The Power of Data Visualization Tools and Techniques to Change the Campus Conversation: An Examination of Gateway and Bottleneck Courses

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Institutional Research and Analytical Studies

Examining Data

- Analyze: Breakdown into small parts or isolate essential features of the data

Examining Data

- Analyze: Breakdown into small parts or isolate essential features of the data
- Visualize: Understand significance and identify important aspects of data by using a visual format

Examining Data

- Analysis is great for applying scientific rigor and describing key quantities/differences (e.g., hypothesis testing)
- Visualization can identify importance by seeing information in a broader context

Traditional look at grade distributions

Report ID: [redacted]
Page: [redacted] of 225
Module: Analytical Studies

[redacted] Grade Distribution Reports
Course Grade Distribution Report - State Support
[redacted]

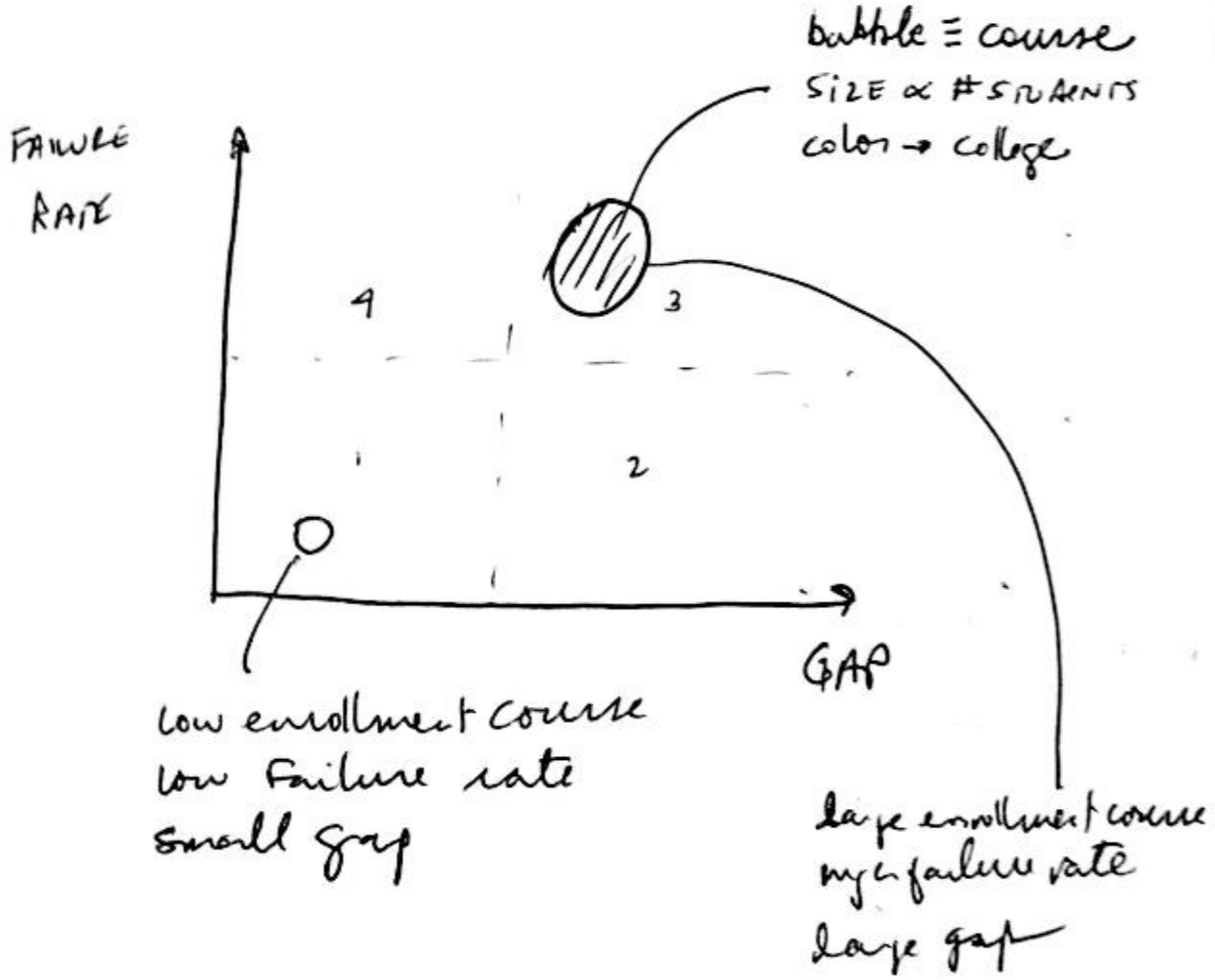
Report Date: [redacted]
Report Time: [redacted]
Proc Inst: [redacted]

COLLEGE: [redacted] DEPARTMENT: [redacted]

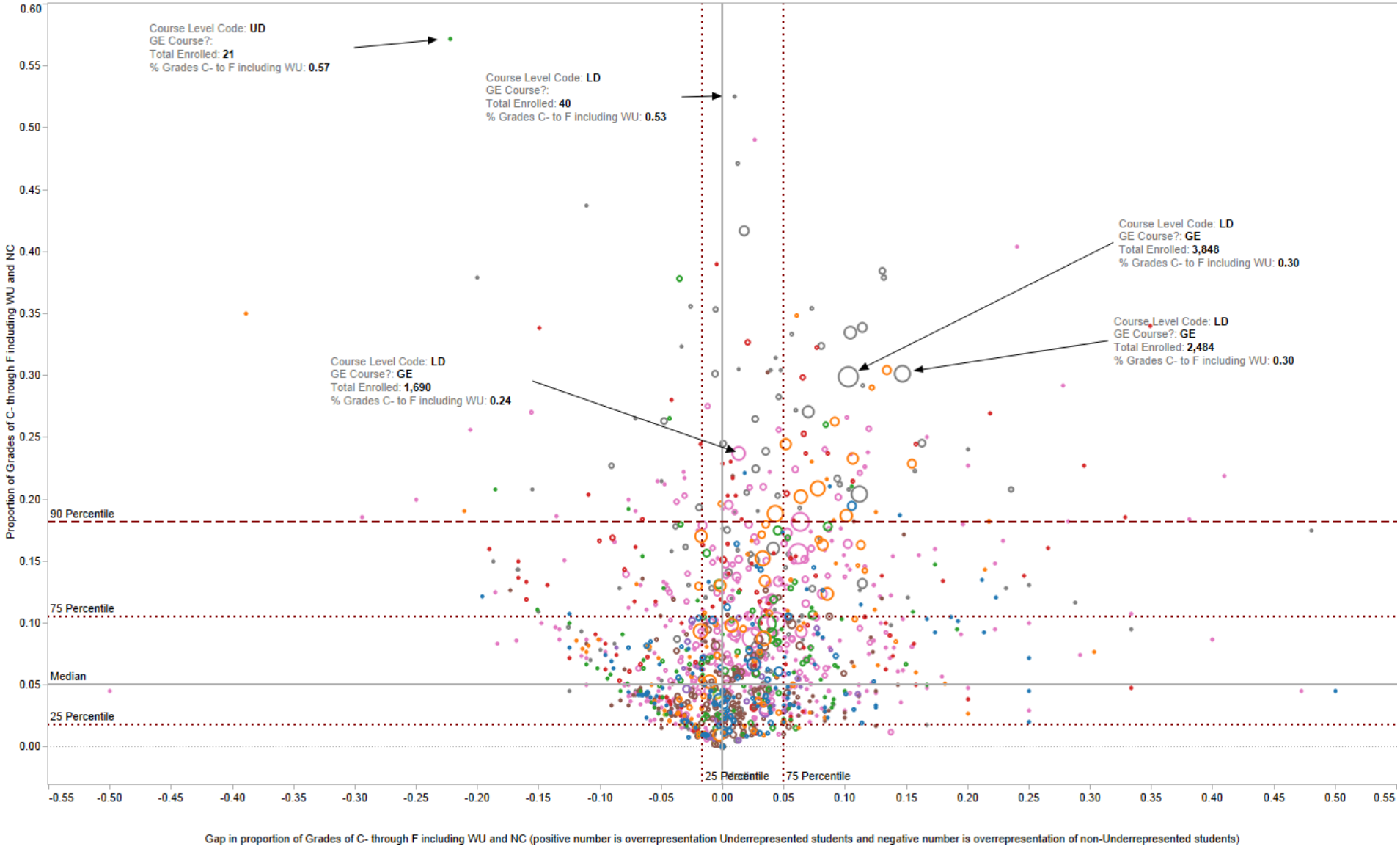
CLASS NUM	SECT NO	INSTRUCTOR	GPA	ENRL	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F	CR	NC	W	WF	WU	AU	OTHER
[redacted]					UNITS: 3.0																			
			2.34	100	0.0	9.0	1.0	20.0	13.0	3.0	5.0	28.0	0.0	0.0	11.0	0.0	9.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
			1.81	97	0.0	4.1	3.1	11.3	9.3	5.2	8.3	10.3	10.3	5.2	10.3	0.0	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.18	110	1.8	6.4	4.6	5.5	10.0	14.6	4.6	16.4	14.6	9.1	1.8	0.0	10.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			1.89	96	0.0	4.2	8.3	6.3	4.2	9.4	15.6	11.5	5.2	5.2	4.2	0.0	24.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0
			2.23	108	0.9	10.2	0.9	2.8	22.2	0.0	7.4	33.3	0.0	0.0	15.7	0.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.14	92	0.0	3.3	3.3	4.4	20.7	12.0	7.6	12.0	10.9	6.5	5.4	5.4	7.6	0.0	0.0	1.1	0.0	0.0	0.0	0.0
			2.27	103	0.0	5.8	1.9	3.9	17.5	11.7	19.4	16.5	3.9	6.8	3.9	1.0	5.8	0.0	0.0	1.0	0.0	1.0	0.0	0.0
			2.01	99	0.0	6.1	2.0	2.0	12.1	7.1	16.2	19.2	7.1	9.1	3.0	7.1	8.1	0.0	0.0	0.0	0.0	1.0	0.0	0.0
			1.43	108	0.0	2.8	0.0	0.0	5.6	0.9	3.7	[illegible]	0.9	[illegible]	26.9	0.0	15.7	0.0	0.0	2.8	0.0	3.7	0.0	0.0
			2.20	85	1.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			2.05	108	0.0	3.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			2.03	95	0.0	1.1	7.4	5.3	6.3	14.7	17.9	9.5	10.5	9.5	2.1	4.2	[illegible]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.09	107	0.9	2.8	4.7	11.2	7.5	15.9	9.4	13.1	6.5	1.9	5.6	5.6	13.1	0.0	0.0	1.9	0.0	0.0	0.0	0.0
			2.97	96	1.0	32.3	12.5	10.4	12.5	5.2	8.3	2.1	2.1	1.0	3.1	0.0	4.2	0.0	0.0	0.0	0.0	5.2	0.0	0.0
			2.08	90	0.0	1.1	5.6	12.2	11.1	[illegible]	7.8	13.3	8.9	5.6	2.2	5.6	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.50	93	2.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.0	2.2	0.0	0.0
			2.14	107	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.0	0.0	0.0	0.0
			1.24	103	0.0	1.0	0.0	1.0	3.9	2.9	2.9	27.2	3.9	5.8	16.5	3.9	27.2	[illegible]	[illegible]	1.9	0.0	1.9	0.0	0.0
			2.19	80	0.0	3.8	3.8	6.3	21.3	2.5	3.8	31.3	0.0	0.0	20.0	0.0	3.8	0.0	0.0	3.8	0.0	0.0	0.0	0.0
			1.74	74	0.0	1.4	0.0	2.7	10.8	9.5	6.8	27.0	0.0	1.4	18.9	0.0	10.8	0.0	0.0	6.8	0.0	4.1	0.0	0.0
			2.08	1,951	0.4	5.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.0	1.1	0.0	1.0	0.0	0.0
[redacted]					UNITS: [illegible]																			
			2.88	24	0.0	8.3	16.7	29.2	25.0	0.0	0.0	8.3	0.0	4.2	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.89	24	0.0	4.2	8.3	29.2	25.0	16.7	4.2	4.2	4.2	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.96	23	0.0	13.0	8.7	26.1	17.4	17.4	4.4	4.4	4.4	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.90	24	0.0	0.0	12.5	25.0	16.7	16.7	25.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			3.17	24	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			3.03	24	0.0	8.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			2.76	24	0.0	0.0	4.2	12.5	41.7	16.7	12.5	8.3	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.80	24	0.0	4.2	20.8	12.5	16.7	20.8	16.7	0.0	0.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.98	24	0.0	12.5	12.5	[illegible]	16.7	12.5	8.3	12.5	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.90	24	0.0	8.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.0	0.0	0.0
			2.97	23	0.0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0	0.0	0.0	0.0
			3.03	24	0.0	8.3	29.2	25.0	12.5	4.2	4.2	8.3	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
			3.01	24	0.0	4.2	16.7	37.5	25.0	4.2	0.0	0.0	4.2	4.2	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			3.24	24	0.0	12.5	33.3	29.2	8.3	8.3	0.0	0.0	4.2	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.68	24	0.0	4.2	4.2	16.7	33.3	12.5	8.3	8.3	4.2	0.0	4.2	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			3.18	24	0.0	0.0	25.0	41.7	16.7	8.3	0.0	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			3.50	23	0.0	34.8	30.4	17.4	8.7	4.4	0.0	0.0	0.0	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.93	24	0.0	12.5	25.0	16.7	12.5	4.2	4.2	4.2	12.5	0.0	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			3.31	24	0.0	20.8	29.2	16.7	16.7	4.2	8.3	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.64	24	0.0	0.0	4.2	20.8	37.5	4.2	0.0	20.8	8.3	0.0	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			2.88	24	0.0	8.3	8.3	20.8	20.8	16.7	12.5	4.2	4.2	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			3.03	24	0.0	12.5	8.3	33.3	12.5	8.3	12.5	8.3	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*SECTION TOTALS(22):			2.98	525	0.0	8.6	16.8	23.8	21.1	9.7	6.5	5.9	2.7	0.8	1.1	0.6	2.3	0.0	0.0	0.0	0.0	0.2	0.0	0.0

- Hundreds of pages to review
- No clear way to see secondary issues
- Does not start conversations about course outcome

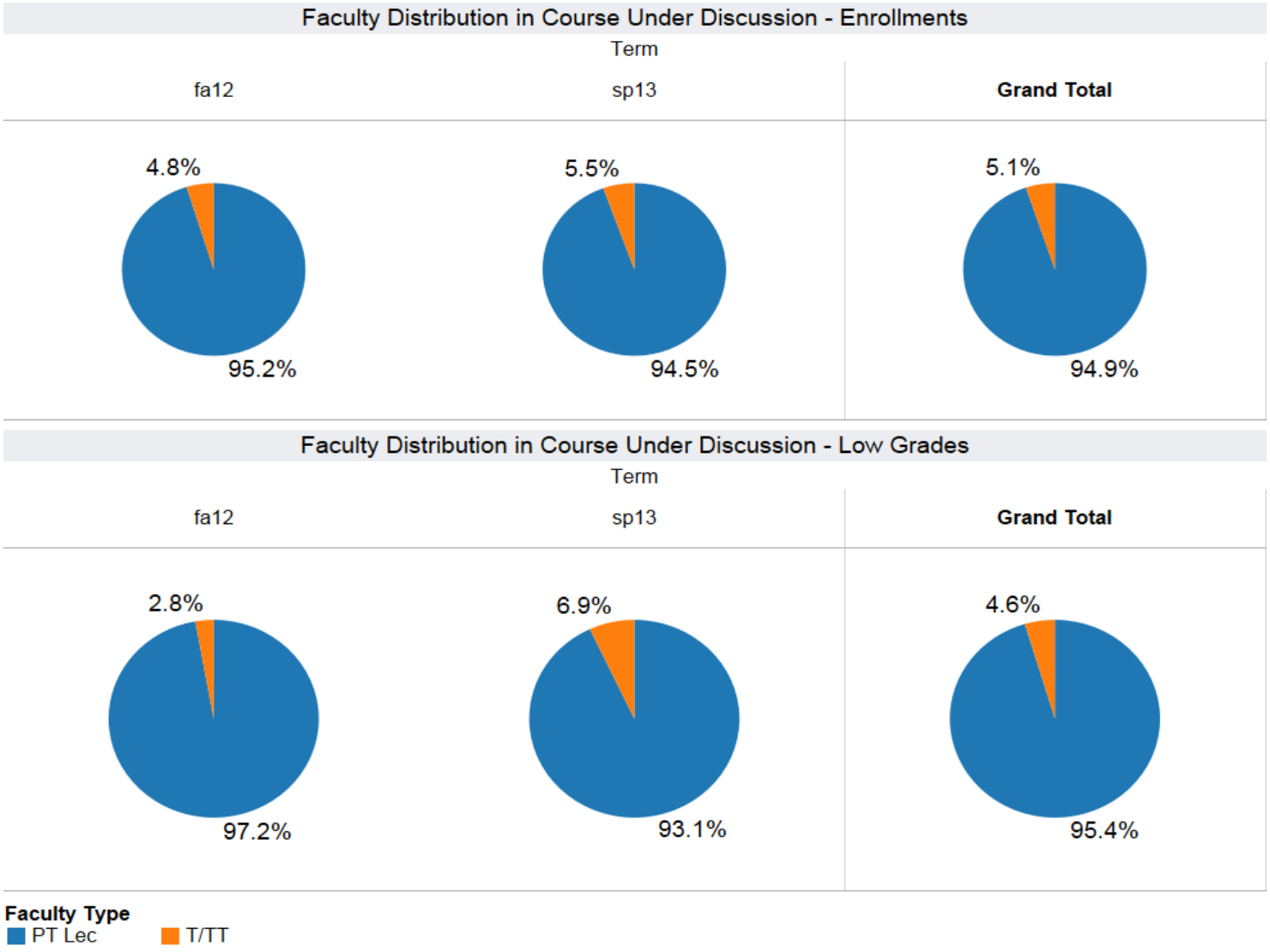
Could we look at things differently?



Visualizing Student Readiness and Curricular Bottlenecks



What if we take a deeper look at the course with 3,848 students enrolled



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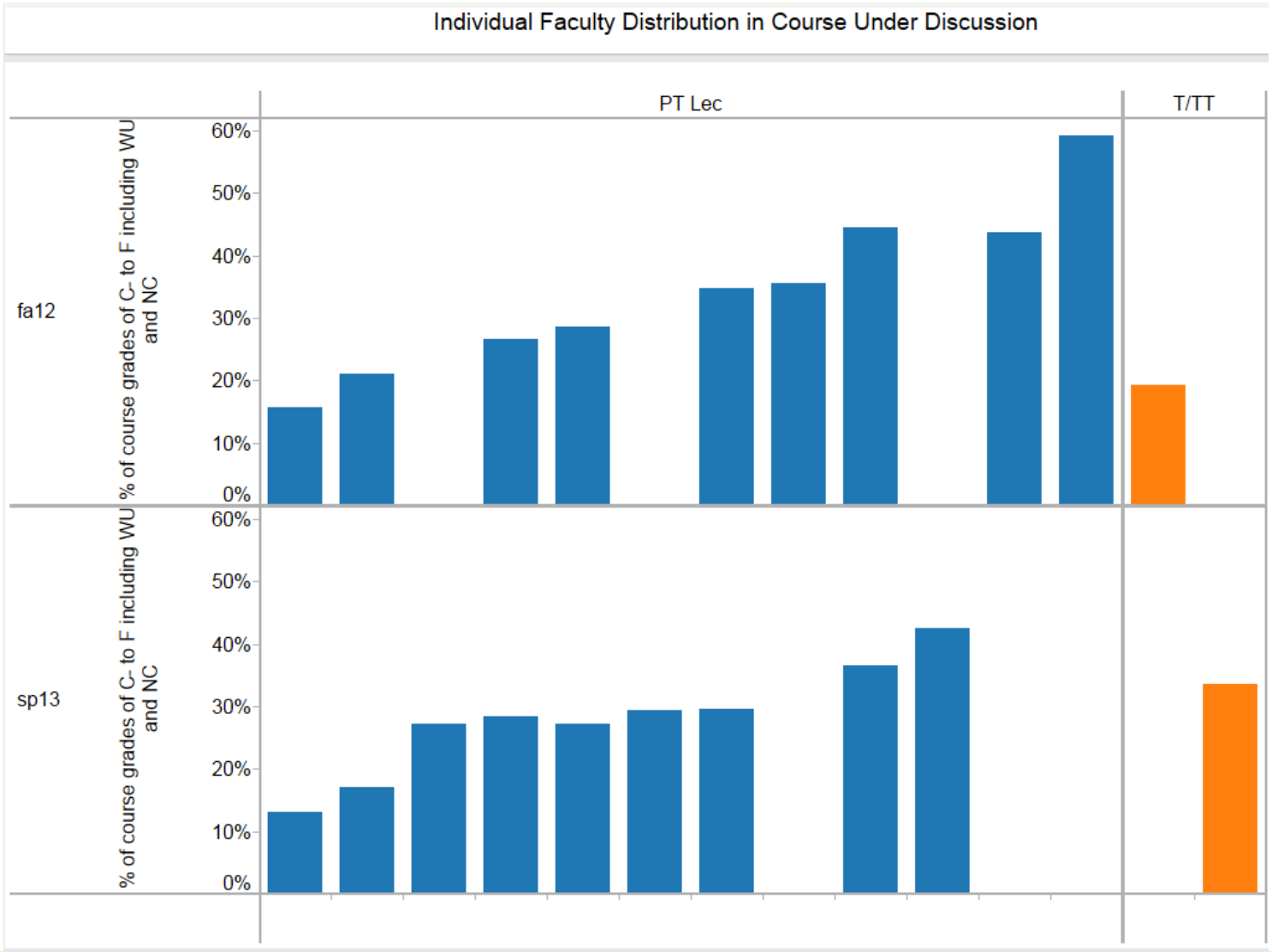

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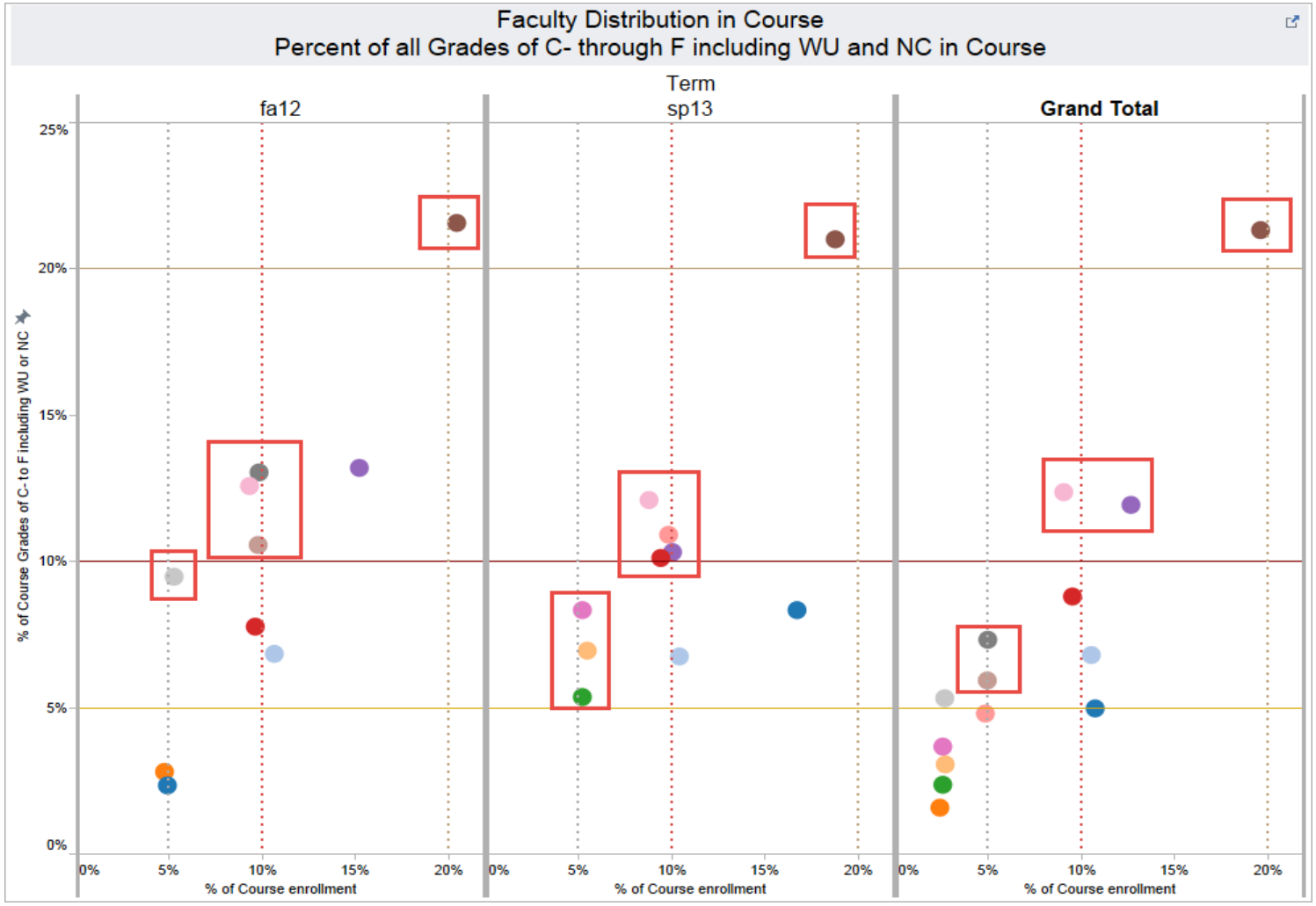

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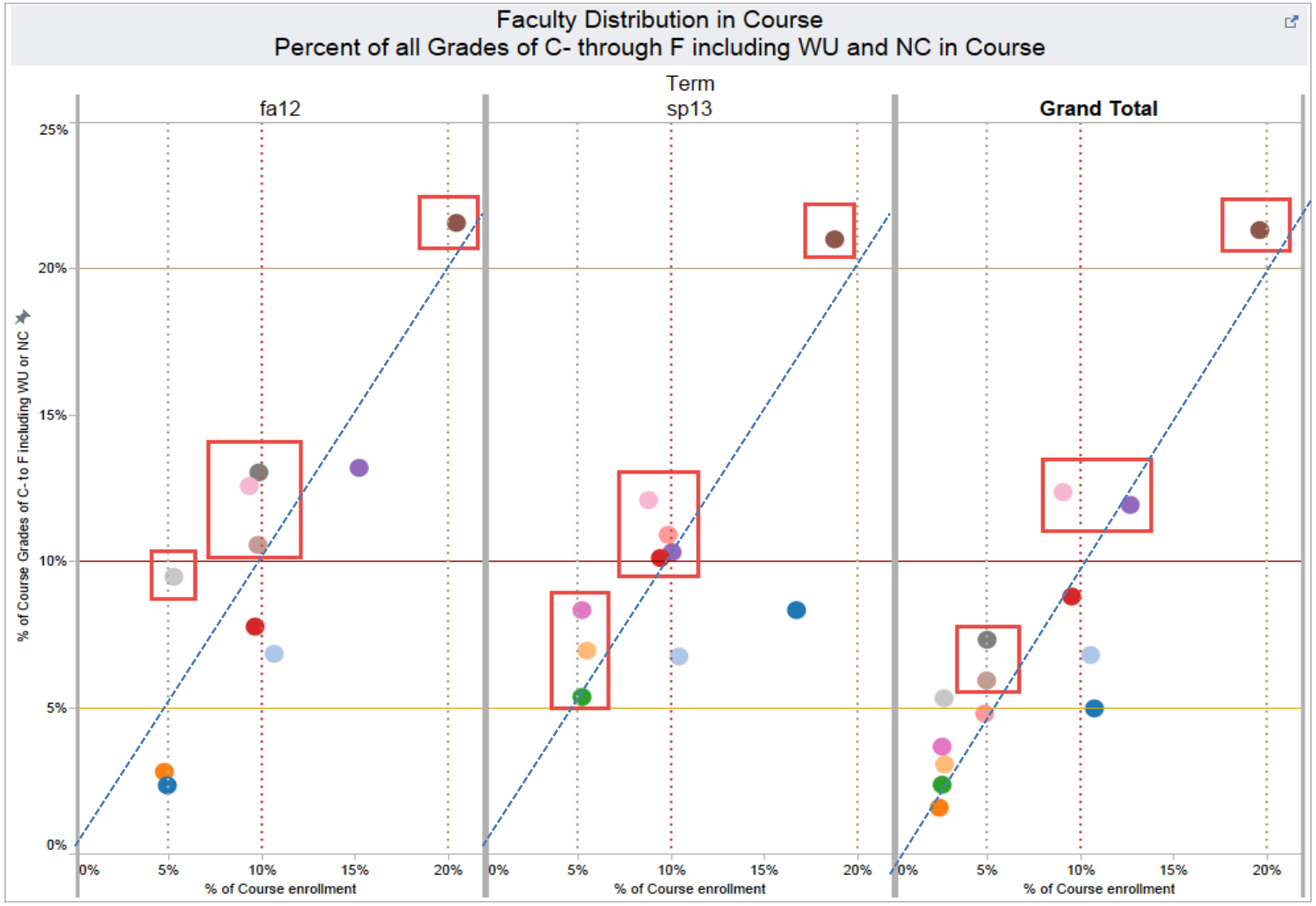
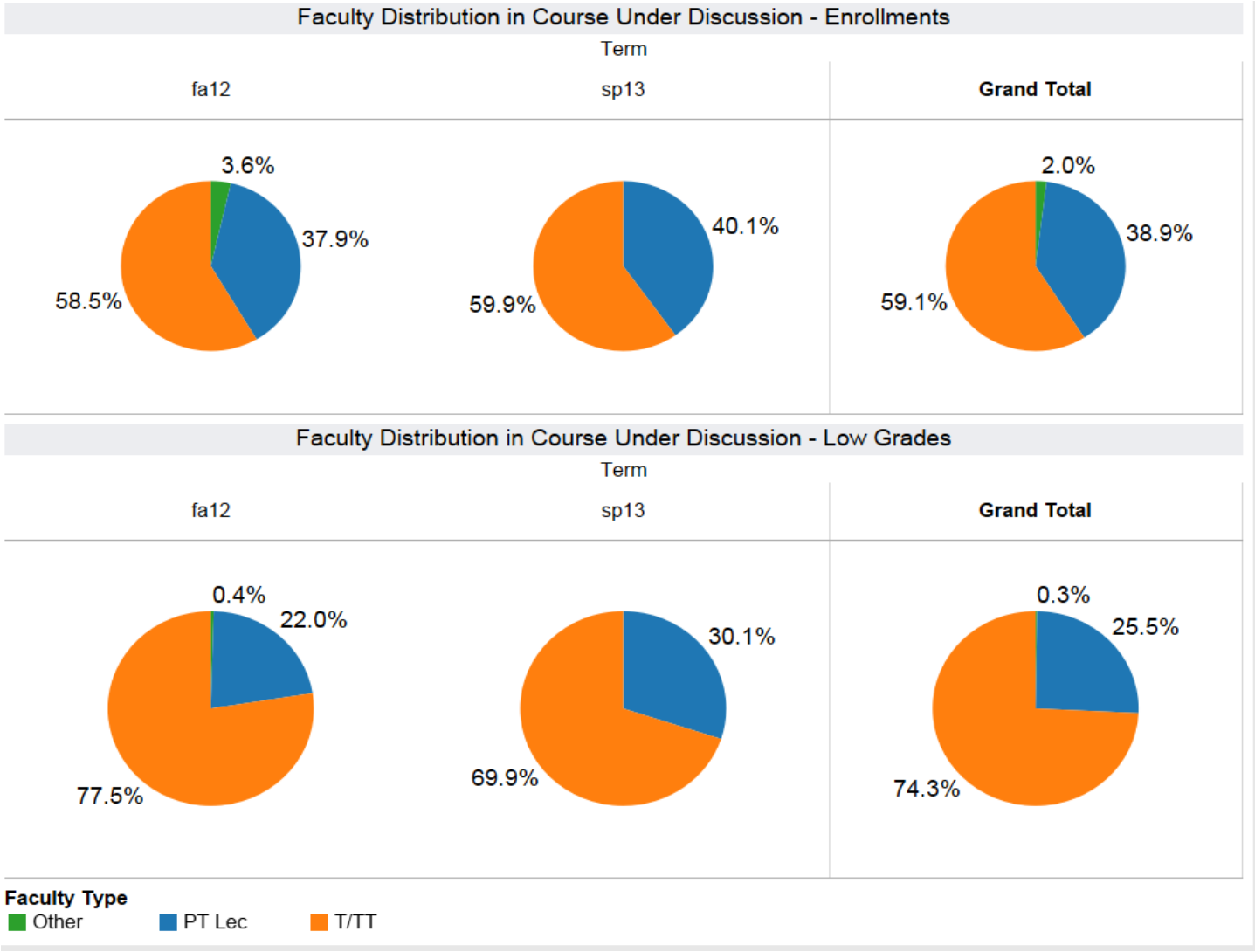


The conversation

- Surprise moments for Course 1
  - Faculty had not been discussing course outcomes amongst themselves
  - Faculty did not have a common frame for grading
  - Faculty conversations led to agreement that a faculty course coordinator was needed.

Other Course example - 1,690 students enrolled (Lower Division GE course in different College)



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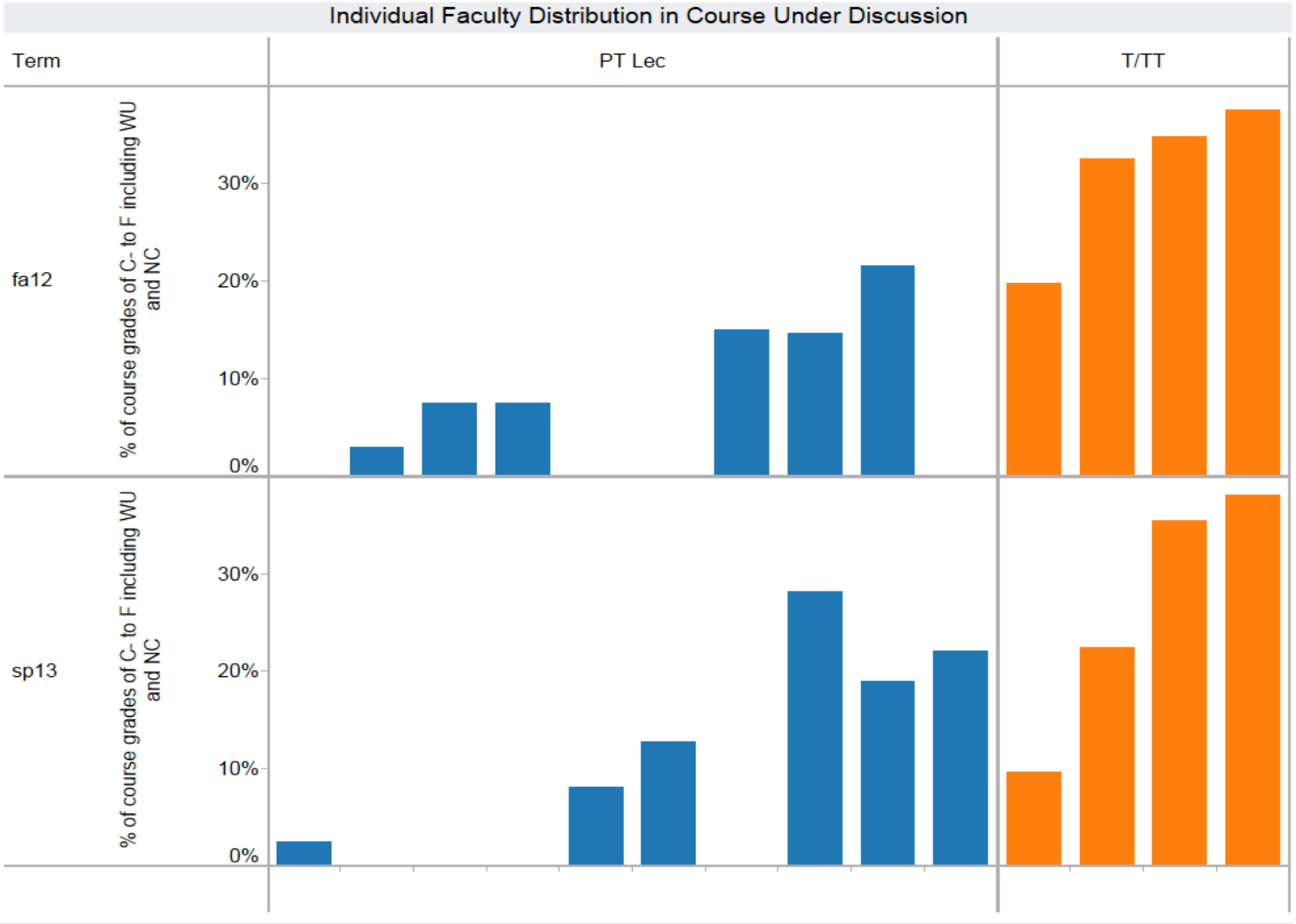

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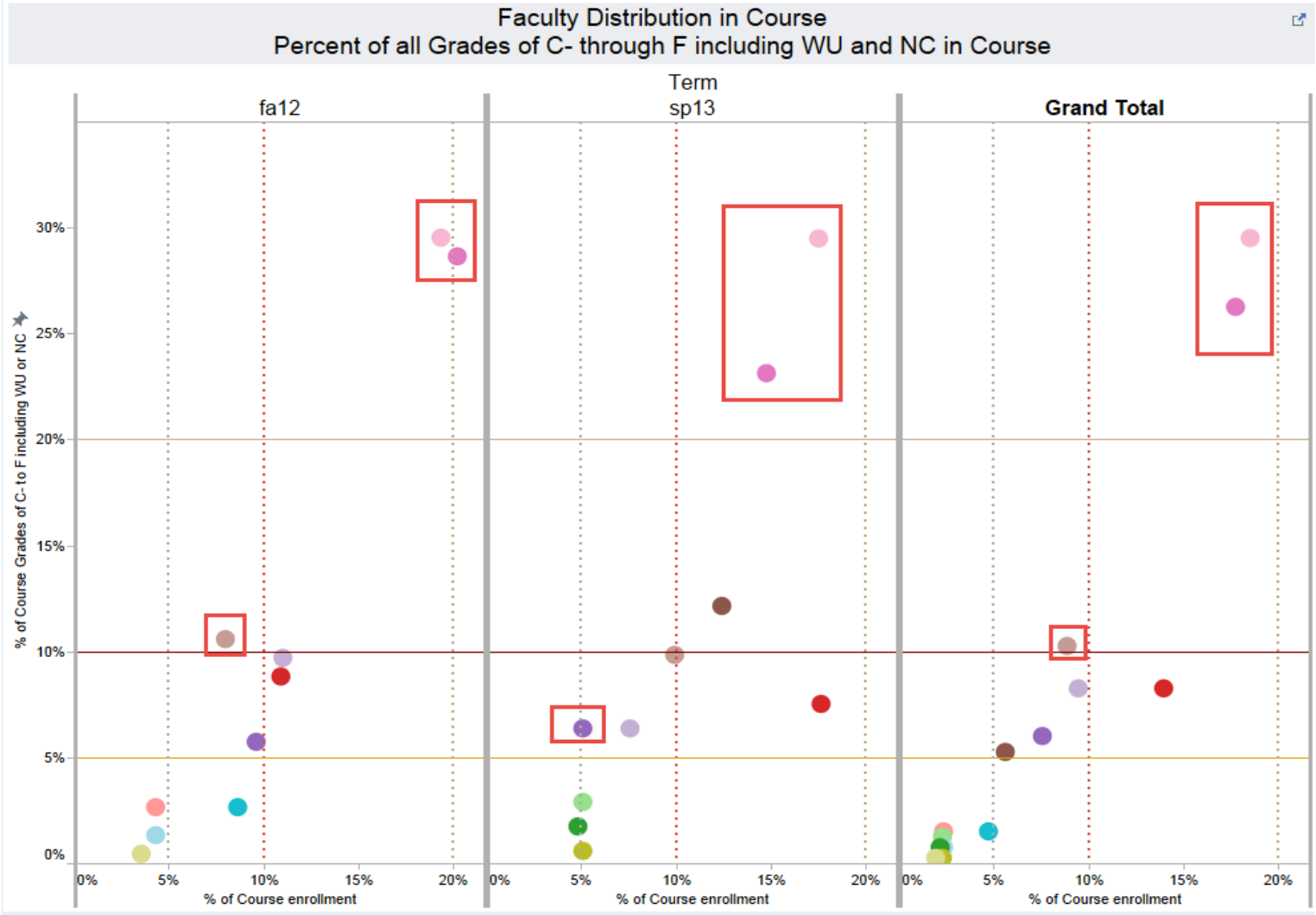

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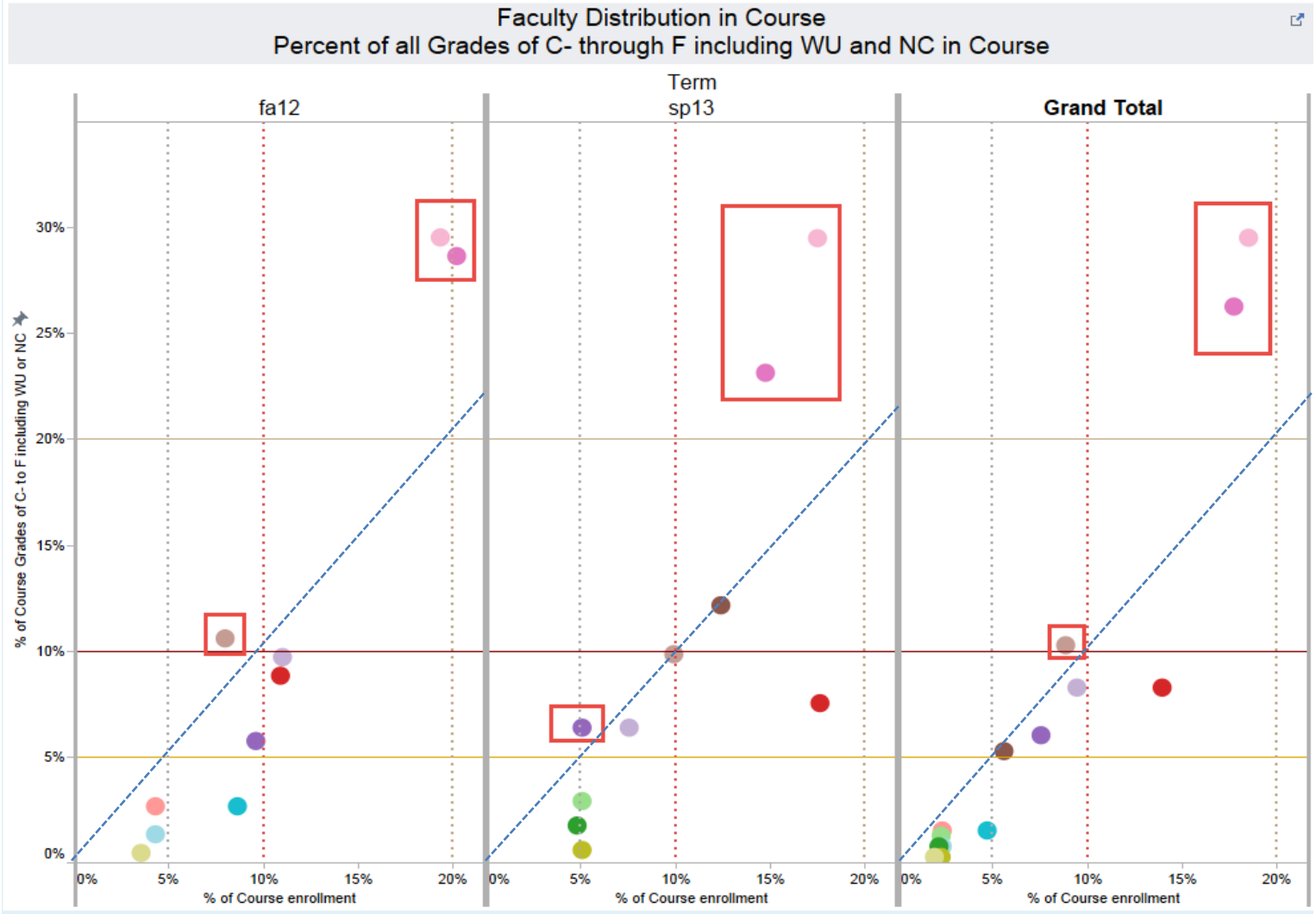

The conversation

- Surprise moments for Course 2
  - A couple faculty can trigger a low success course finding
  - Amplification on discussion of what rigor is or isn't

Findings shared with

- Provost/leadership teams
- Deans
- Faculty

Asked What Might We Do Differently while maintaining or increasing rigor?

Course Re-Design

- Flipped courses
- Embedded technology
- High impact practices (e.g., SI)
- Rethinking content and grading policies

The conversation

- Participation in course redesign effort
- Submitted and received RFP funding from CSU Chancellor's Office and CSU Fullerton funds to look at methods to improve student outcomes

The conversation

Courses Redesign Awards

Course	Title	Award
Biology 361 & 362	Anatomy & Physiology	$ 50,262
Chemistry 120B*	General Chemistry	$ 10,731
Economics 201	Microeconomics	$ 14,442
History 110A & 110B	World Civilizations	$ 64,884
Math 40	Intermediate Algebra	$ 25,776
Math 110	Mathematics for Liberal Arts Students	$ 40,021
Math 115*	College Algebra	$ 49,198
Math 120	Introduction to Probability and Statistics	$ 70,516
Math 125	Precalculus	$ 64,945
Math 130	Short Course in Calculus	$ 29,284
Math 135	Business Calculus	$ 41,431
Total		$ 461,490

* Implemented in fall 2014

Next steps / Conclusion

- 3 Themes in Higher Education
  - Graduation Rates, Closing Gap, Tuition Cost Down
- What should we do in next step?
  - We are ULTIMATELY responsible (Tinto, 2002)
  - Faculty
    - "*What faculty think and value makes a difference* with regard to the likelihood that students will participate in educationally effective practices" (Kuh, 2009)
  - Holistic Approach
    - *Engagement!*

Questions?

www.fullerton.edu/analyticalstudies **for more information**