

Finding the “Bleeding Spots”: How to Identify At-Risk Groups

Jing Wang

Director of Institutional Research

Tamara Lapointe

Research Analyst

California State University, Sacramento

Sacramento State University

- ▶ Public Metropolitan University
 - Commuters (undergraduate): 96%
 - Transfer students: 45%
 - Enrollment: 29,011
 - Student FTE: 22,947
 - Faculty: 1,583
 - Staff: 1,402
 - California State University: 23 campuses

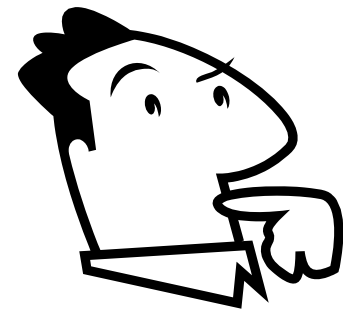
* Fall 2008 Census files



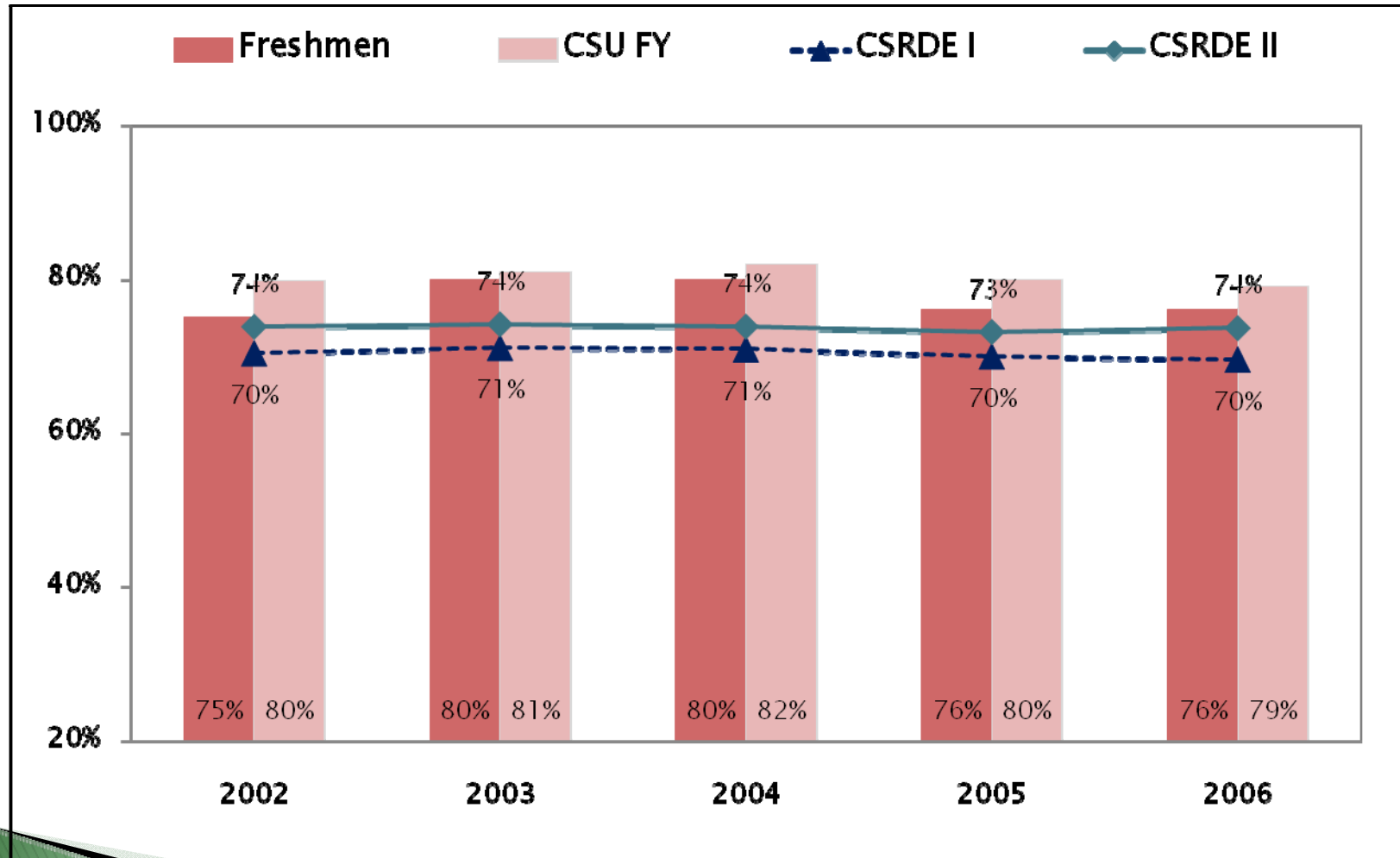
Process and Conclusion

“The process is more important than the conclusion”

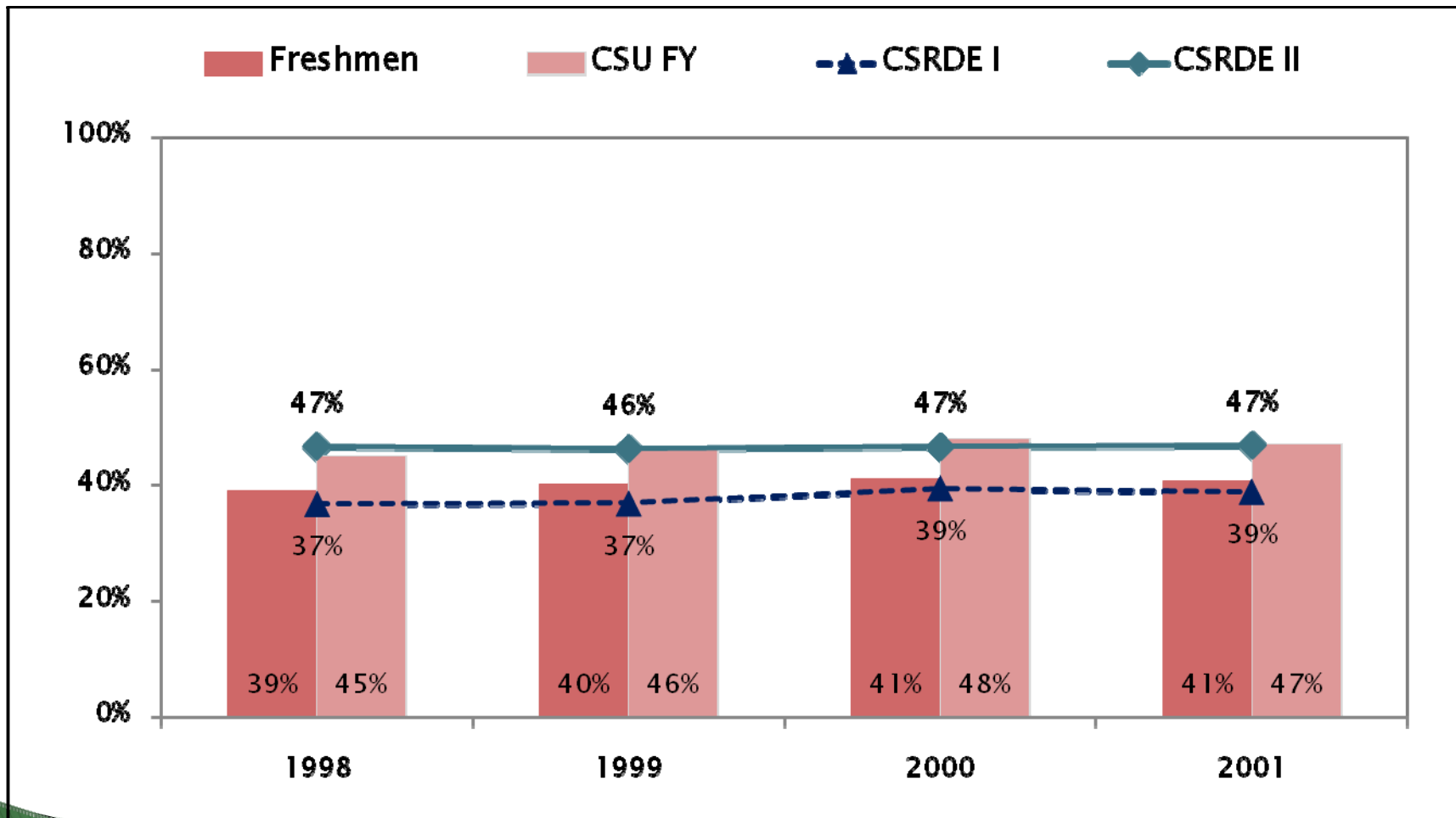
- ▶ Prior Research and Best Practices
 - Identified about 30 factors that have impact on student retention and graduation.
- ▶ Unique Features of Individual Campuses
 - Risk factors vary from campus to campus.
- ▶ Assumptions and Facts
 - Assumptions must be proven by data.
 - Decisions must be made based on research.
- ▶ Procedure and Methodology
 - How to identify the high risk group is the purpose of this presentation rather than simply naming the high risk group.



First-Time Freshmen: Second Year Retention Rates



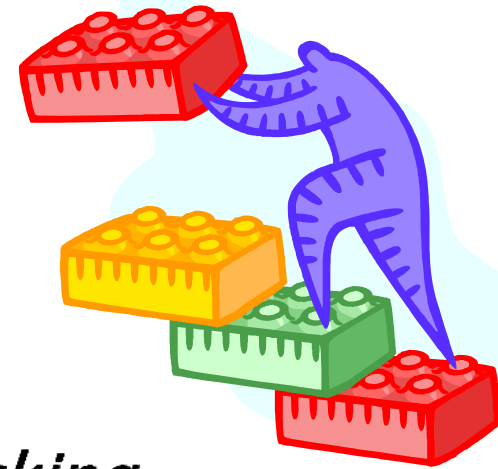
First-Time Freshmen: Six Year Graduation Rate



Stage 1 : Building Cohort Files

Data Elements

- ▶ *Demographic & Academic Background*
 - .. Ethnicity
 - .. Gender
 - Admission Status
 - High School GPA
 - SAT scores
 - Remediation Status
- ▶ *Academic*
 - Commuter Status
 - Major
 - Course Load
 - First Year Programs



- ▶ *Tracking*
 - Enrollment Status
 - Overall GPA
 - Probation Status
 - Degree Data

Stage 1 : Building Cohort Files

Student Tracking Report

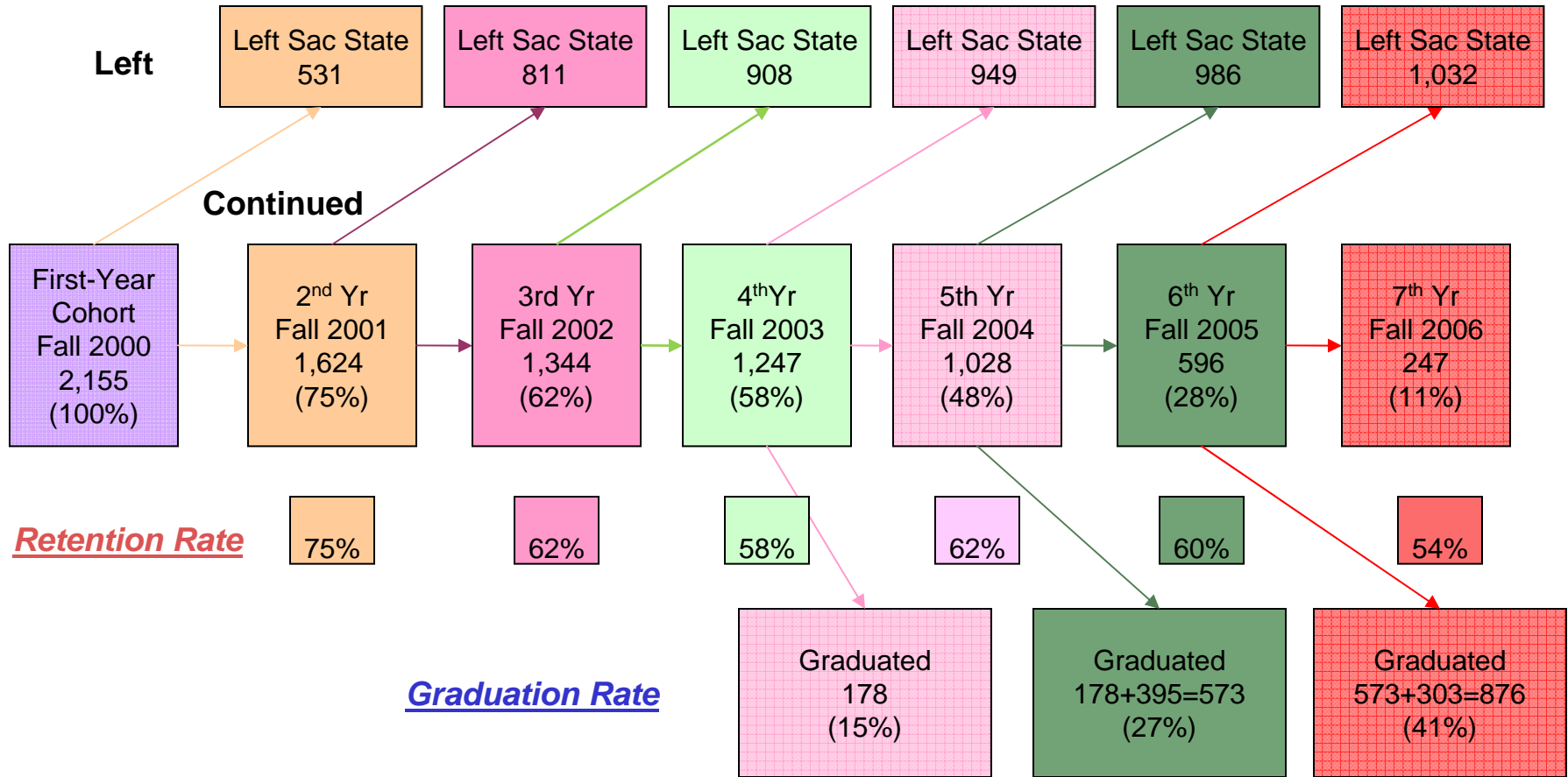
8/22/2008 California State University, Sacramento - Office of Institutional Research

Performance Tracking of First-time Freshmen

		H.S. GPA		1-yr retention rate						6-yr grad rate						To date		
		F97	S98	F98	S99	F99	S00	F00	S01	F01	S02	F02	S03	F03	S04	F04	S05	
Fall 1997	Enrollment	1473	1347	1123	1073	950	908	874	817	706	589	390	279	204	173	115	90	
	Continuation Rate	1.00	.91	.76	.73	.64	.62	.59	.55	.48	.40	.26	.19	.14	.12	.08	.06	
	Degrees Awarded					2	6	12	82	111	162	100	74	36	52	24	23	740
	Graduation Rate						.01	.01	.07	.14	.25	.32	.37	.40	.43	.45	.46	.50
	Retention Rate	1.00	.91	.76	.73	.64	.62	.60	.57	.55	.54	.52	.51	.51	.51	.51	.51	
	Overall GPA	3.16	2.43	2.48	2.59	2.62	2.69	2.71	2.75	2.78	2.77	2.71	2.61	2.58	2.59	2.57	2.51	2.51
	Good Standing		.67	.70	.76	.79	.83	.86	.76	.82	.83	.84	.77	.75	.81	.79	.72	.82
		F98	S99	F99	S00	F00	S01	F01	S02	F02	S03	F03	S04	F04	S05	F05	S06	
Fall 1998	Enrollment	1568	1462	1182	1094	995	952	917	895	732	614	430	326	217	164	104	82	
	Continuation Rate	1.00	.93	.75	.70	.63	.61	.58	.57	.47	.39	.27	.21	.14	.10	.07	.05	
	Degrees Awarded			1			5	13	122	107	154	96	101	50	53	24	18	784
	Graduation Rate							.01	.09	.16	.26	.32	.38	.41	.45	.46	.47	.50
	Retention Rate	1.00	.93	.75	.70	.64	.61	.59	.58	.56	.55	.53	.53	.52	.52	.51	.52	
	Overall GPA	3.19	2.61	2.61	2.69	2.72	2.76	2.80	2.85	2.84	2.81	2.76	2.73	2.70	2.62	2.62	2.62	2.62
	Good Standing		.72	.73	.79	.82	.76	.79	.84	.83	.84	.83	.81	.79	.76	.80	.82	.84
		F99	S00	F00	S01	F01	S02	F02	S03	F03	S04	F04	S05	F05	S06	F06	S07	
Fall 1999	Enrollment	1830	1700	1387	1329	1173	1122	1084	1049	872	726	450	349	234	172	121	84	
	Continuation Rate	1.00	.93	.76	.73	.64	.61	.59	.57	.48	.40	.25	.19	.13	.09	.07	.05	
	Degrees Awarded				1	1	4	14	140	129	215	119	108	51	49	31	22	904
	Graduation Rate							.01	.09	.16	.28	.34	.40	.43	.45	.47	.48	.49
	Retention Rate	1.00	.93	.76	.73	.64	.61	.60	.58	.56	.55	.52	.53	.53	.52	.52	.52	
	Overall GPA	3.21	2.70	2.65	2.73	2.75	2.80	2.83	2.87	2.87	2.86	2.80	2.74	2.65	2.59	2.59	2.56	2.57
	Good Standing		.76	.76	.71	.76	.80	.84	.84	.86	.85	.80	.85	.78	.78	.77	.80	.74

Stage 1 : Building Cohort Files

Tracking Diagram



Note: Retention rate = (Sum of Previous Graduates+ Fall Continued)/Cohort Count.

Stage 2: Diagnose Risky Factors

▶ Samples

- Retention Study: FY Cohort 2003–2005
- Graduation Study: FY Cohorts 1999–2001

▶ Comparison:

- Returned vs. Non-Returned at Second Year
- Compared among the groups of graduated, continued and withdrew six years later.

▶ Statistic Analysis:

- Chi-Square Test
- Independent-Samples T-Test



Stage 2: Diagnose Risky Factors (Cont.)

► Factors:

◊ Background

- Ethnicity
- Gender
- Remediation Status
- Admission Status
- High School GPA
- SAT Scores

◊ Academic Activities

- Enrollment Type
- Commuter Status
- Probation Status
- Major Declaration
- Course Load

- **Changed Major > 1 in 6 Years**

- **Second Year Retention**

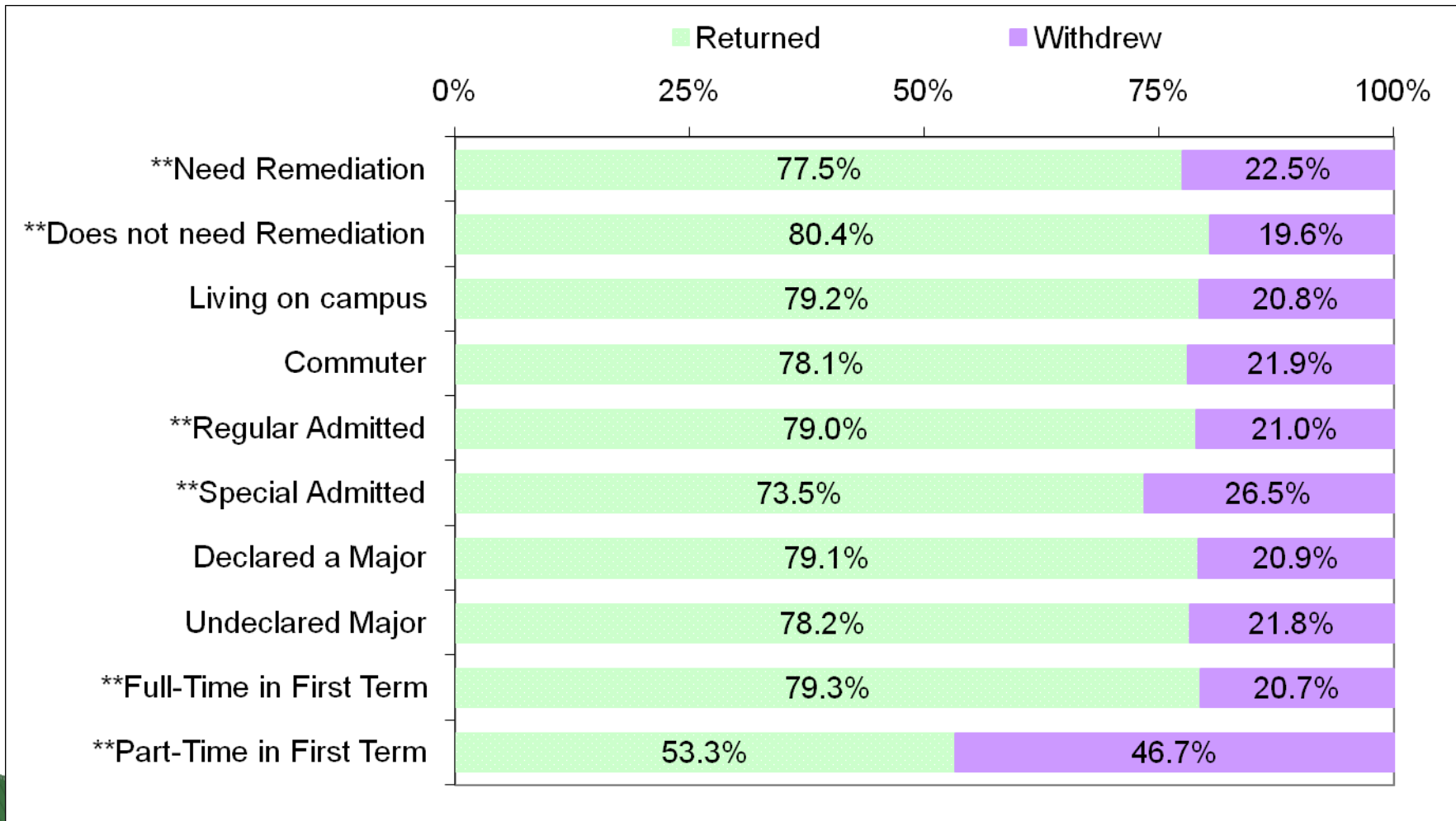
**Last two for Graduation rate analysis*

◊ College Intervention

- Learning Community
- Freshmen Seminar
- Equity Program
- Athletics
- Financial Aid during First Year
- Financial Aid for One Year or More
- Merit Based Financial Aid
- Need Based Financial Aid

Retention Study Results I

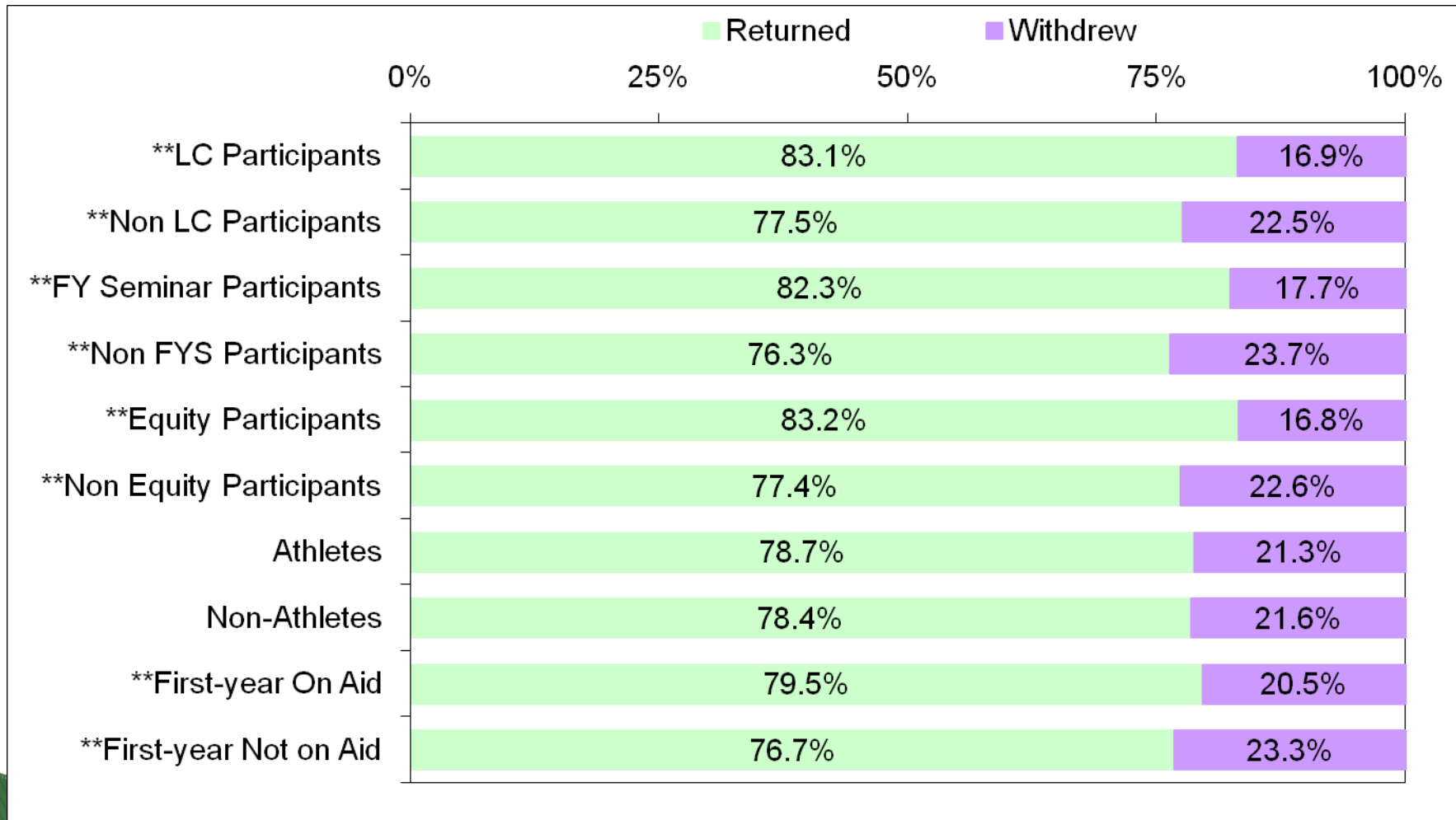
Second Year Retention Rate by Background and Academics (2003–2005 Cohorts)



** Signifies a Significant Difference between the two factors.

Retention Study Results II

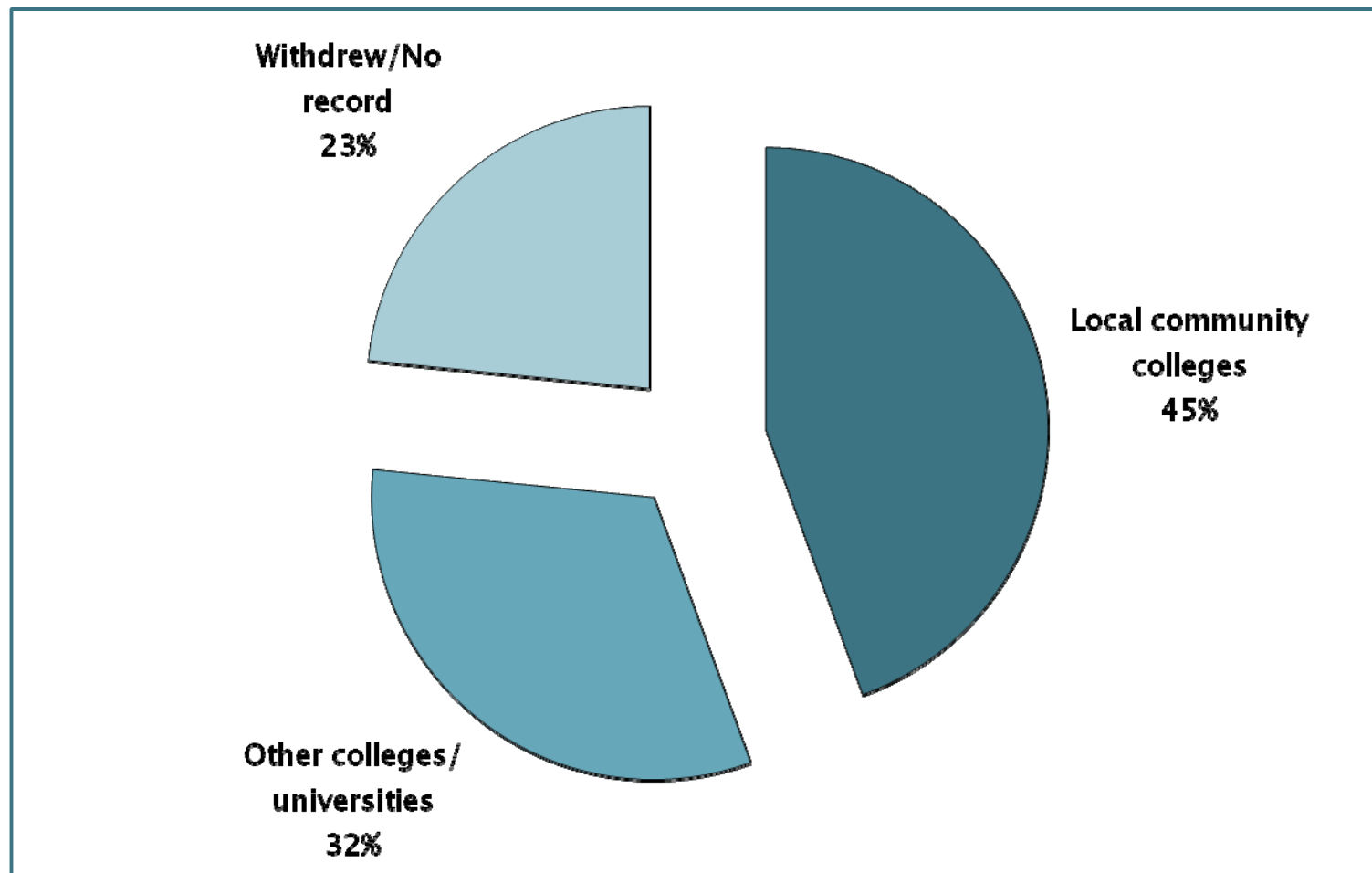
Second Year Retention Rate by College Intervention (2003–2005 Cohorts)



** Signifies a Significant Difference between the two factors.

Retention Study Results III

Tracking Withdrawn Students (2003–2005 Cohorts)



Retention Study Results IV

Retention Rate by Major

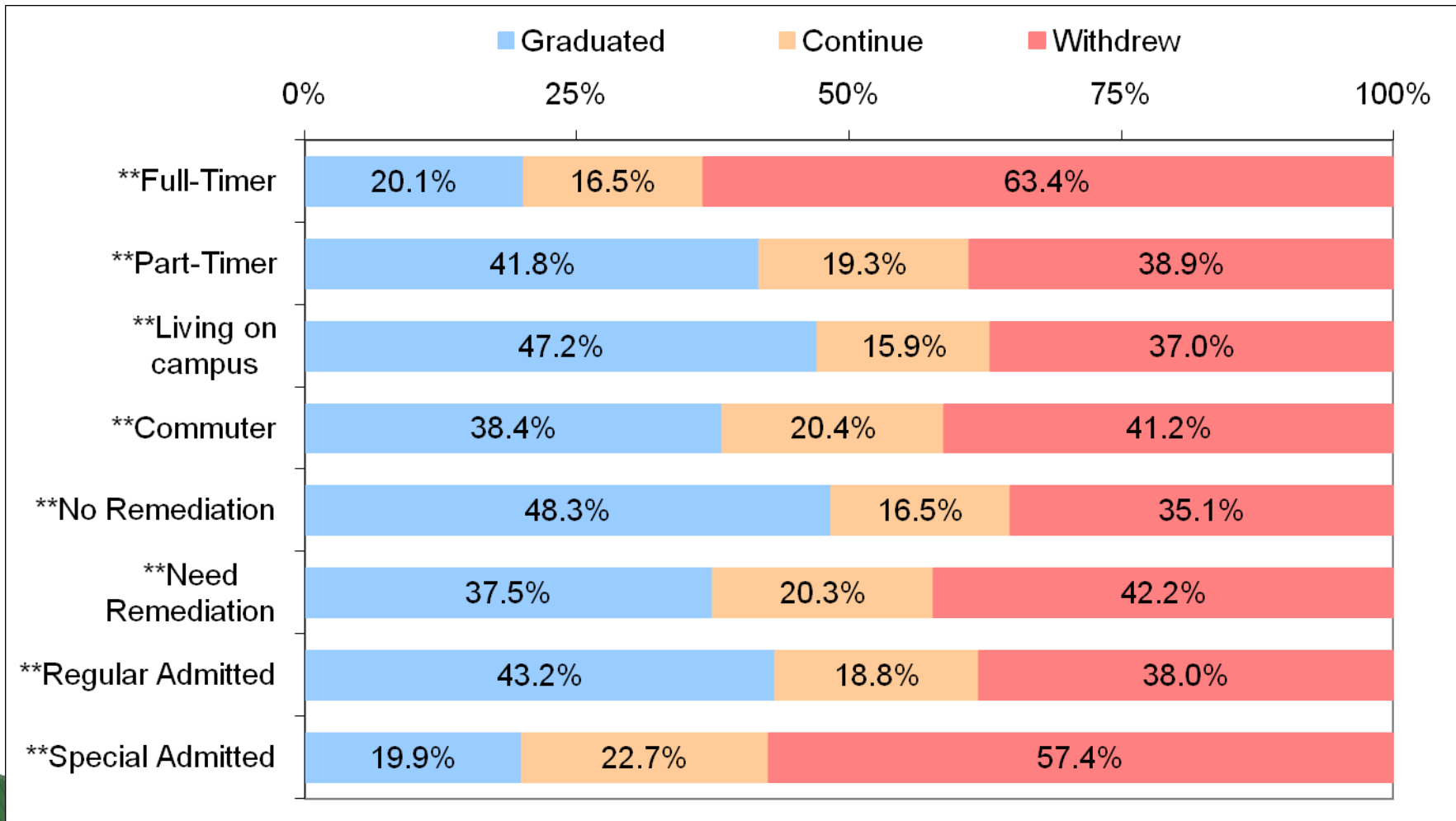
2003-2005 First-Time Freshmen Cohorts

First Term and Second Year Retention Rate by Majors

Major	Next Spring				Next Fall				Fall	Spring
	Withdrew	Returned	Total	Rate	Withdrew	Returned	Total	Rate		
Anthropology		13	13	100.0%	3	10	13	76.9%		Below
Art	5	55	60	91.7%	5	52	57	91.2%	Below	
Asian Studies		1	1	100.0%		2	2	100.0%		
Biology	17	290	307	94.5%	48	260	308	84.4%		
Business Admin..	70	1025	1095	93.6%	177	829	1006	82.4%	Below	
Civil Engineering	12	151	163	92.6%	21	125	146	85.6%	Below	
Child Development	10	149	159	93.7%	24	112	136	82.4%	Below	
Chemistry	6	139	145	95.9%	27	102	129	79.1%		Below
Construction Management	3	37	40	92.5%	12	24	36	66.7%	Below	Below
Communications	8	148	156	94.9%	18	112	130	86.2%		
Computer Engineering	5	144	149	96.6%	30	112	142	78.9%		Below
Criminal Justice	29	416	445	93.5%	77	367	444	82.7%	Below	
Computer Science	14	157	171	91.8%	28	120	148	81.1%	Below	Below
Dance	1	24	25	96.0%	5	11	16	68.8%		Below
Economics	3	17	20	85.0%	3	18	21	85.7%	Below	
Electrical and Electronic Eng	4	89	93	95.7%	21	74	95	77.9%		Below
English	8	81	89	91.0%	12	65	77	84.4%	Below	
Environmental Studies		9	9	100.0%	1	6	7	85.7%		
Ethnic Studies		9	9	100.0%	1	9	10	90.0%		
Family and Consumer Sci.	3	40	43	93.0%	4	39	43	90.7%	Below	
Foreign Language	1	22	23	95.7%	4	20	24	83.3%		
Geology		3	3	100.0%		4	4	100.0%		
Gerontology		1	1	100.0%		1	1	100.0%		
Government	9	102	111	91.9%	18	88	106	83.0%	Below	

Graduation Study Results I

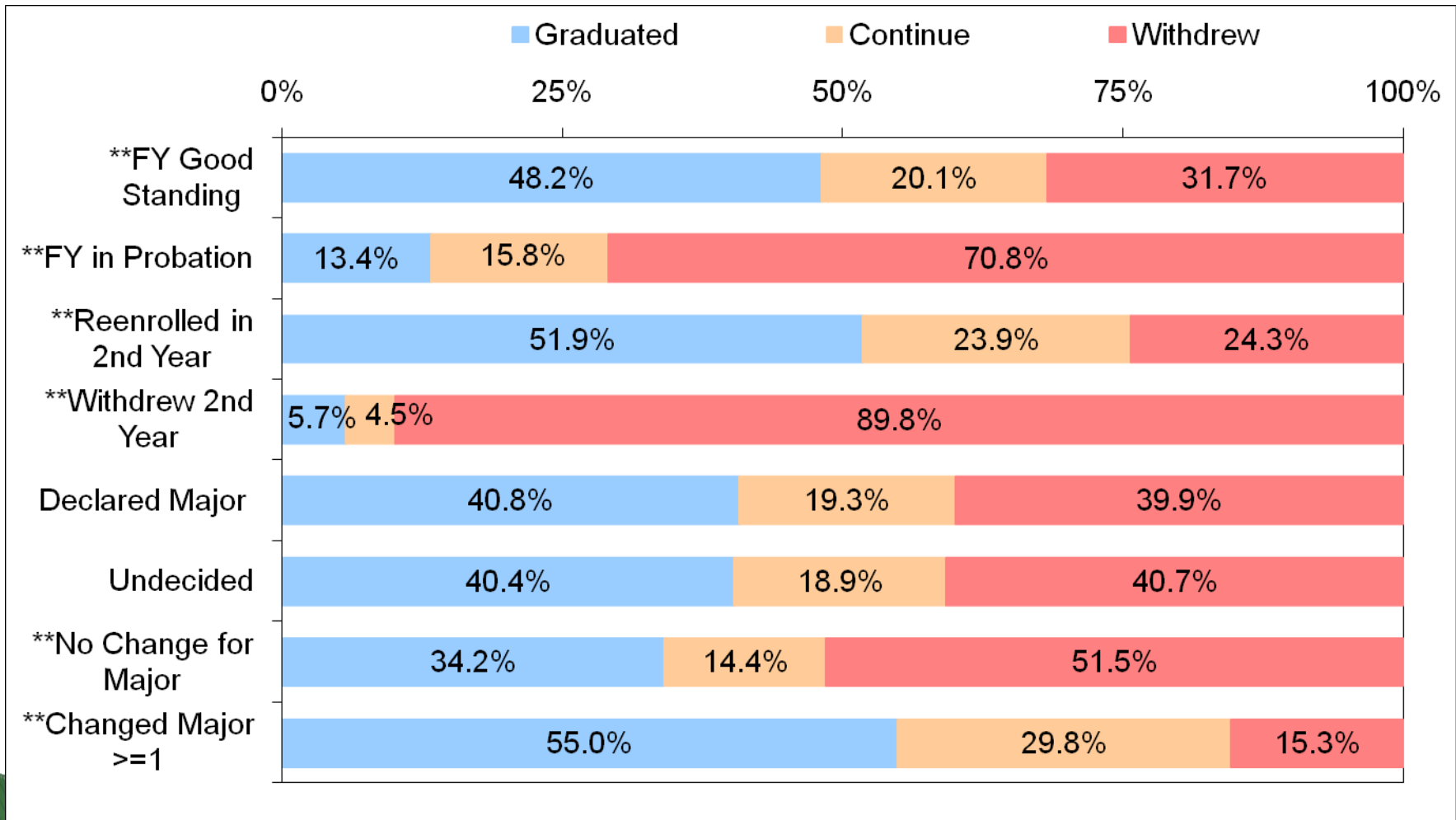
Six Year Graduation Rate by Academic Background (1999–2001 Cohorts)



** Signifies a Significant Difference between the two factors.

Graduation Study Results II

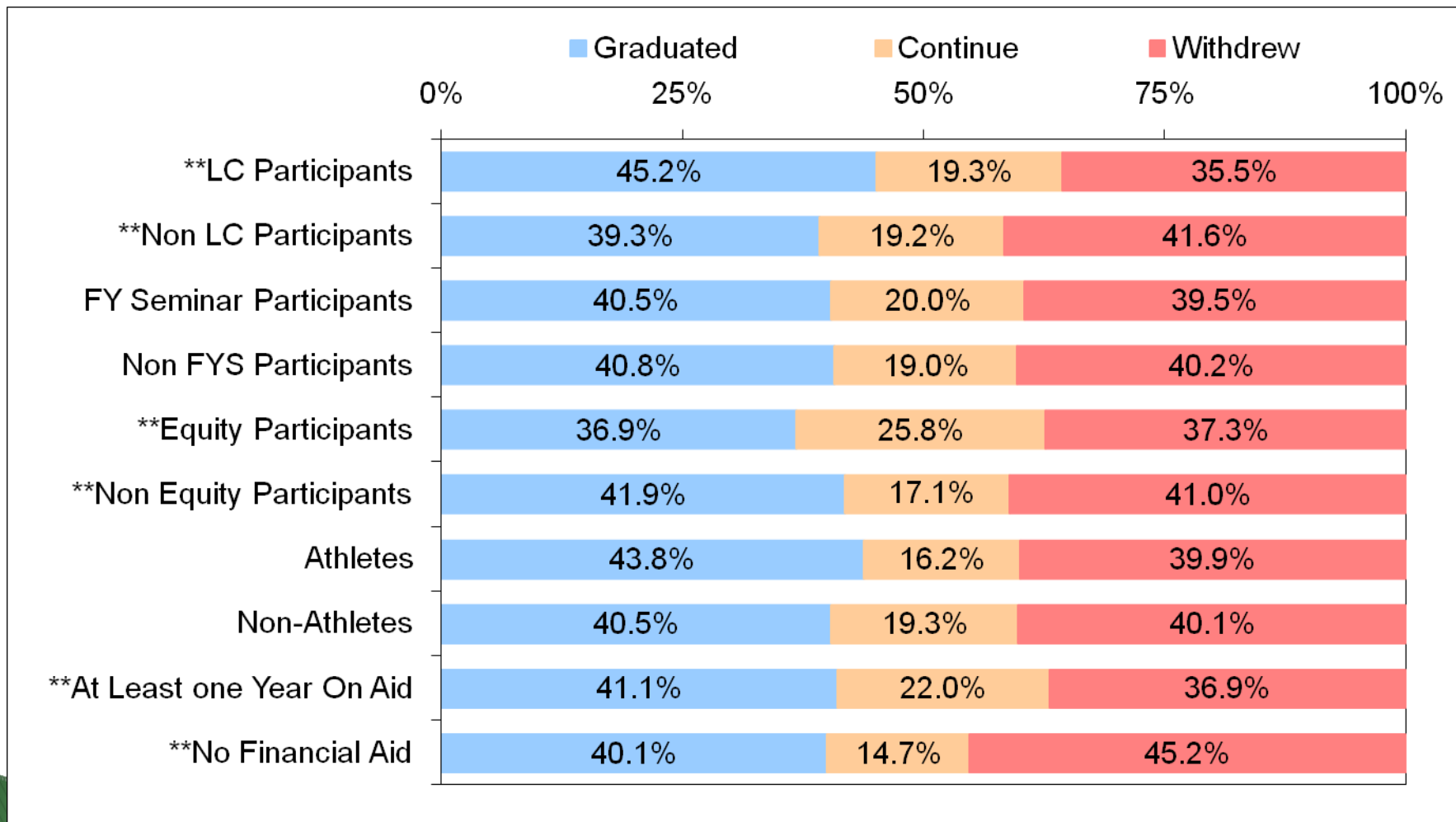
Six Year Graduation Rate by Academic Activities (1999–2001 Cohorts)



** Signifies a Significant Difference between the two factors.

Graduation Study Results III

Six Year Graduation Rate by College Intervention (1999–2001 Cohorts)



** Signifies a Significant Difference between the two factors.

Stage III: Zoom in on the “Bleeding Spot”

► *Rate:* (Based on 3 Cohorts for each group)

First Term:	GPA \geq 2.0	GPA $<$ 2.0	All
1-year Retention	87%	43%	78%
6-year Graduation	48%	13%	41%

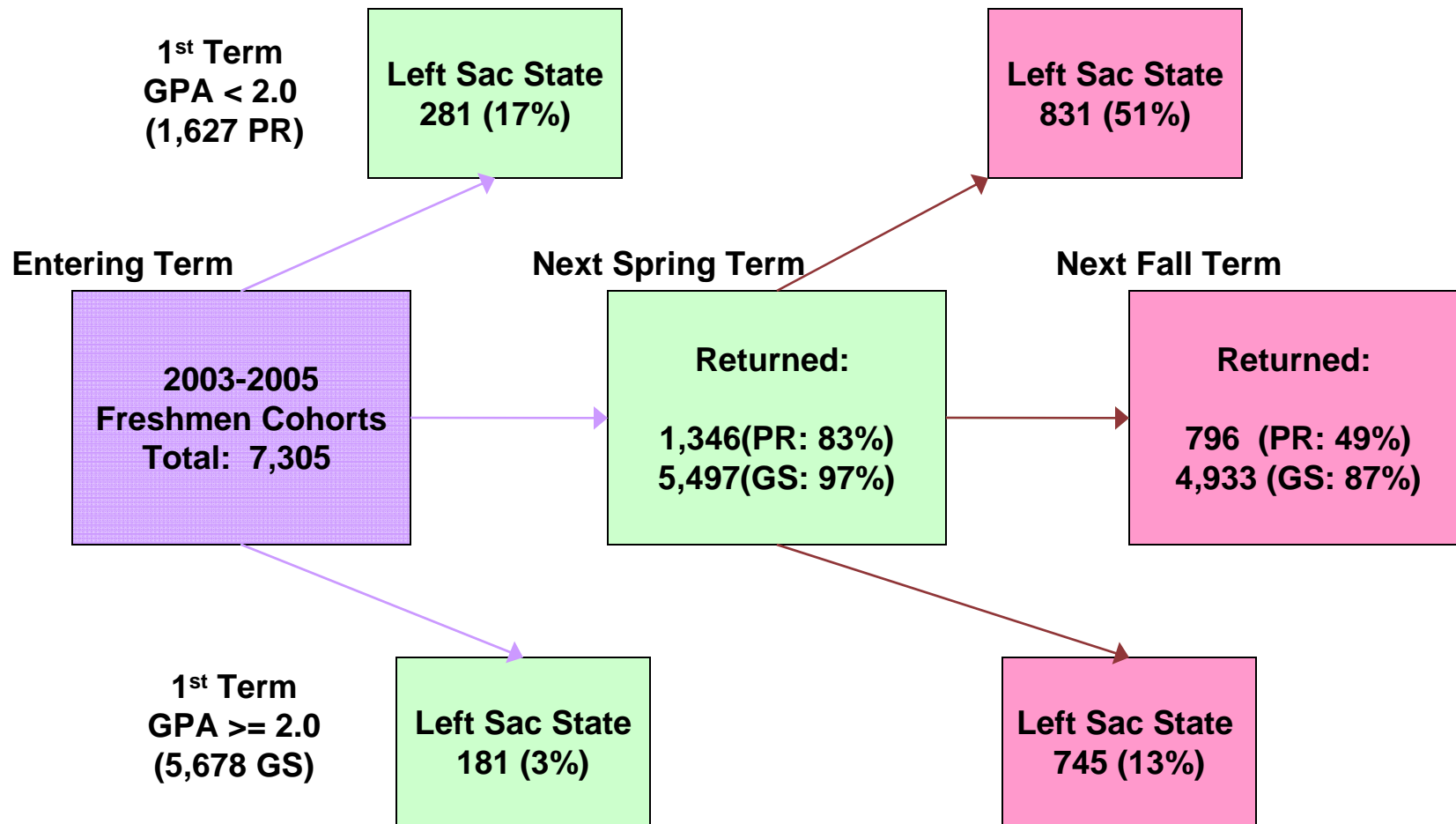
Chi-Square test, $p < 0.01$

► *Odds:* (Based on Cohort 2006 & 2001)

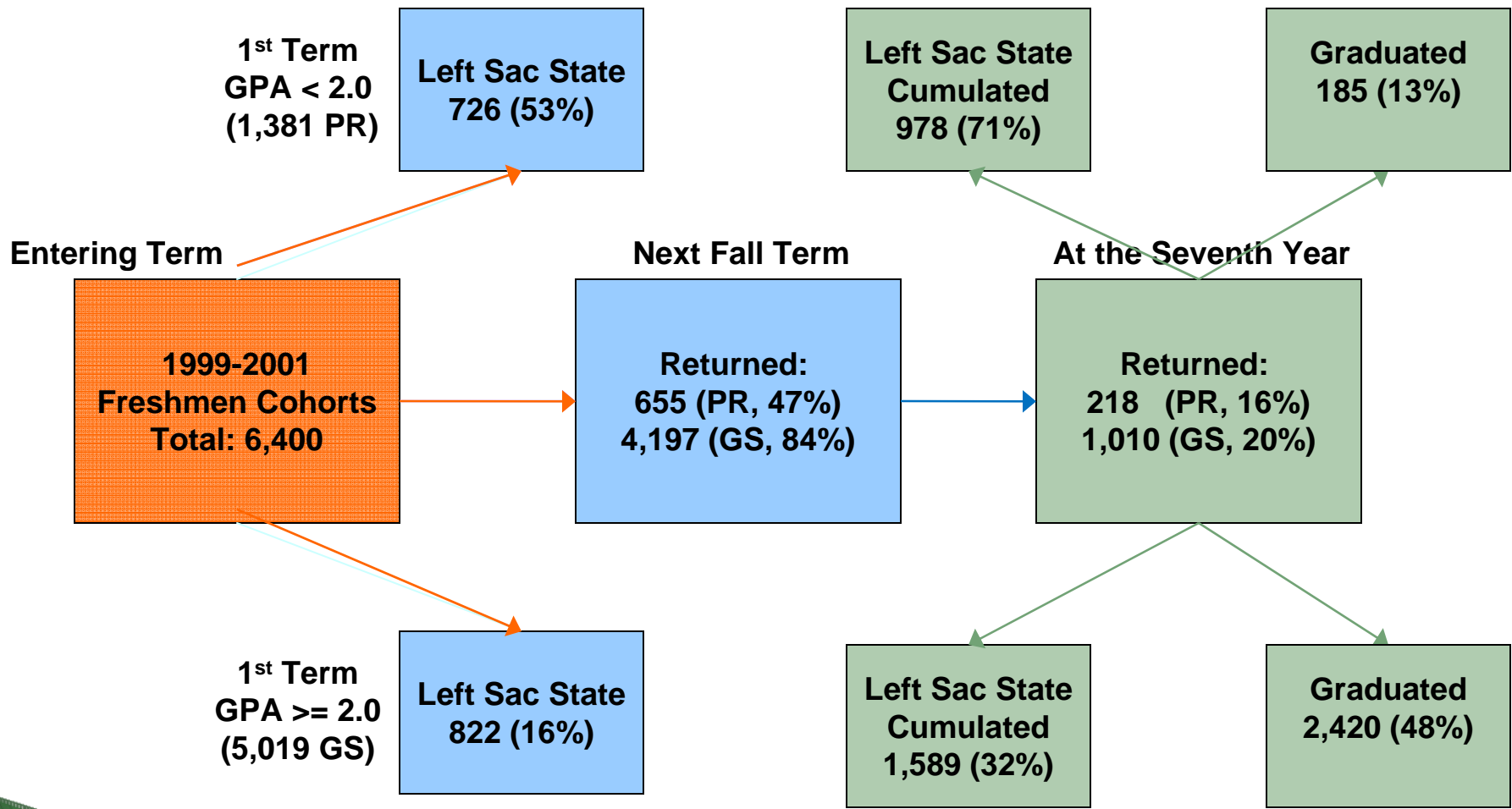
First Term	GPA \geq 2.0	GPA $<$ 2.0
1-year Retention	8.6 to	1
6-year Graduation	5.6 to	1

Logistic Regression, $Exp(B)$

At Highest Risk Group: Lowest Retention Rate



At Highest Risk Group: Lowest Graduation Rate



Conclusion



- ▶ Reduce the % of Students on Academic Probation
 - Probation is the outcome of student learning rather than a factor of student background, so it is more under the control of the university.
 - Probation is a manageable task for a short term plan since there were an average of 22% Freshmen who earned a GPA under 2.0 during their first term (about 500 students for each cohort).

Predictive Model: Methods

- ▶ Use Factors with Negative Impact
 - Identify students who are most likely to earn a GPA less than 2.0 by the end of their first term.
- ▶ Find the Best Predictor(s)
 - Calculate the Passing Rate for Each Factor
 - Compare the values of lower possibility event and correlation coefficient (r .) among the factors.



Predictive Model: The Best Predictor(s)

(Based on Cohort 2006 data by using Binary Logistic Regression)

▶ “Need remediation”

Percent of Cohort: 68.3%

First Term Failure rate:

Need Remediation: 25%

No need for Remediation: 14%

Prediction:

*Lower possibility event
80.1%*

*Correlation coefficient
 $r = -0.88$*

▶ “Need remediation in English”

Percent of Cohort: 56.6%

First Term Failure rate:

Need Remediation: 27%

No need for Remediation: 15%

Prediction:

*Lower possibility event
71.8%*

*Correlation coefficient
 $r = -0.56$*

Next Step

- ▶ Conduct further analyses on the remediation type (English or Math) and which are the “Blocking Courses” due to high failure rates for students who need remediation.
- ▶ Determine which GE or introductory courses are considered a “Gateway Course” due to high failure rates for all students.
 - A 5-year study on the courses with higher failure rate than the group average.



Q & A

- ▶ Sacramento State OIR Website:
 - www.oir.csus.edu
- ▶ Jing Wang:
 - jwang@csus.edu
- ▶ Tamara Lapointe:
 - lapointe@csus.edu

