
UCDAVIS

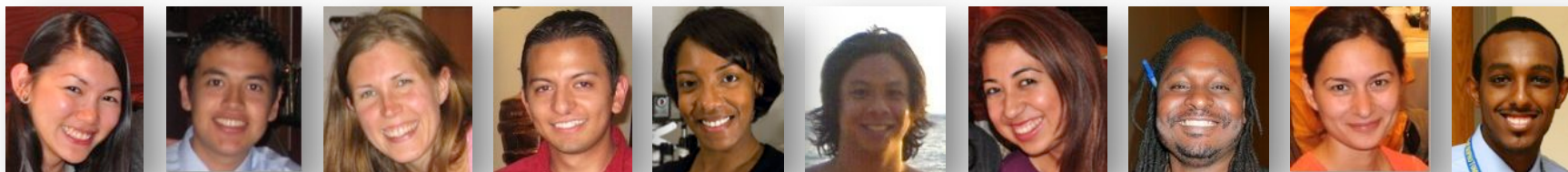
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Monitoring and supporting persistence to STEM degrees

(Examples from the Innovation and analytics trenches)

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Maximize UCD graduates' **Capability + Resilience** → **CAREER**
through **EVIDENCE-BASED ACTION**

Strategy 1

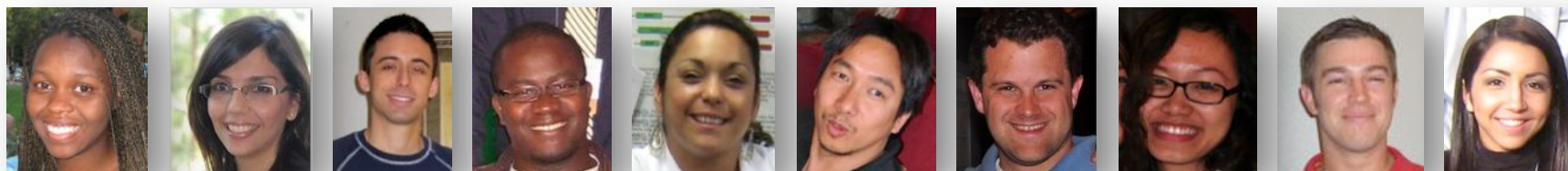
Catalyze **cultural change**
[institution & policy]
Develop **communities**
[support/sustain change]

Strategy 2

Catalyze/Test **innovations**
instruction
assessment
Curriculum
experiences
(**iACE**)

Strategy 3

Build and share
analytics tools & architecture
to measure and inform
improvement
of student outcomes and
teaching practices



PATTERNS& SOLUTIONS?



STEM & Non-STEM **LOSS** – URG, First Generation, Low Income

GPA patterns – STEM stayers and leavers, URG

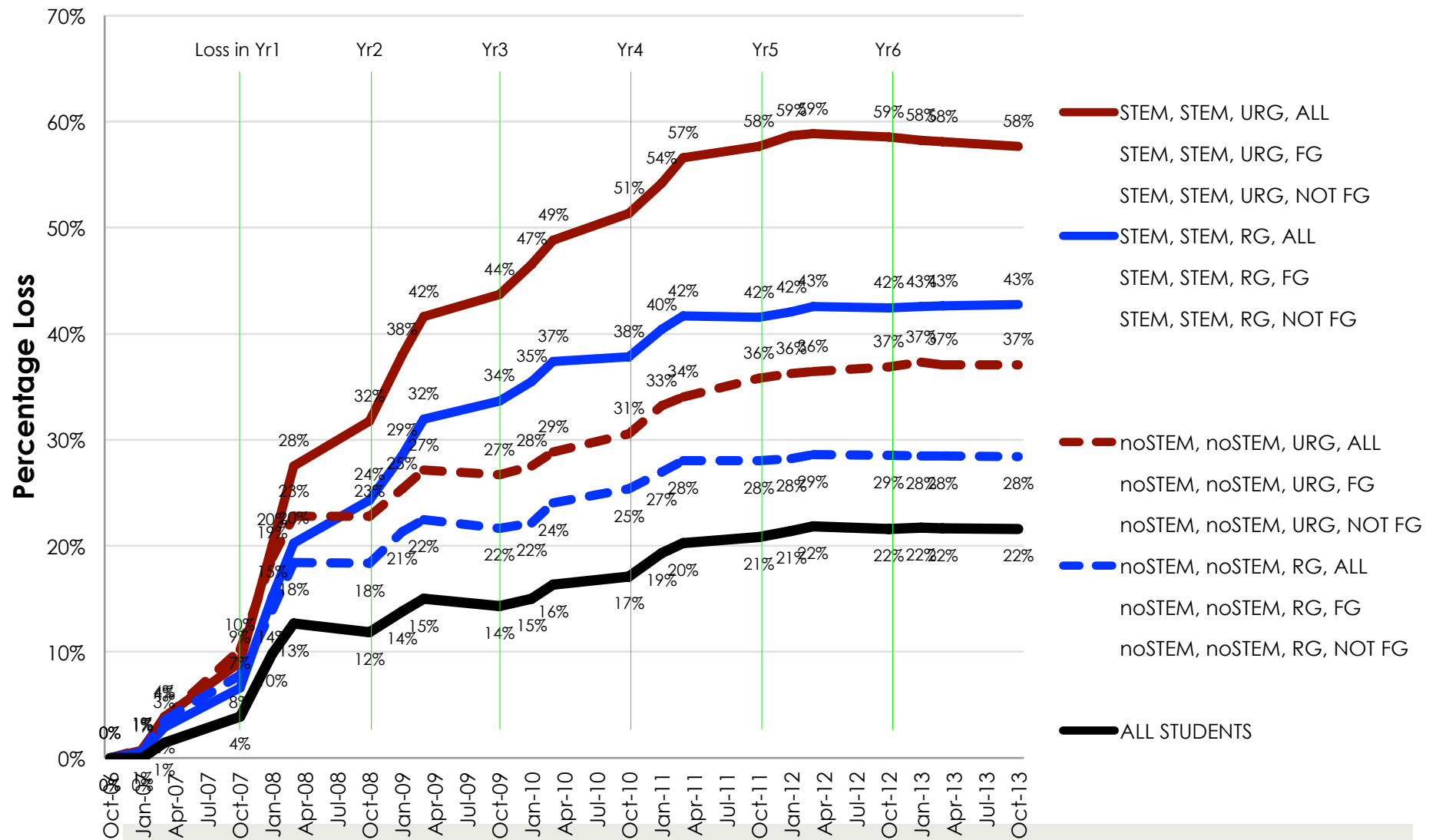
SPECIFIC STEM MAJOR **PATHS**

EMBRACING **WHOLE SYSTEM-** PLACEMENT, GRADING,
INSTRUCTION

A **HOLISTIC APPROACH** towards improvement

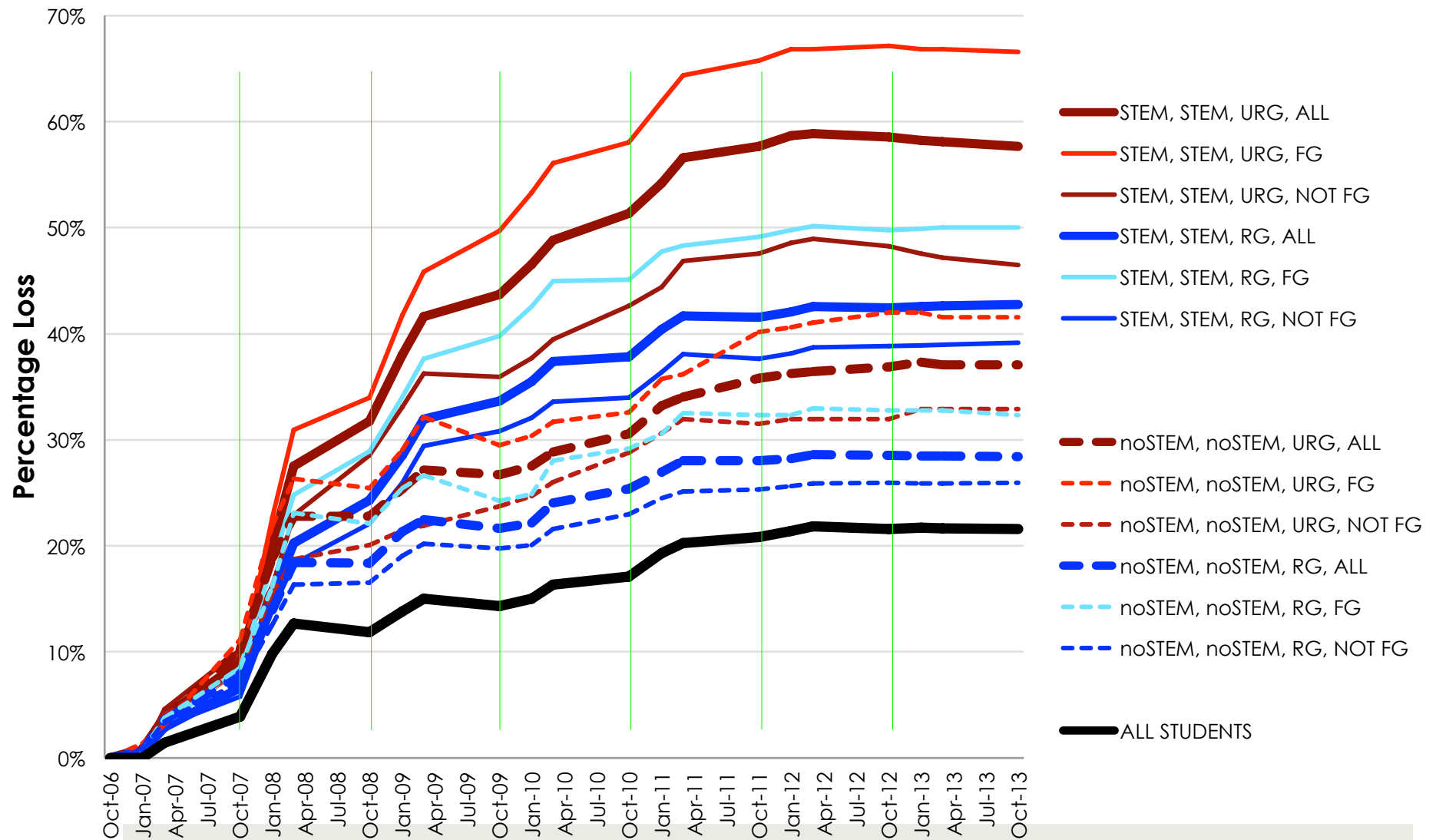
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Percentage Loss of Students from Graduation by Term (Fall 2006 entering class)

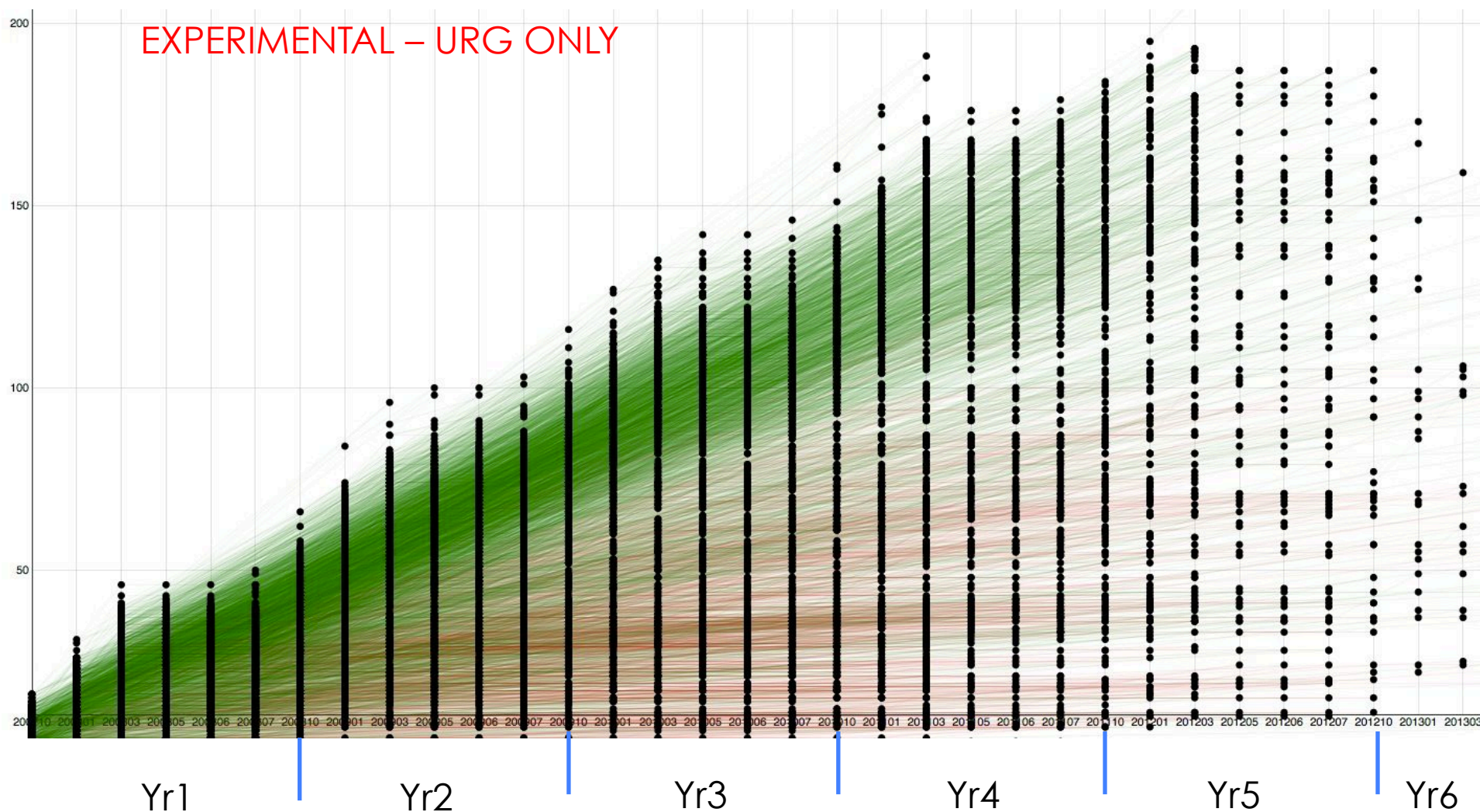


Impact of First Generation

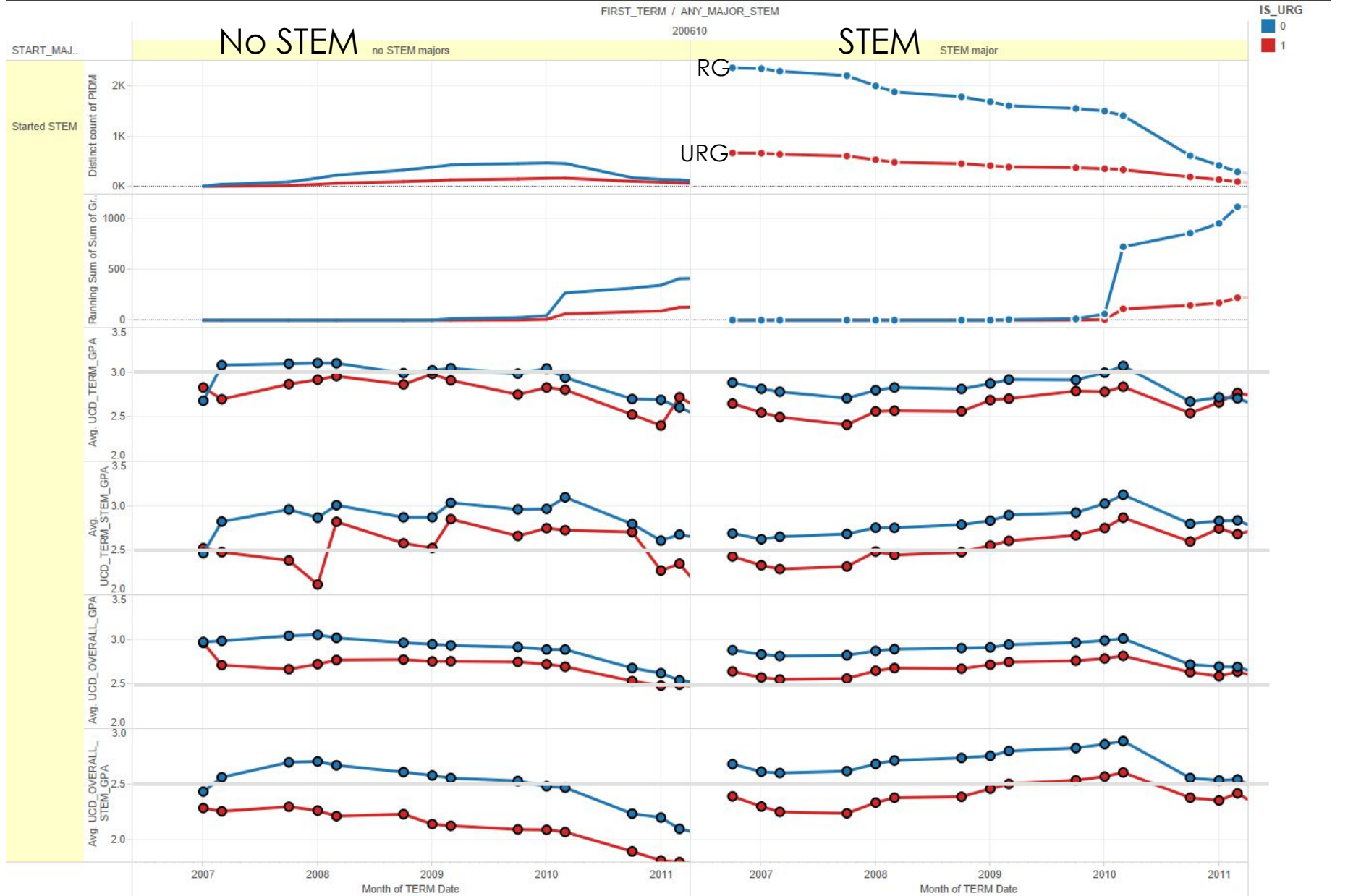
Percentage Loss of Students to Graduation by Term (Fall 2006 entering class)



When do they really leave?



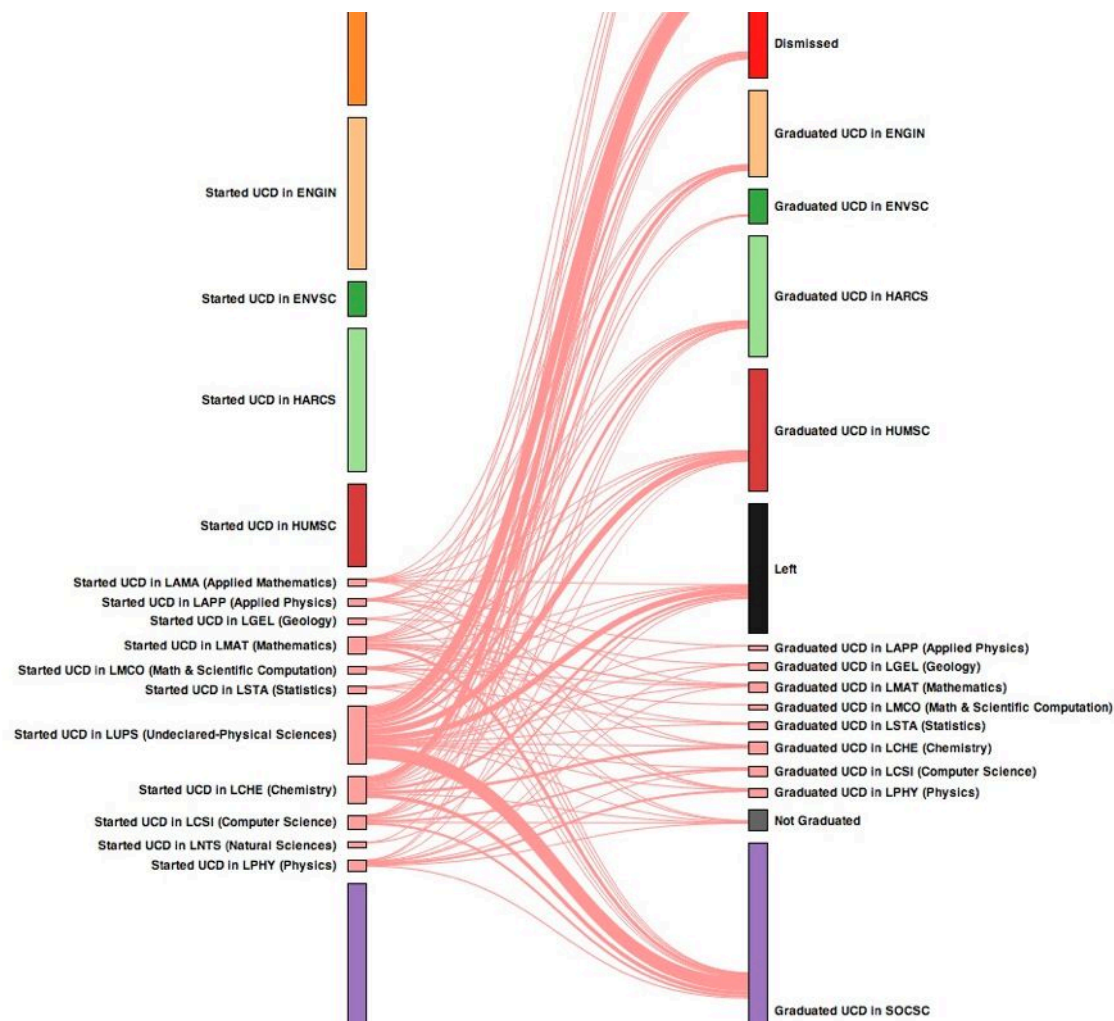
GPA and URG status –STEM start



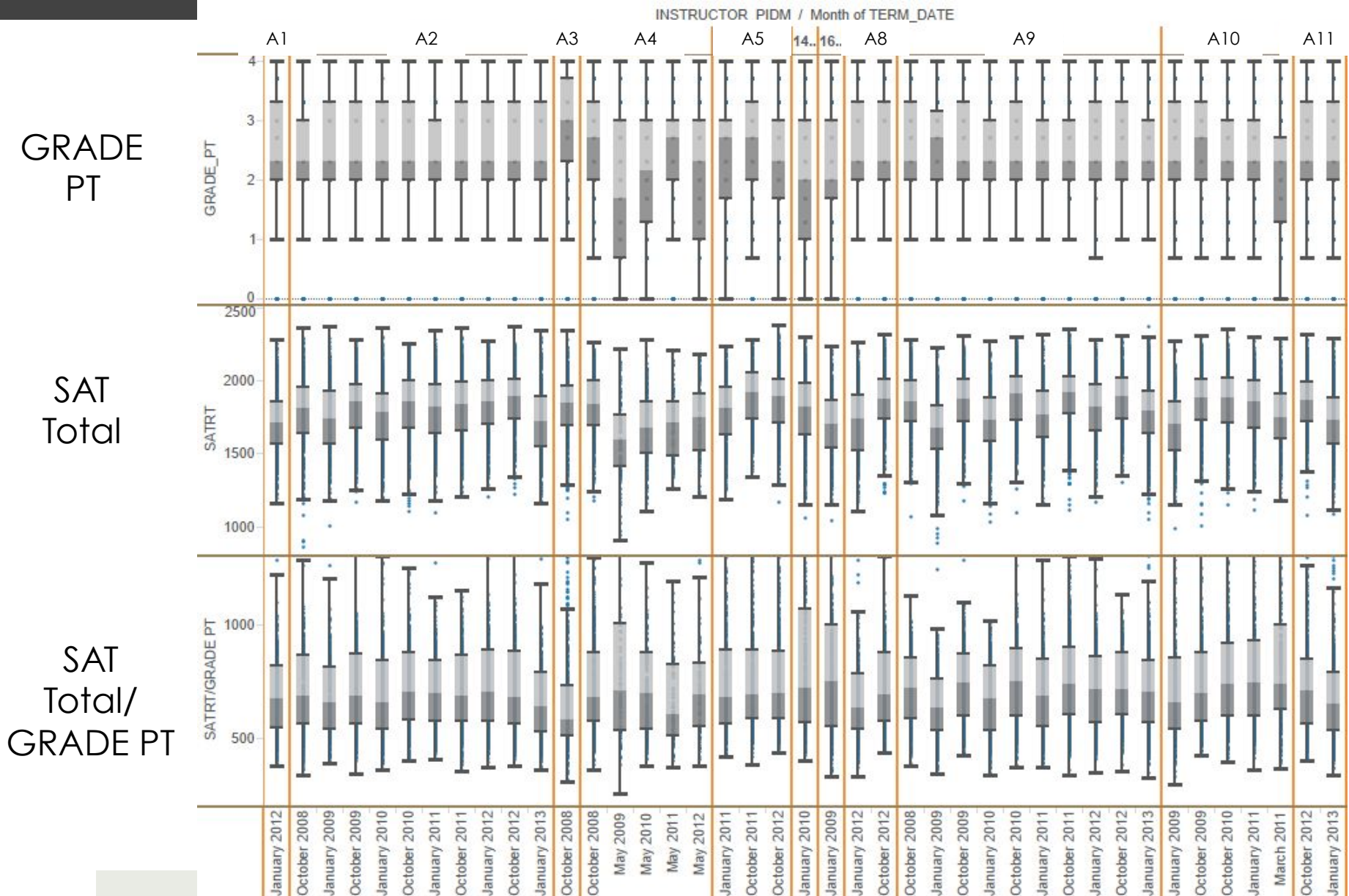
PATHS: Major in/Major out



Fall 206 Student Flows from Math and Phys Science to Graduation



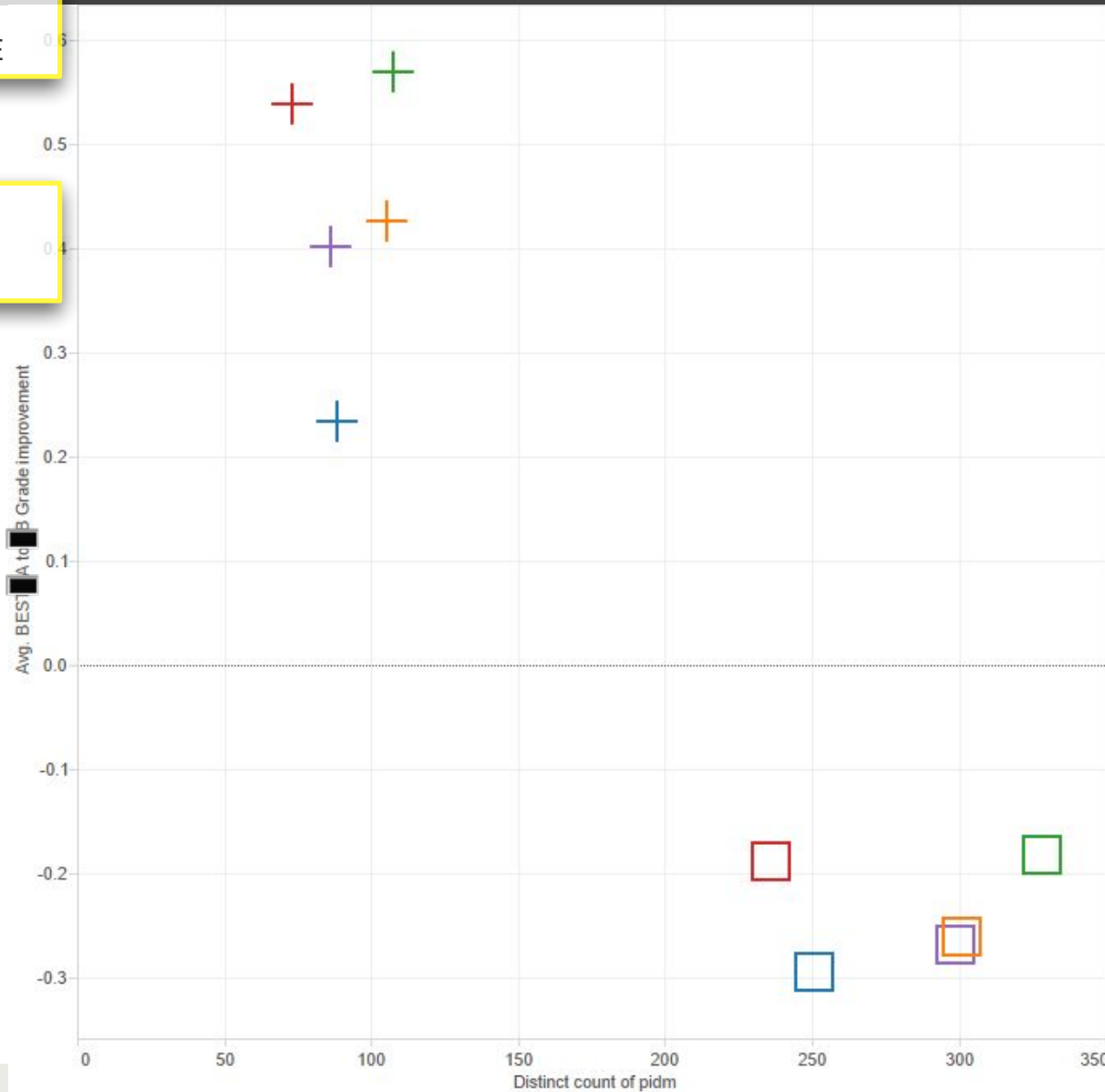
SYSTEM: Instruction



Instructor/Student Outcomes

SUBSEQUENT
COURSE
PERFORMANCE

INSTRUCTOR
VARIATION



2012 Fall
A

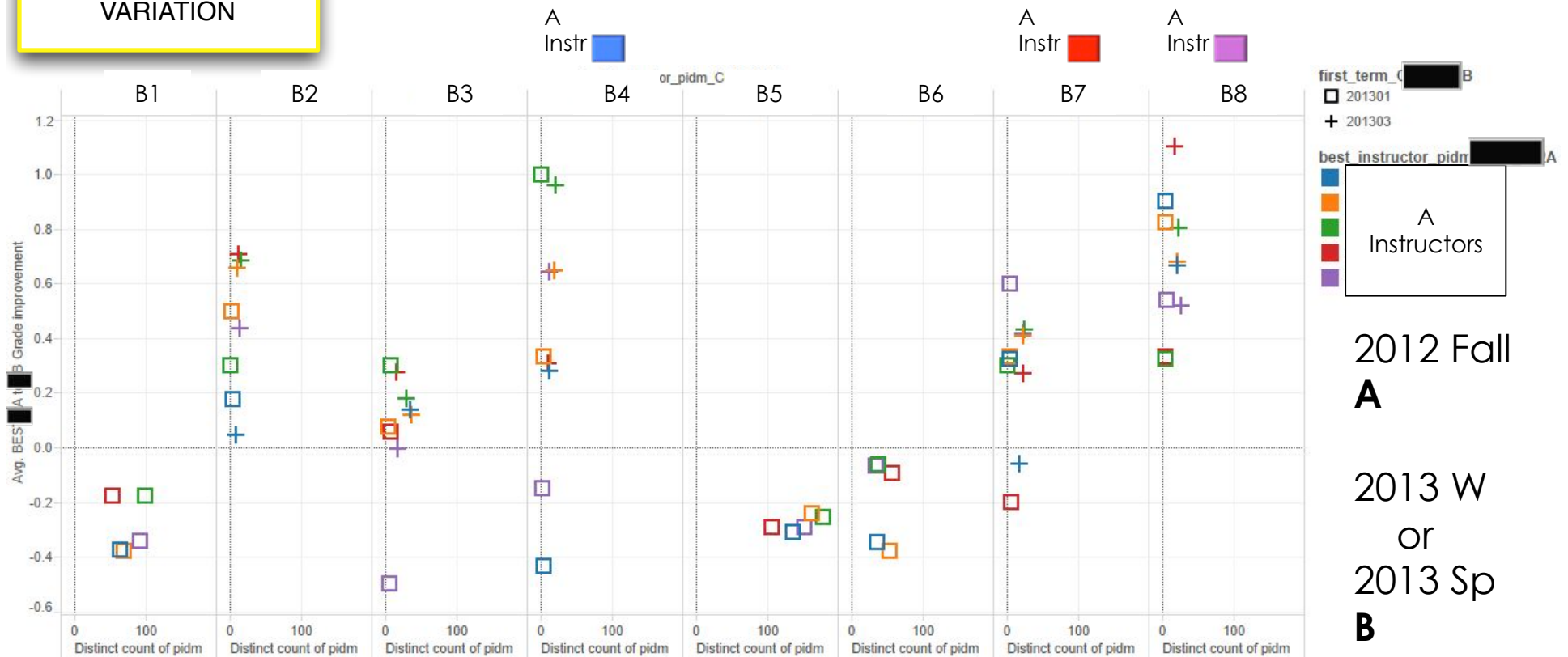
2013 W
or
2013 Sp
B

Instructor/Student Outcomes

SUBSEQUENT
COURSE
PERFORMANCE



INSTRUCTOR
VARIATION



HOLISTIC APPROACH



PRE/POST CONTENT

PRE/POST Attitude

CLASSROOM **OBSERVATIONS & PRACTICE**

STUDENT **FEEDBACK**

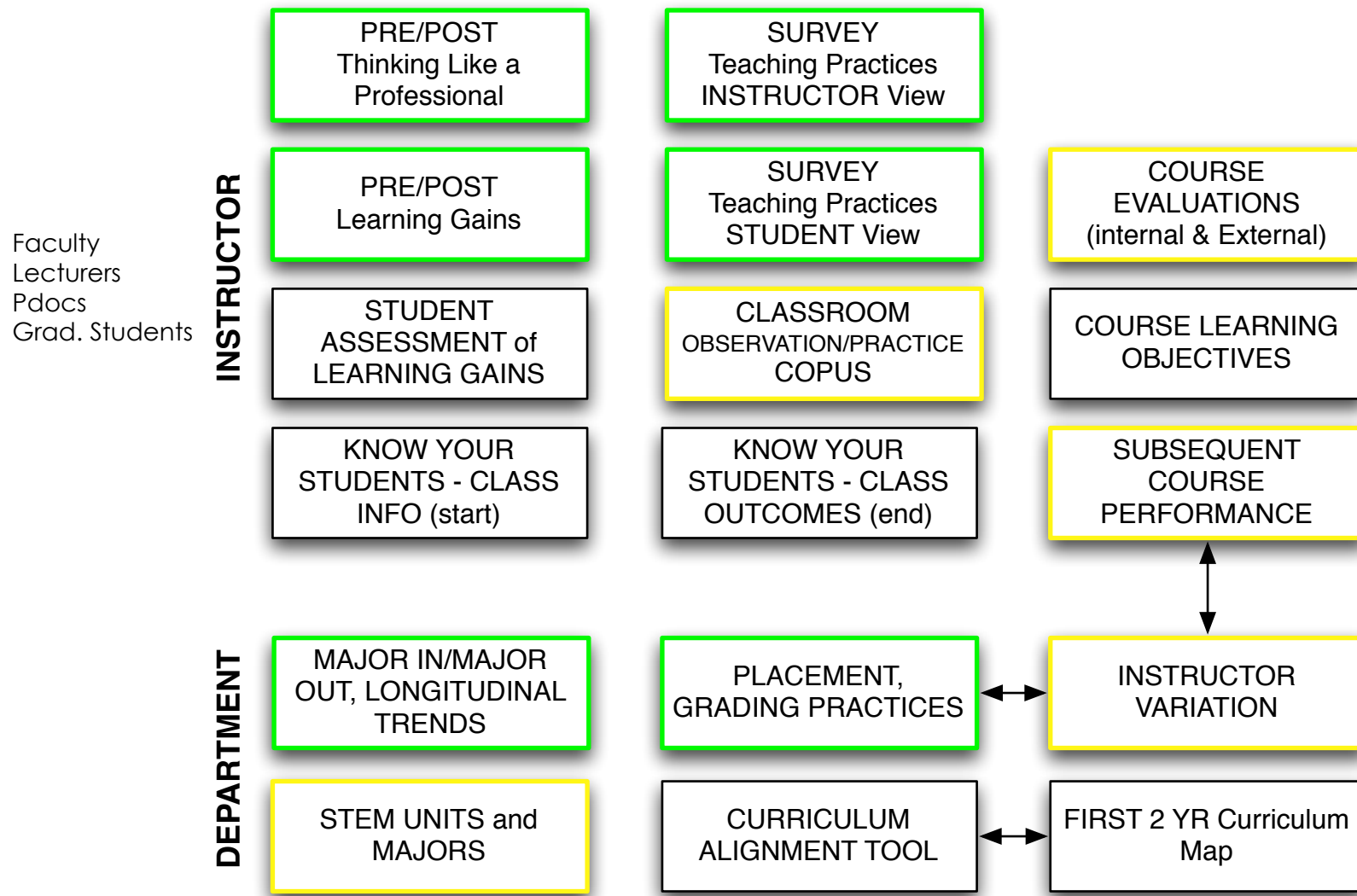
ENCOURAGE **EVIDENCE-BASED** Practices



**BAY VIEW
ALLIANCE**

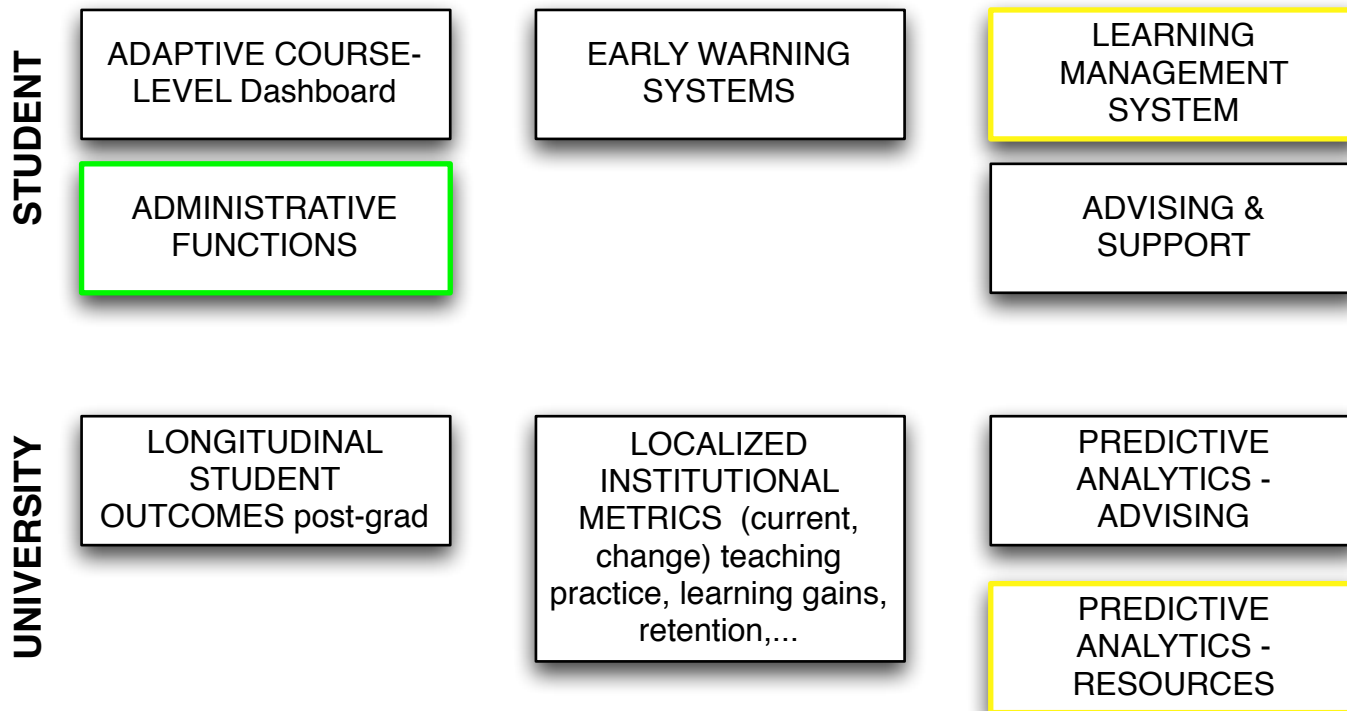


USER: Instructor/Department



USER: Student/University Overall

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PRE/POST Example: Content



BIOLOGY (Preliminary results)

average # of questions answered correctly on Pre-Post :

Total students

Before: 13/26

After: 17/26

4 point (15% gain)

Top Quartile students

Before: 18/26

After: 19/26

Bottom Quartile students

Before: 8/26

After: 15/26

4 point (30% gain)

PRE/POST Example: Attitudes



	Class A			Class B			Time X Group Interaction p-Value
	Pre	Post	Change	Pre	Post	Change	
Overall	63.4	60.9	-2.5	63.4	58.9	-4.5	.075
Real World Connections	71.4	70.6	-0.8	73.7	68.0	-5.7	.010*
Problem-Solving Difficulty	49.1	47.1	-2.0	48.5	45.6	-2.9	.618
Enjoyment	59.6	59.9	0.3	60.2	56.1	-4.1	.023*
Problem-Solving Effort	64.2	64.0	-0.2	66.1	61.2	-4.9	.012*
Conceptual Connections/Memorization	68.3	65.0	-3.3	69.5	64.0	-5.5	.203
Problem-Solving Strategies	67.0	69.6	2.6	68.1	65.9	-2.2	.042*
Reasoning	76.8	73.5	-3.3	78.3	73.1	-5.2	.384

Note: A statistically significant Time X Group Interaction indicates that the amount Class A and Class B changed from pre to post was significantly different.

CLASS BIO instrument from Boulder

Classroom Observation(COPUS)

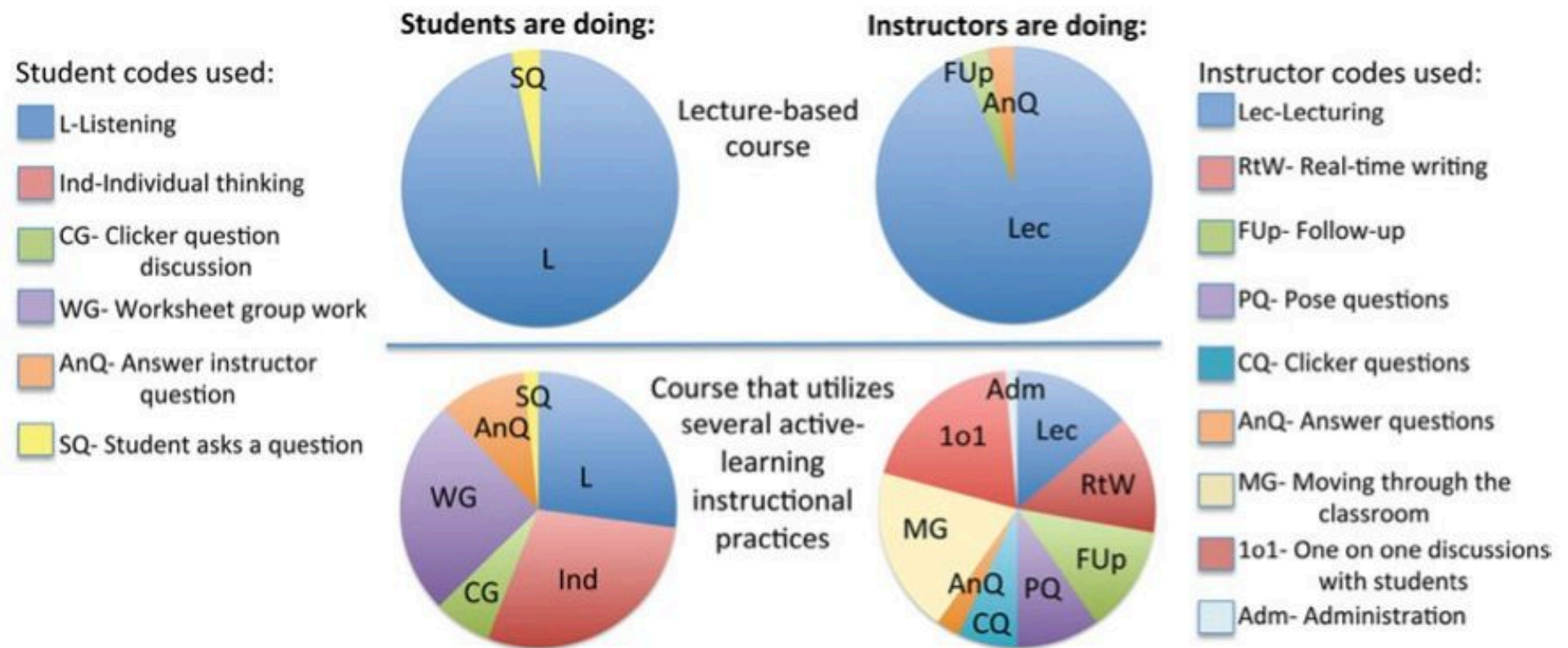


Figure 4. A comparison of COPUS results from two courses that have different instructional approaches.

Based on 2-minute increment observations

Student Feedback



Highly Structured Course

Adaptive Learning Modules [Carnegie Mellon OLI]

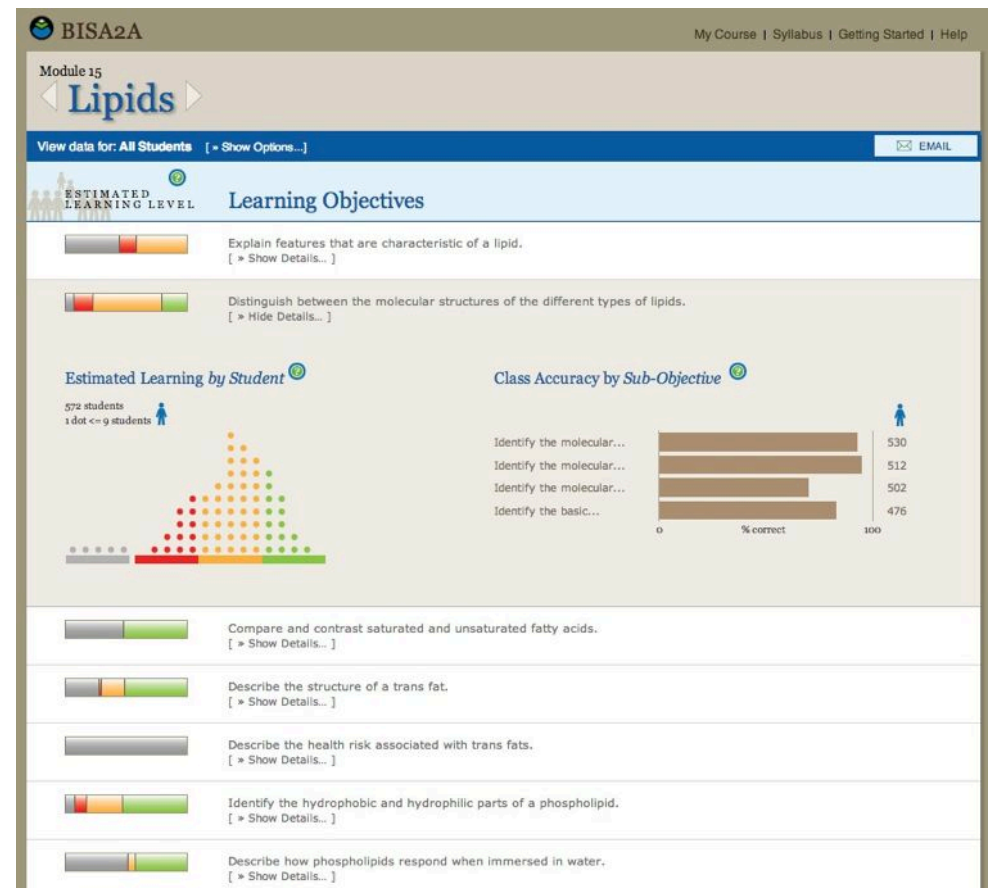
Flipped Classroom [UW Bio Group]

In-class group exercises

Practice exams, Reading quizzes

EXPECTED (hoped for) reduction in achievement gap

~**45%**





iamstem.ucdavis.edu

THANK YOU!!

QUESTIONS?



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