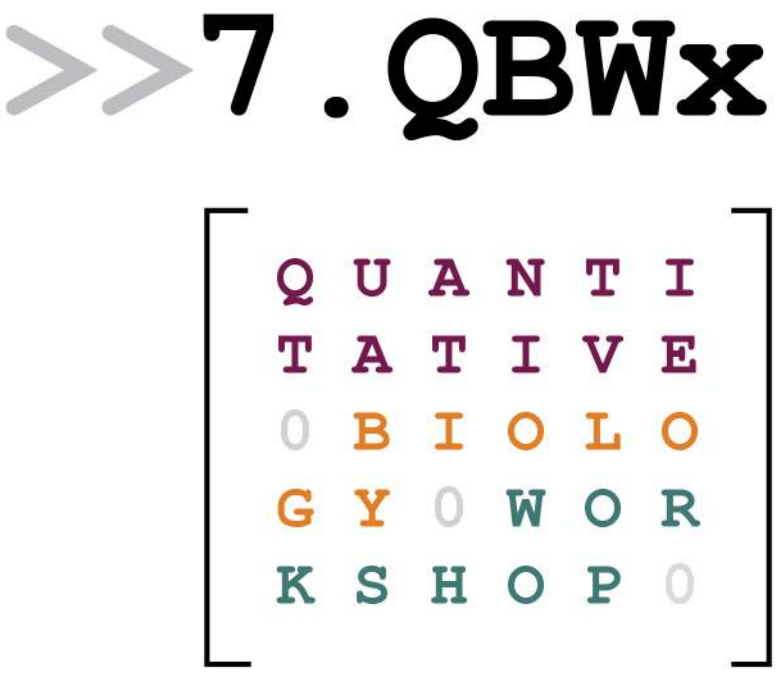


Summer 2014

7.S390 Creating Digital Learning Materials for Biology

- Final Projects Demo July 31st

7.S391 Quantitative Biology Workshop



- Opened June 10, 2014 on edX.org
- Based on an outreach program offered by the Biology Department of MIT
- Converted exercises to platform for January program on campus
- Analyzing biological data using MATLAB, Python, and R
- MATLAB boxes within platform with autograding

Do MIT students like MITx sites (7.012 Survey)?

6. Do you visit the 7.012 MITx site even if not required by assignment?

	Response Percent	Response Count
Yes	76.9%	327
No	13.4%	57
Not yet, but I want to start doing so.	9.6%	41
answered question		425

10. Have you tried answering a problem on the 7.012 MITx site?

	Response Percent	Response Count
Yes	95.5%	405
No	1.9%	8
Not yet, but I want to start doing so.	2.6%	11
answered question		424

Do MIT students like MITx sites (7.012 Survey)?

9. Did you find the videos useful as a study aid?

	Very useful	Somewhat useful	Not useful	Rating Average	Rating Count
Lecture Video	**81.9% (339)**	16.7% (69)	1.4% (6)	1.20	414
Deep Dive Video	35.0% (119)	**51.8% (176)**	13.2% (45)	1.78	340
Lab Video	6.4% (13)	**54.4% (111)**	39.2% (80)	2.33	204
			answered question		**421**

12. Did you find the problems useful as a study aid?

	Very useful	Somewhat useful	Not useful	Rating Average	Rating Count
Test yourself	**48.2% (191)**	43.9% (174)	7.8% (31)	1.60	396
Problem set	**49.8% (161)**	41.8% (135)	8.4% (27)	1.59	323
Exam	45.3% (111)	**46.5% (114)**	8.2% (20)	1.63	245
			answered question		**408**
			skipped question		**23**

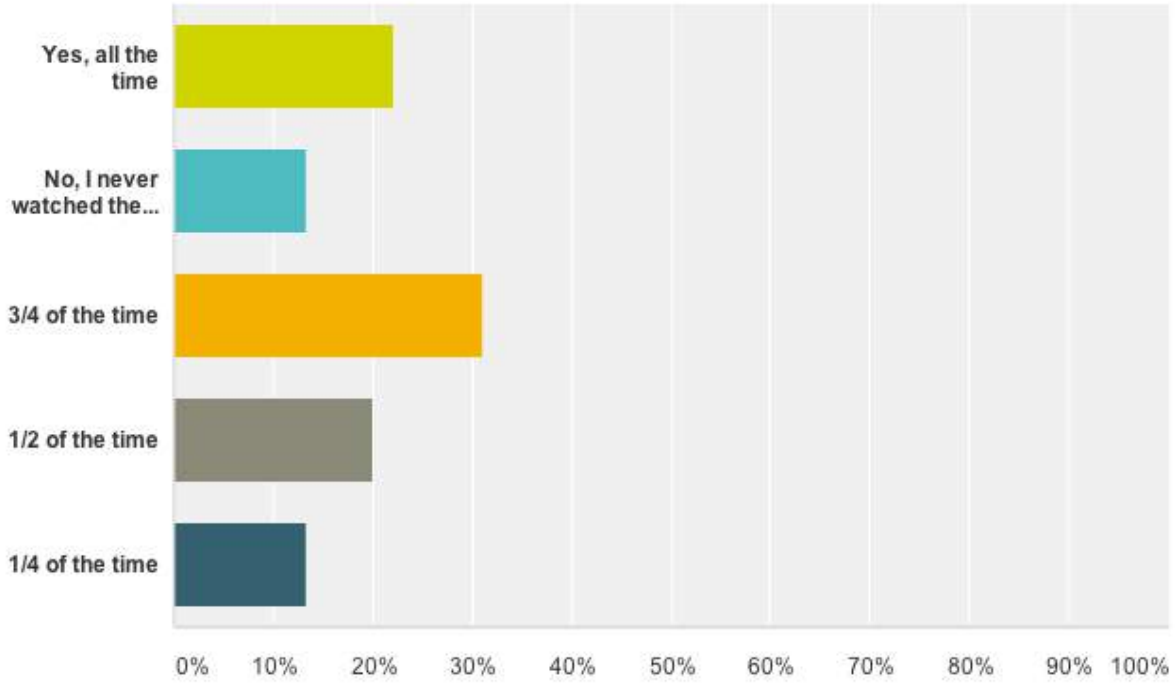
Do MIT students like MITx sites (7.012 Survey)?

14. Would you like to have an associated MITx site in other courses that are currently not doing so?

		Response Percent	Response Count
Yes		80.4%	341
No		19.6%	83
		Yes, but only if	51

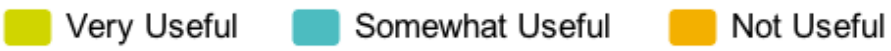
Early Challenges to Using Flipped Classes in 7.014 Introduction to Biology at MIT

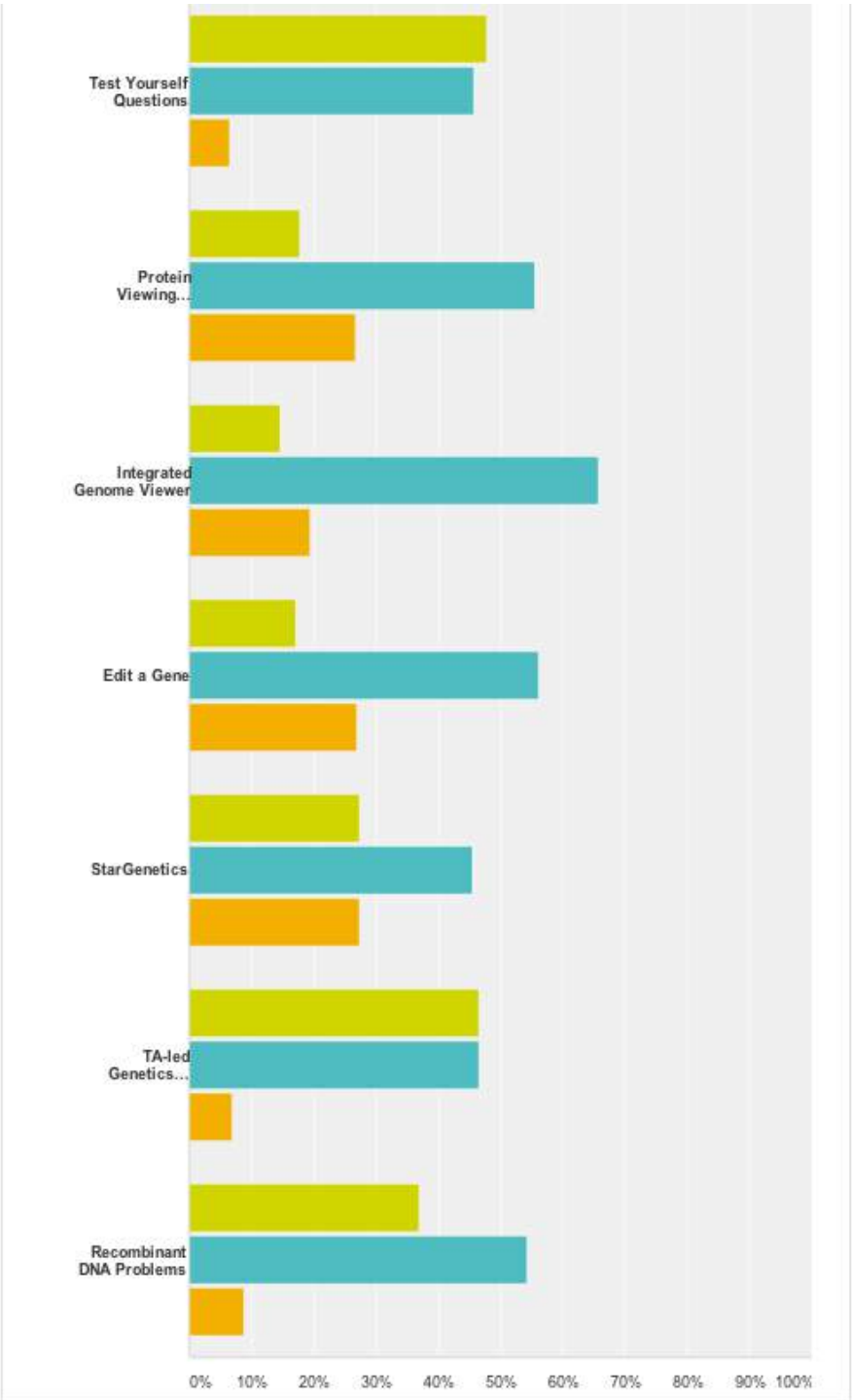
Before going to class, I watch the lecture video clips assigned for that day (when assigned).



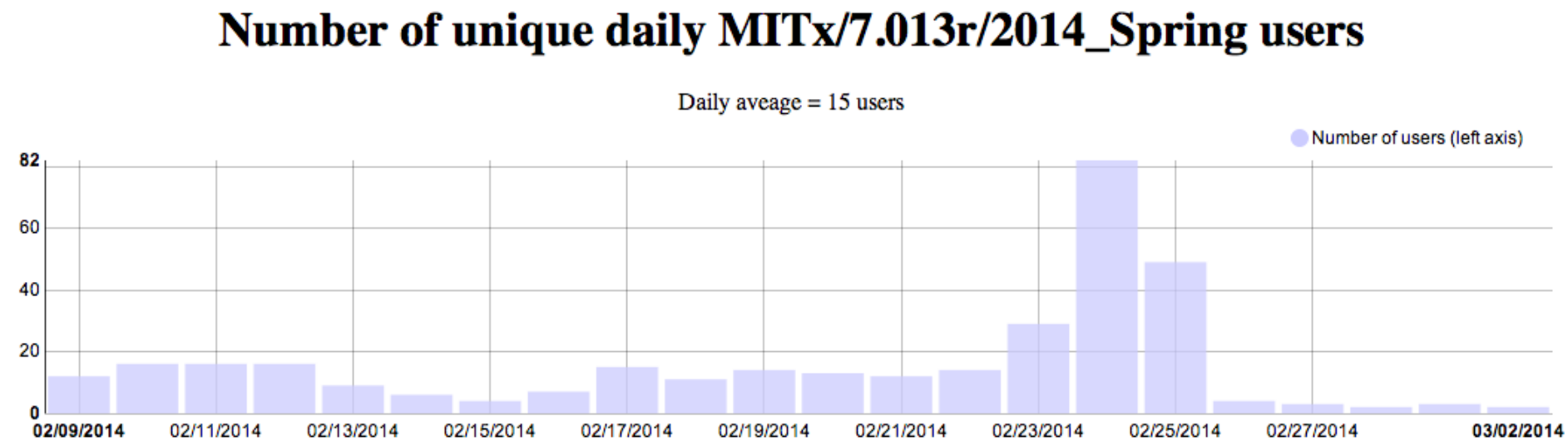
7.014 MITx Online Problems

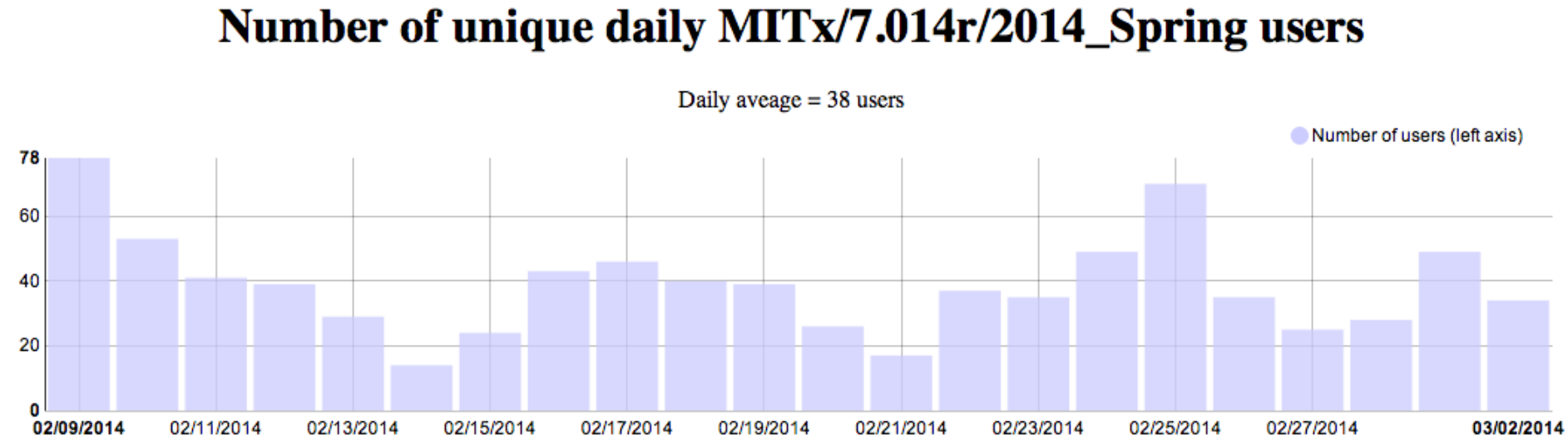
If you tried answering a problem on the 7.014 MITx course site, did you find the problems useful as a learning tool or study aid? Only rate a problem type that you have tried.





Implementation Strategy of Online Materials Affect Student Use





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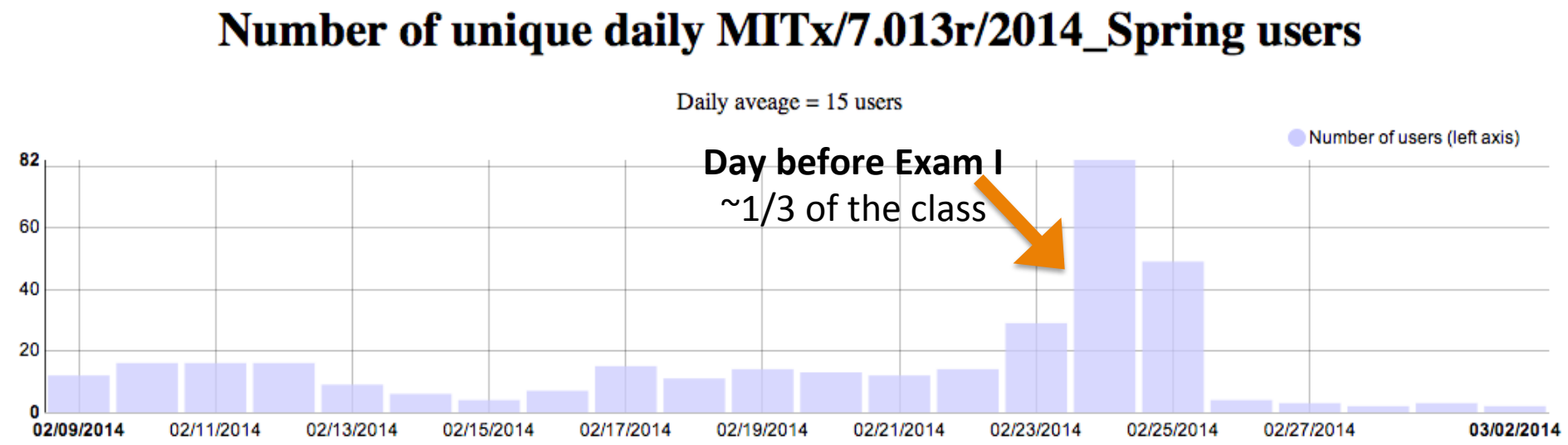
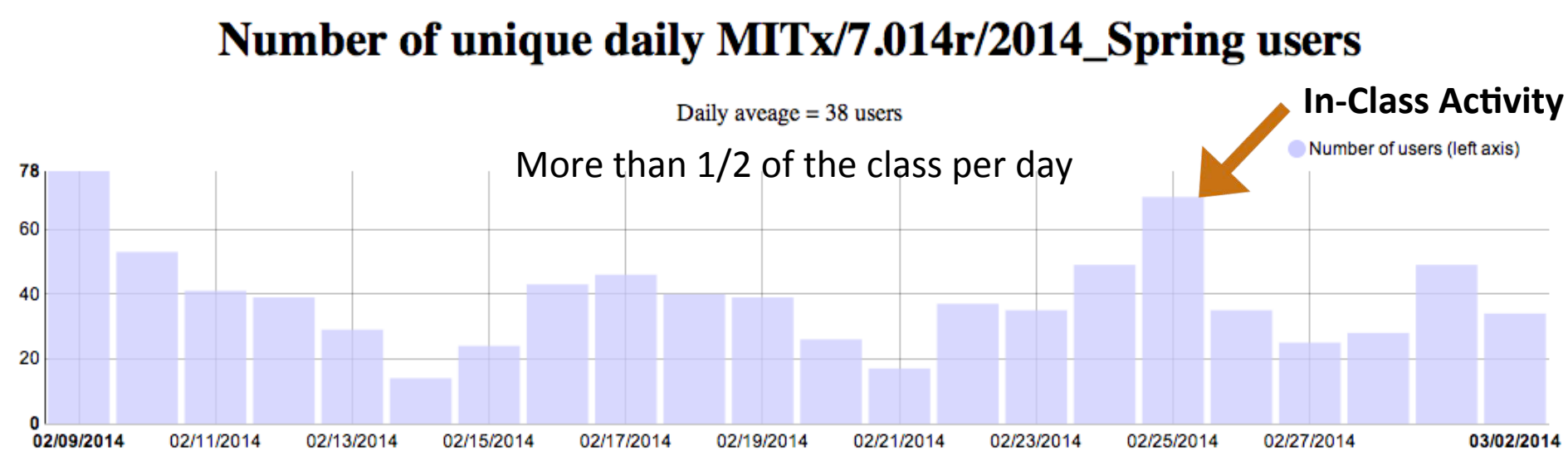




SPOCs
Small, Private, Online Courses

MITx course customized and only made available to a select group though edX edge

SUTDx

10.010 Introduction to Biology

View Course

7.00x_UMass: General Biology I: Bio 111 MITx

REGISTER FOR 7.00X_UMASS

Flipped Class Goals

- Use the students' and teacher's time most effectively:
- At home (flexible time; no instructor)
  - Read
  - Watch Video
  - Warm-up problems
- In class (fixed time; instructor)
  - Discuss
  - Apply
  - Ask questions
  - Fill in gaps
  - Active Learning

General Biology I at Umass Boston

- First semester course
- Majors
  - 52% Biology/Biochemistry/Chemistry
  - 26% Miscellaneous
  - 22% Undecided
- 334 students
  - 68% Female
  - 64% Non-White
  - Average age 20.0

MOOC vs SPOC

- Massively Open On-line Course
  - ~ weekly units
  - Lectures with graded “Test Yourself Questions”
  - Graded Problem Sets and Exams
- Small Personalized On-line Course
  - ~ daily units
  - Lectures with ungraded “Test Yourself Questions”
  - Ungraded Warm-up Problems

“Ungraded” problems

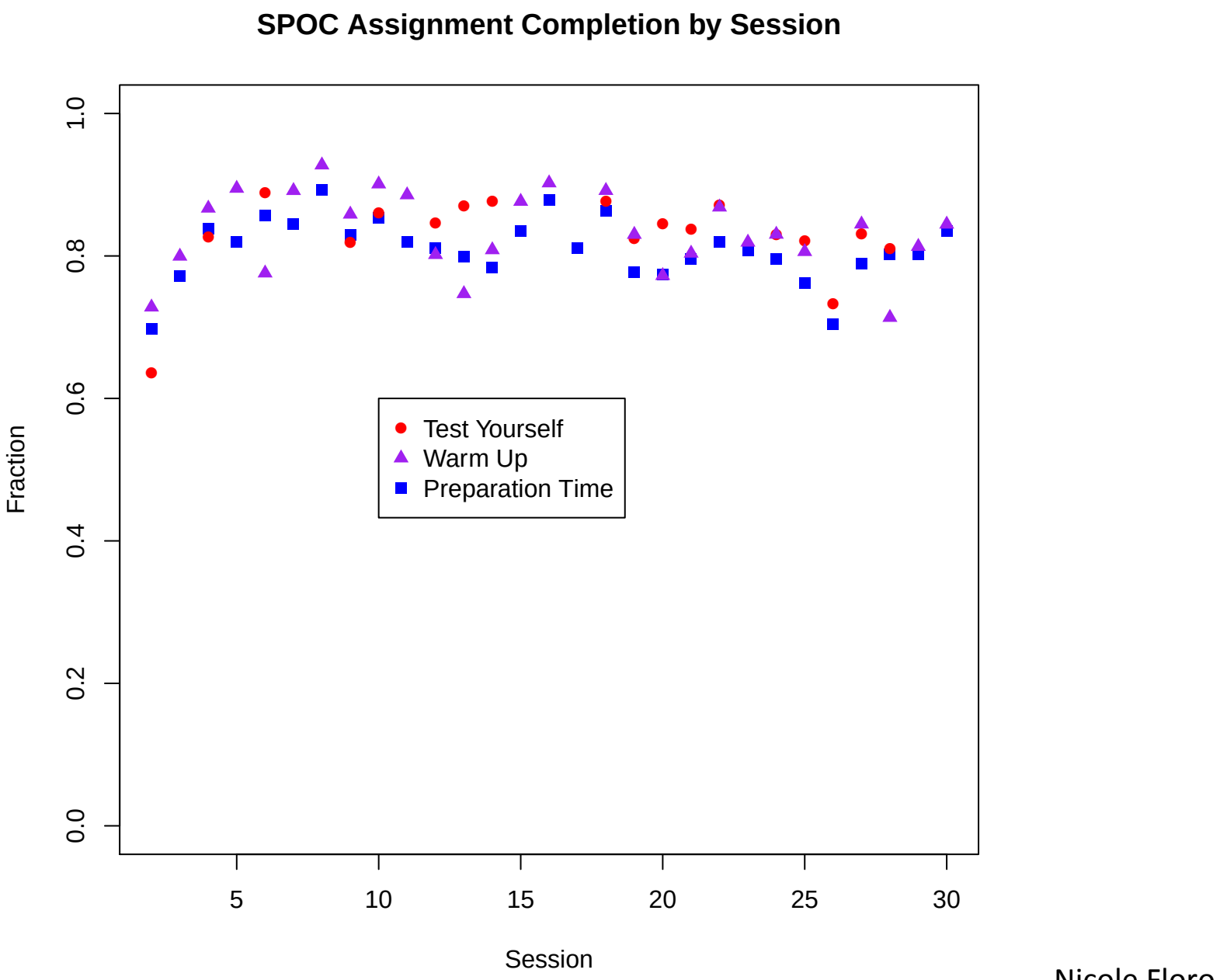
- Must get correct but:
  - After first try, they can click “Show answer”
- Goals:
  - Low stakes => more exploration
  - They might not “get it” from on-line materials
  - Wrong answer = learning opportunity (≠ failure)
- Risks:
  - Slacking
  - Potential course collapse…

Flipped Class Session activities

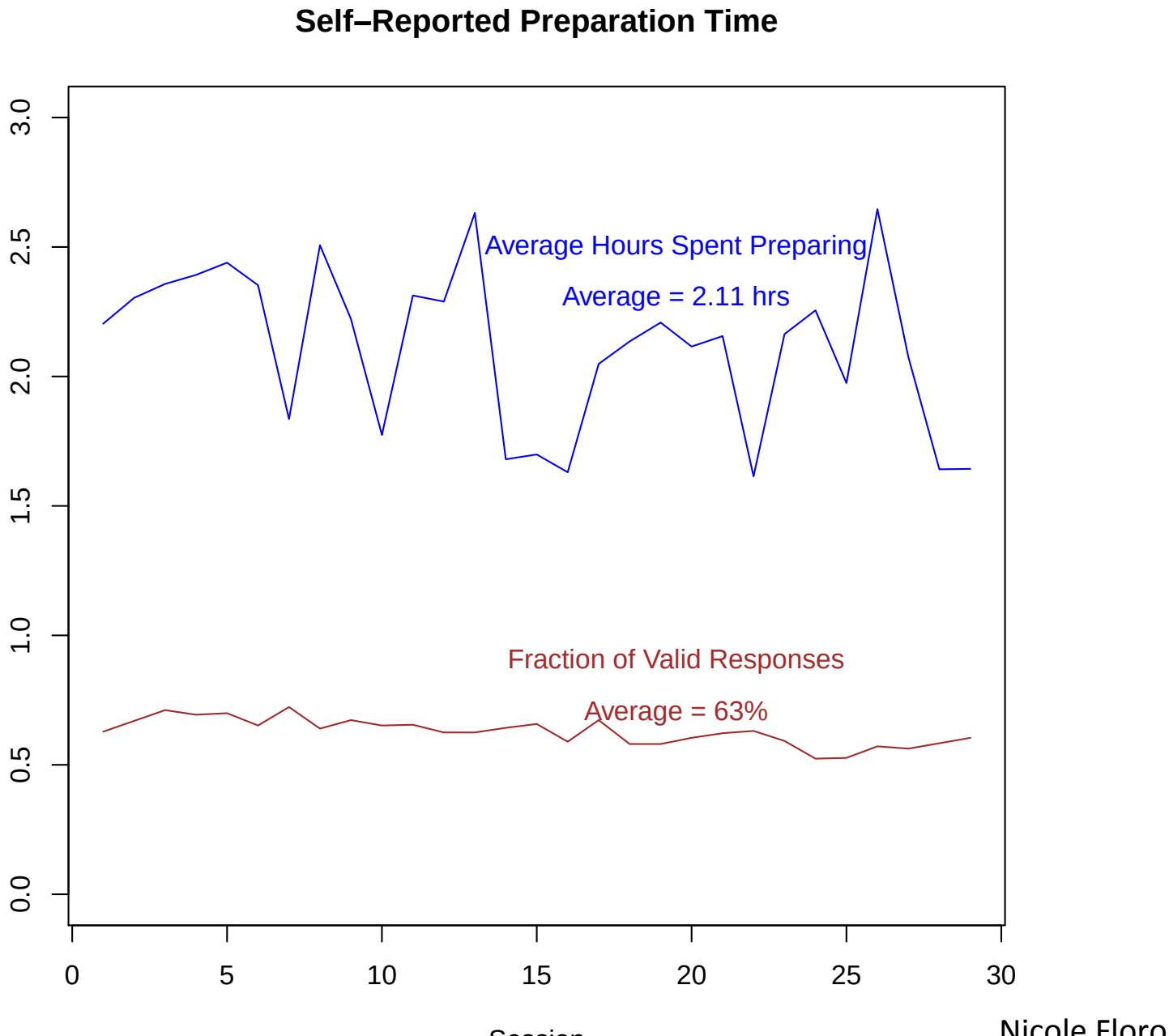
- 6-10 iClicker Questions
  - Be sure they understood SPOC
  - Move from SPOC difficulty to exam difficulty
- Mini Lectures
  - Introduce examples
  - Fill in cracks
- Examples
  - Practice Problems

Results

- Did they do the preparation work?
- Did they learn the material?
- Did they slack off? Does it matter?
- Did they like it?



Nicole Floro



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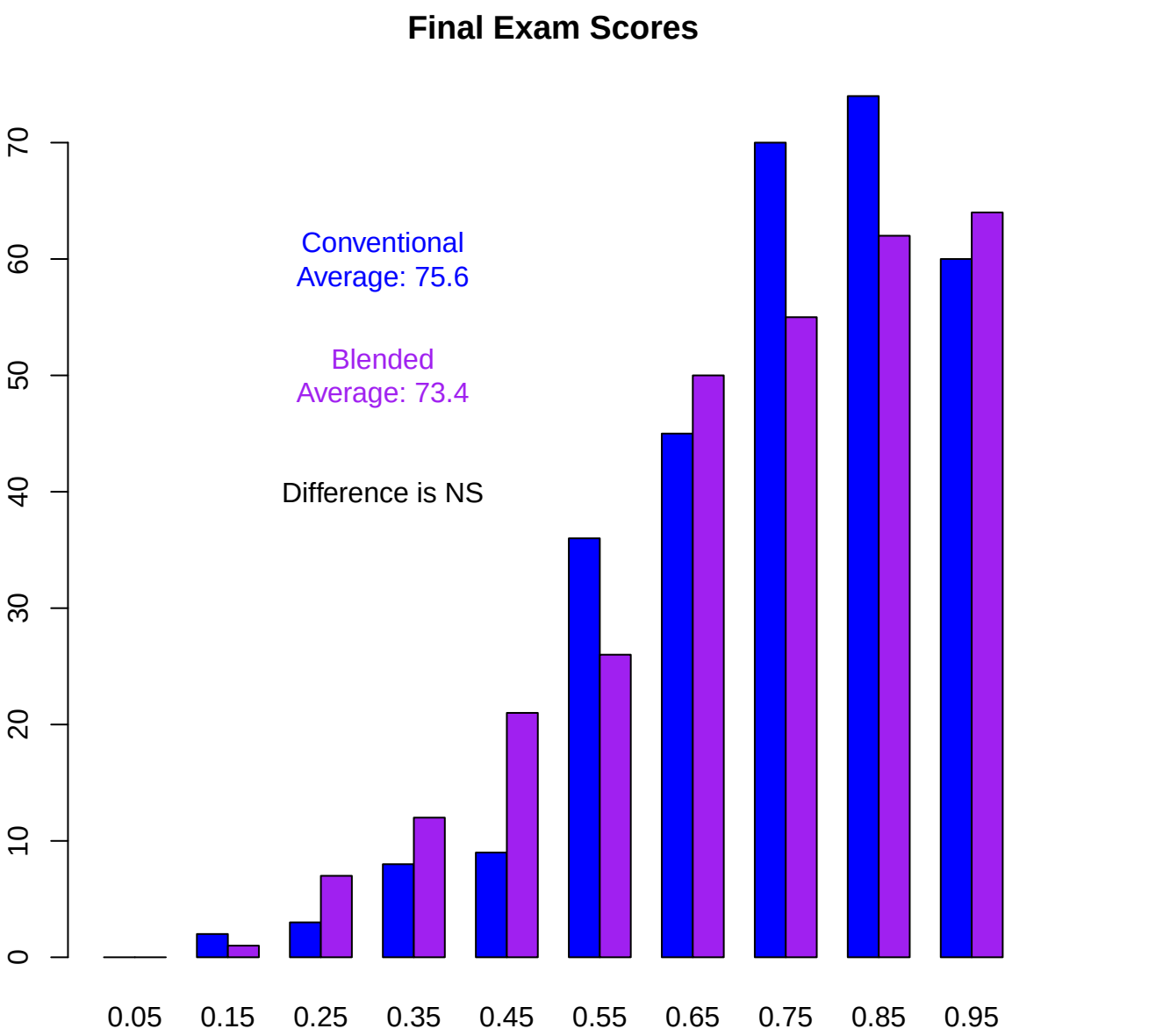
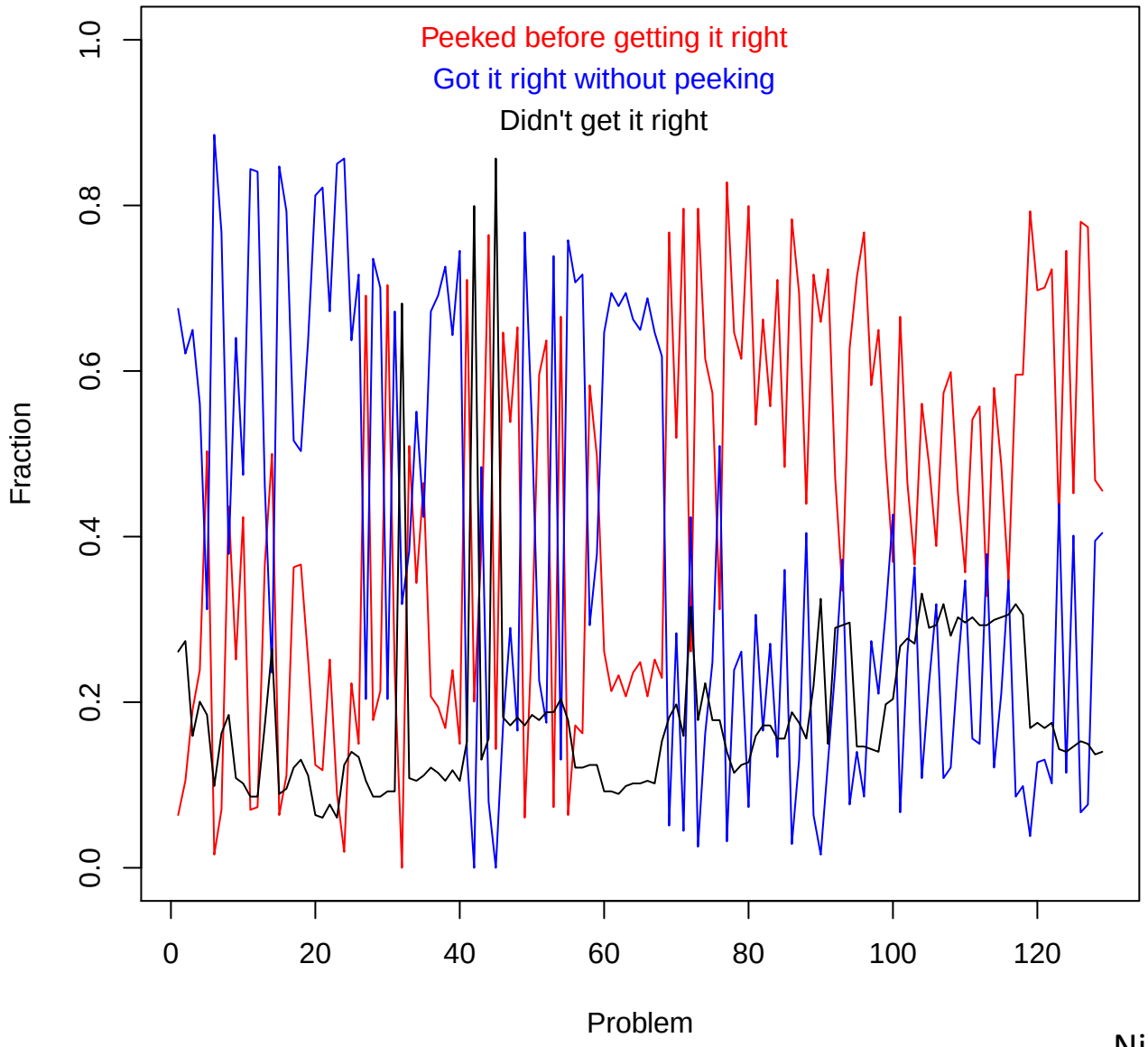


Kiley Brown & Drew Caruso

Student's Attempts at Warm-up problems

	Correct	Incorrect
Peeked at Answer	P	W
Did not peek	C	I
Never Tried	N	

Nicole Floro



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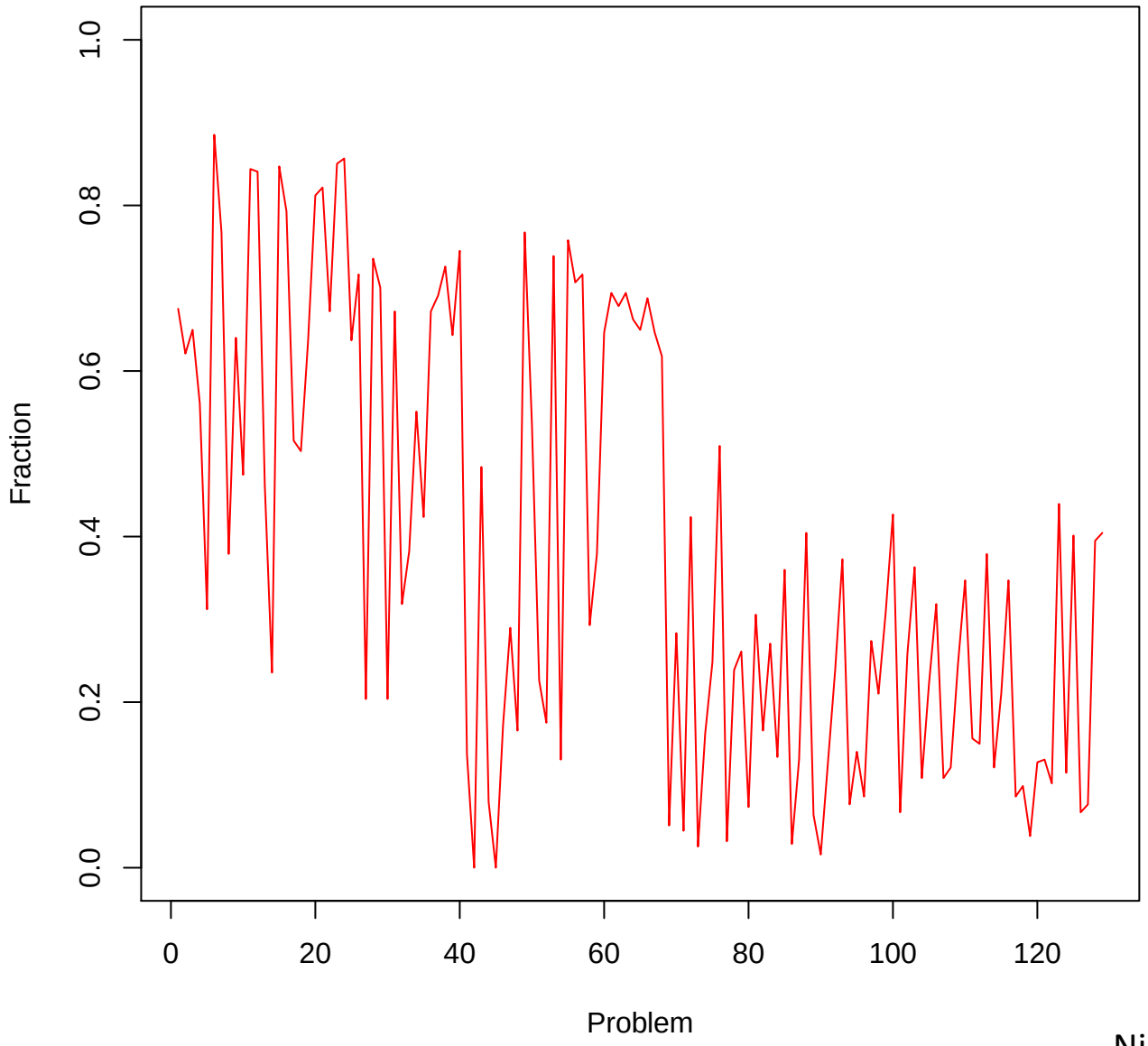

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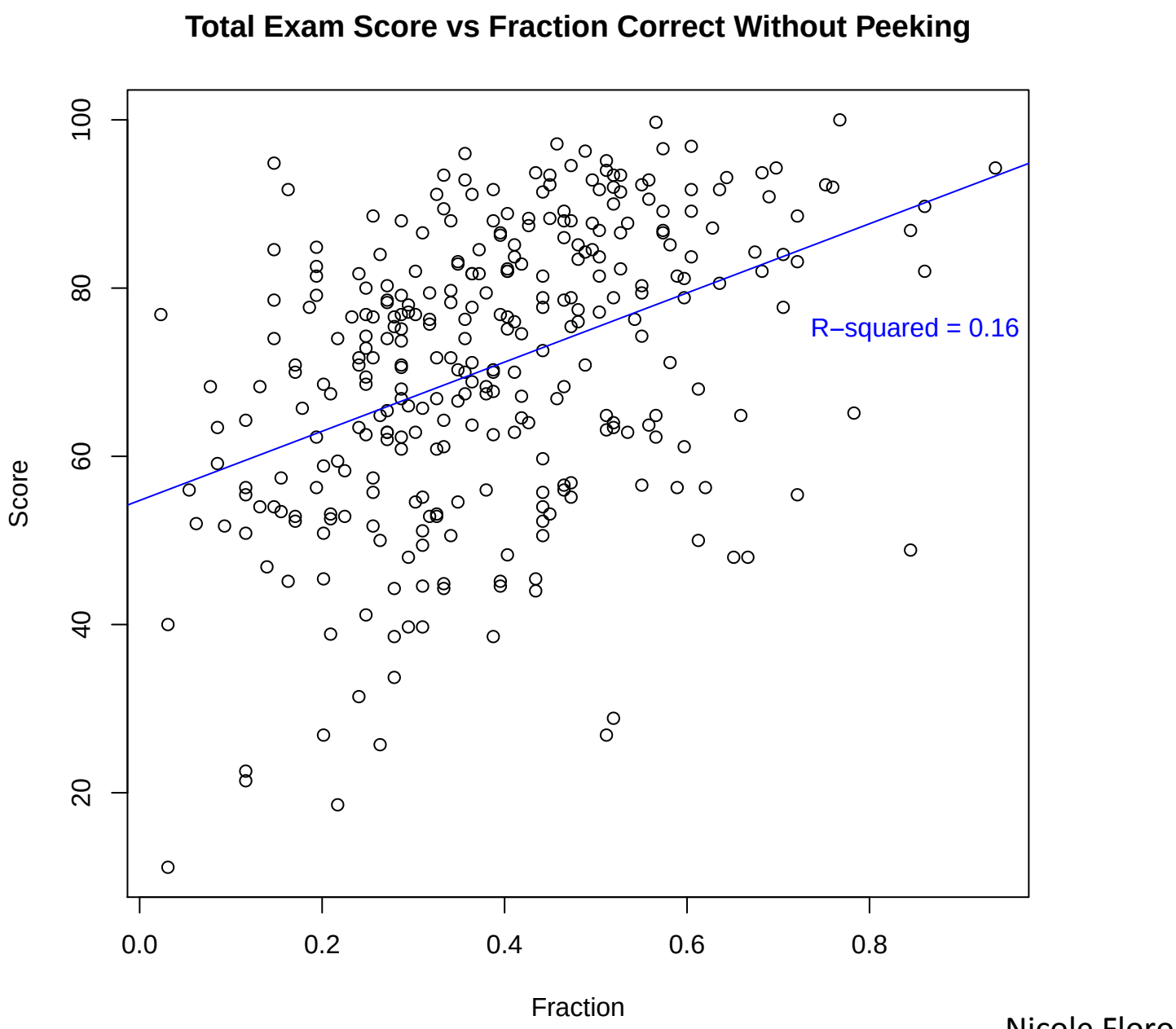
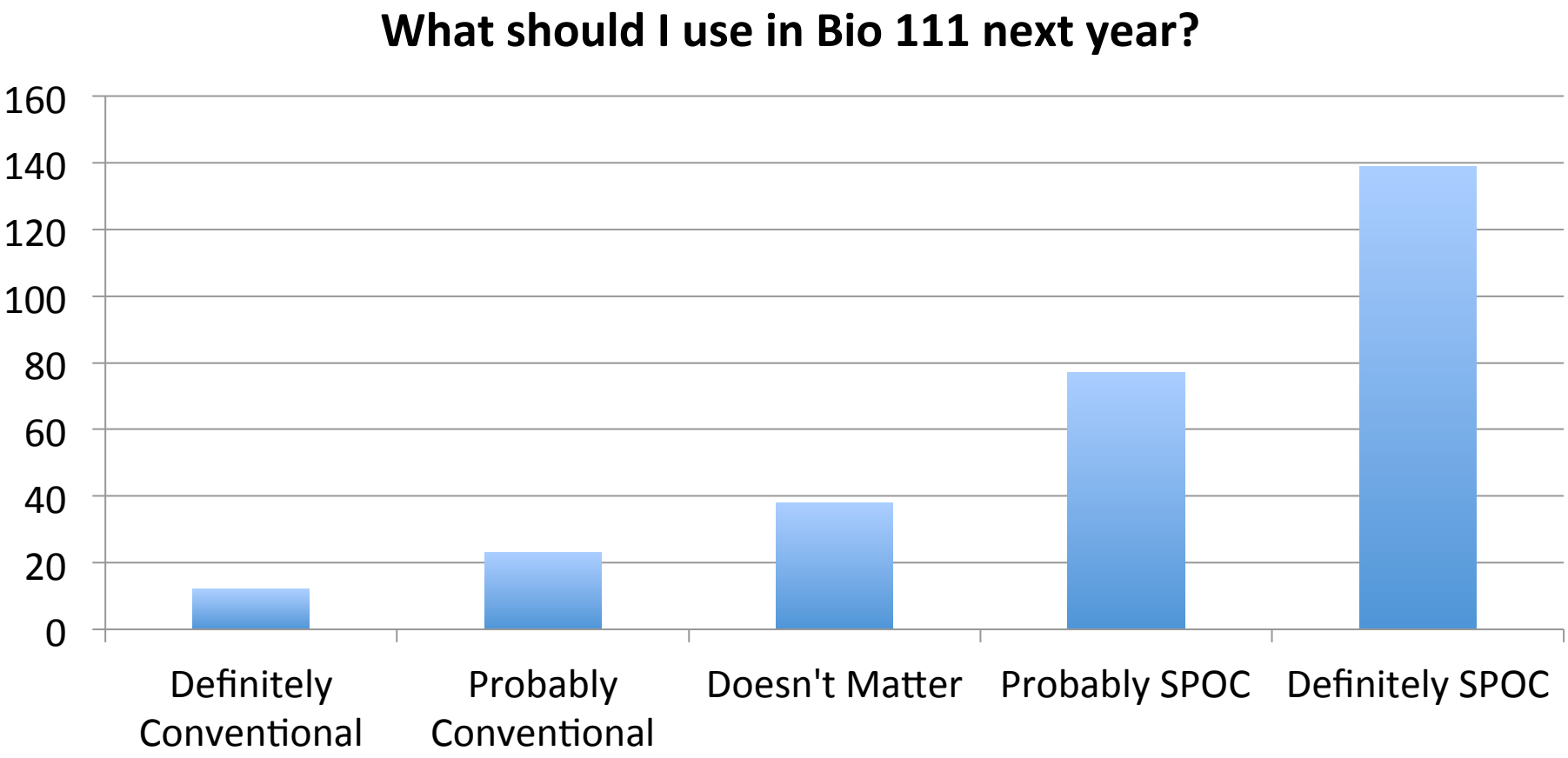


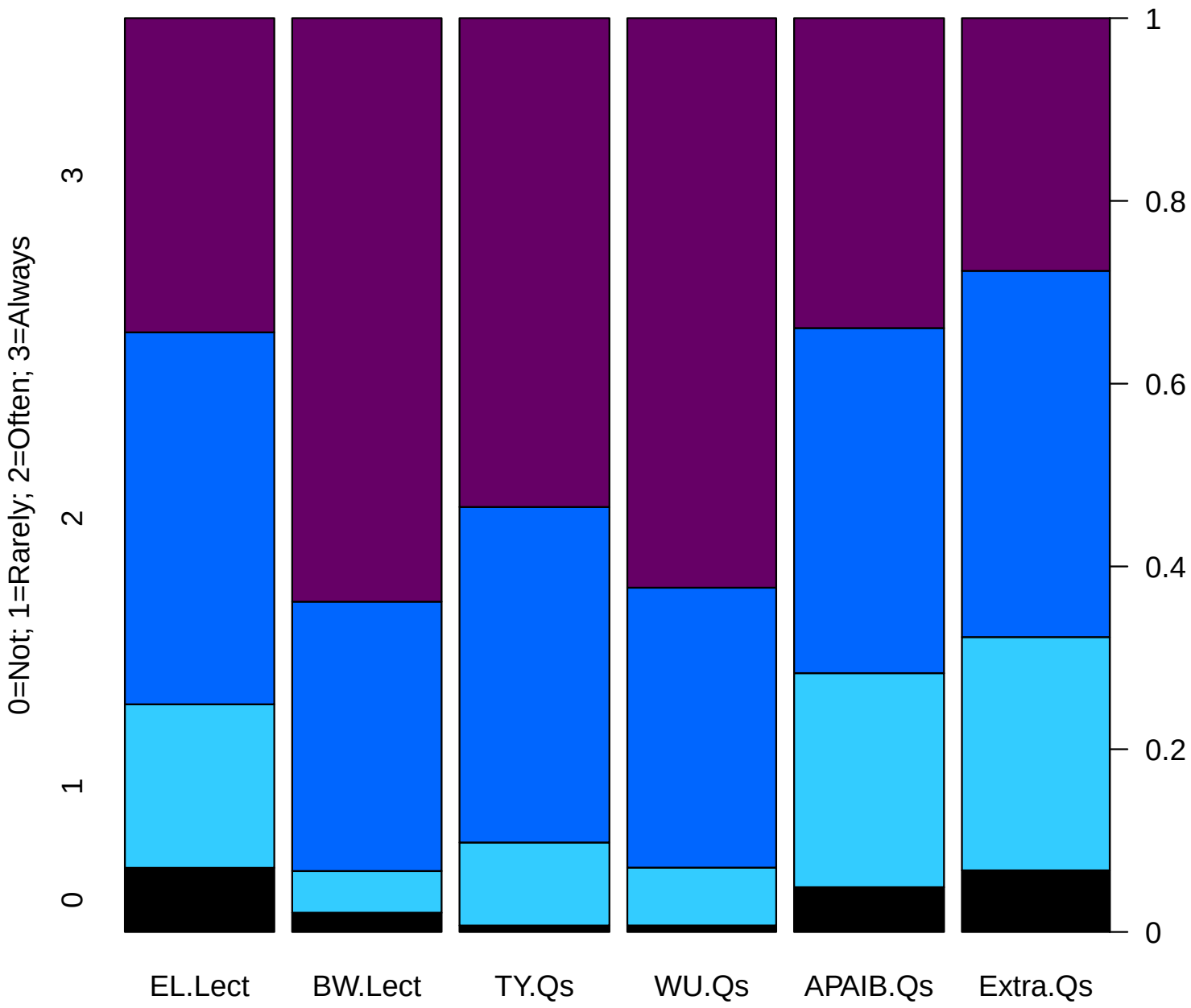
Nicole Floro

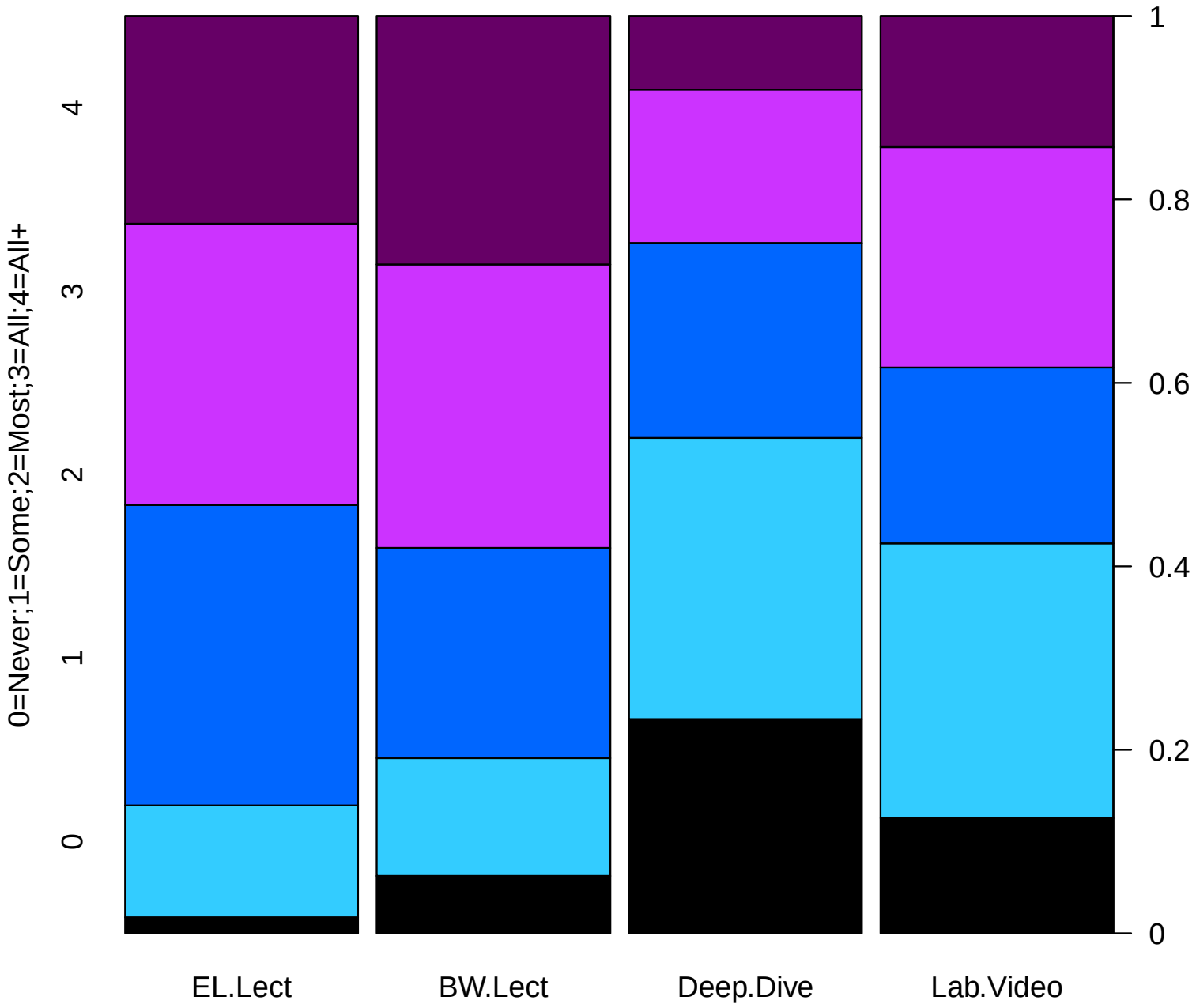
Student Feedback: SPOC?



Student Feedback: SPOC?

- Advantages of SPOC-based Class (289/334 students):
- "Can stop and rewind lectures" (46%)
- "Can watch at my own pace/time" (33%)
- "Practice questions help me understand" (25%)
- "Rapid feedback on problems is helpful" (18%)
- "Can go back and review material" (16%)
- "I come to class prepared" (13%)
- "Class time is used for application, etc" (12%)


How useful were these when preparing for the exams?
0=Not; 1=Rarely; 2=Often; 3=Always
0
1
2
3
0
0.2
0.4
0.6
0.8
1
EL.Lect
BW.Lect
TY.Qs
WU.Qs
APAIB.Qs
Extra.Qs


How often did you watch these videos?
0=Never;1=Some;2=Most;3=All;4=All+
0
1
2
3
4
0
0.2
0.4
0.6
0.8
1
EL.Lect
BW.Lect
Deep.Dive
Lab.Video

Some of the Key People in Biology Making this Possible at MIT

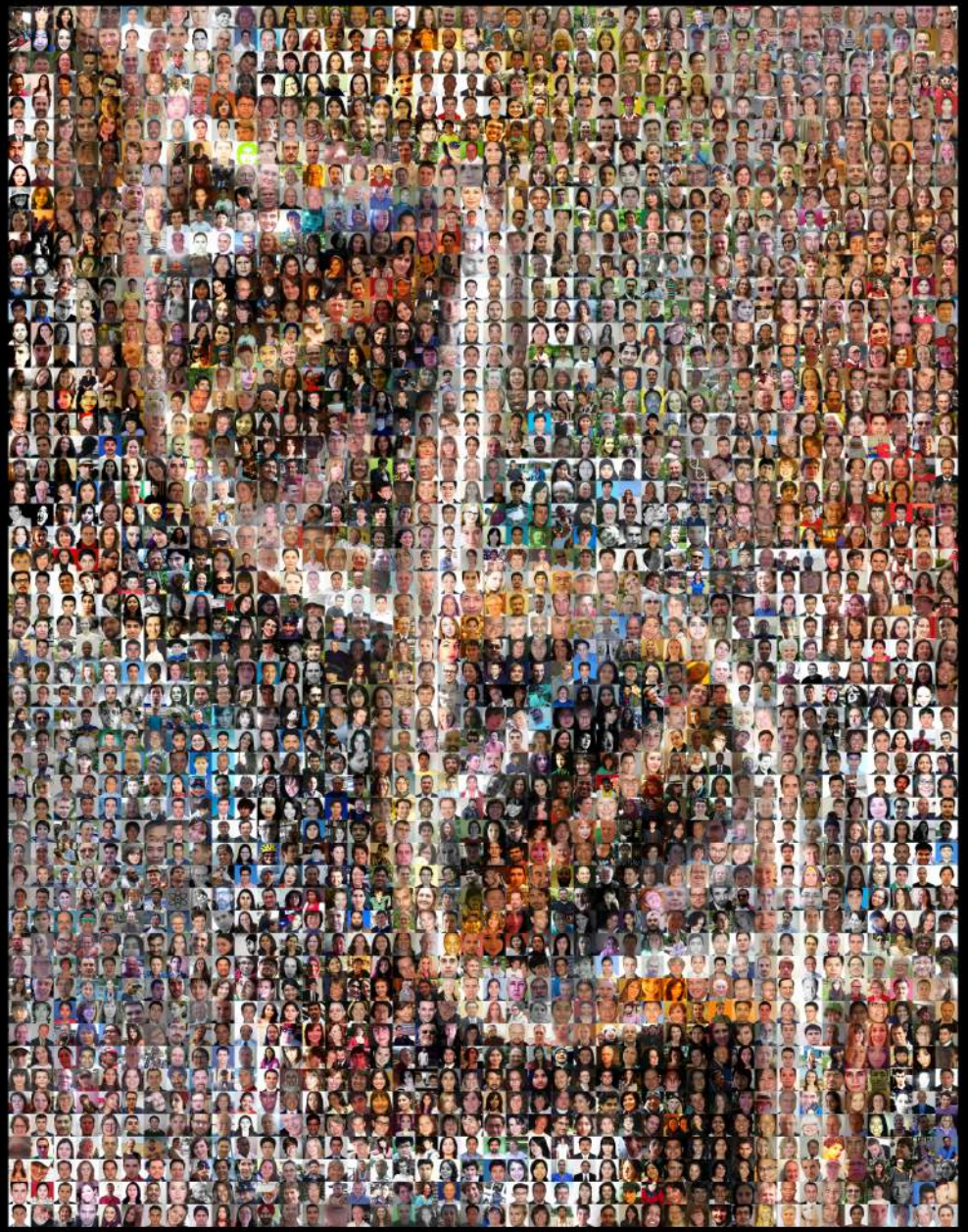
Tania Baker
Department Head
(until May 2014)

7.00x

Eric Lander
Graham Walker
Mary Ellen Wiltrout
Michelle Mischke
Brian White

MITx Biology

Nathaniel Schafheimer
Sera Thornton



Biology Faculty Most Involved with MITx on campus

Eric Lander (7.012)
Graham Walker (7.014)
Steve Bell (7.28)
Hazel Sive (7.013 and MIT Faculty Committee)
And more…

ODL
MITx
edX

7.00x Secret of Life