BOISE STATE UNIVERSITY
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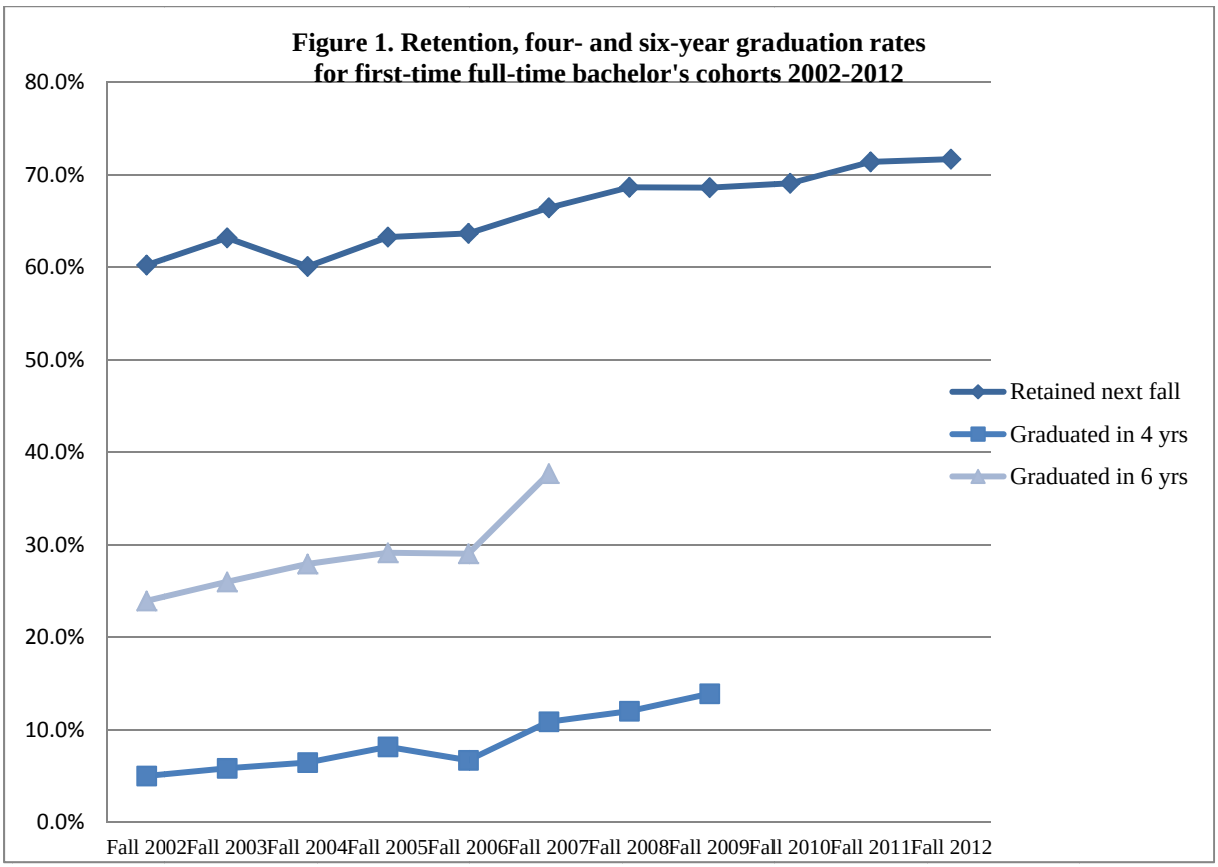
Prepared by:
Marcia Belcheir, Ph.D.
Office of Institutional Research

Patterns of change in retention and graduation rates over time

Boise State's retention and graduation rates have been steadily improving. Over the past ten years, retention rates have increased over 10 percentage points, changing from 60.2% for the fall 2002 first-time full-time (FTFT) bachelor's degree-seeking cohort to 71.4%[1] for the fall 2011 cohort. Though still low, four-year graduation rates have more than doubled from 5.0% for the 2002 cohort to 13.9% for the fall 2009 cohort. Six-year graduation rates also showed a dramatic jump recently.

As shown by Figure 1, this change in retention seemed to really take off starting with the fall 2007 first-time, full-time bachelor's degree-seeking cohort. Four-year graduation also has recently shown the same improvements already seen in retention starting with the fall 2007 cohort. The recently related six-year graduation rates for the fall 2007 cohort saw a one-year increase of over eight percentage points.

Figure 1. Retention, four- and six-year graduation rates for first-time full-time bachelor's cohorts 2002-2012



[1] Fall 2012 showed another improvement to 71.7% at 10th day, but official figures will be calculated after the October 15th census date.

The conclusions reached by visual inspection are confirmed by statistical analysis (see Table 1 below). Compared to the 2005 cohort, the retention rate is significantly higher starting with the 2007 cohort and continuing through the 2011 cohort. A similar pattern is seen for four-year graduation rate. Although the 2006 cohort had a similar four-year graduation rate compared to 2005, the 2007 and 2008 cohorts had graduation rates that were significantly higher.

Table 1. Retention and graduation rates by cohort compared to the 2005 cohort

Cohort year	Percent retained	Significant compared to 2005?	Percent graduated in 4 years	Significant compared to 2005?
2005	63.3		8.2	
2006	63.7	No	6.7	No
2007	66.4	Yes	10.9	Yes
2008	68.7	Yes	12	Yes
2009	68.6	Yes	NA	
2010	69.1	Yes	NA	
2011	71.4	Yes	NA	

To what do we owe these improvements? Are we seeing the effects of closer attention to students' academic experience? A variety of initiatives have been undertaken to improve retention following the recommendations of the Student Success Taskforce, which finished its work in 2005. These recommendations included hiring someone to directly oversee the undergraduate experience; the Associate Vice Provost for Undergraduate Studies was hired in the fall of 2006. A variety of approaches to improve retention across the campus followed. These approaches included:

- Increasing course capacity to support progress toward degrees
- Developing waitlists for students wanting to take courses that were full
- Promoting a "Finish in Four" program to encourage students to complete their degrees in four years.
- Adding additional advisor positions to support general and college-based advising
- Expanding the new student summer orientation to a two-day overnight experience to build community and focus on academics
- Increasing opportunities for first-year seminars, leaning communities, and residential colleges
- Developing early warning systems in a number of first-year courses to identify and support students who are struggling
- Restructuring early math courses to increase student time with instructors, increase instructor preparation and training, and better assess current student knowledge.
- Prompting students to review their Academic Advisement Report at 30, 60, and 90 credits to keep students on-track for graduation.
- Contacting students who were eligible to enroll but had not to inquire about barriers which might be impacting their registration.
- Offering faculty development activities through the Center for Teaching and Learning and college-based initiatives to help foster student learning and persistence.

In addition, the composition of incoming freshmen has been changing. The admissions index scores, a combination of high school GPA and test scores, have been increasing. More out-of-state students also have been coming to Boise State, and more new students are living on-campus. Are these changes driving better retention and graduation rates?

A prior study addressed the relationship of admissions, early college experiences, and first term GPA to retention and graduation (*Predicting student success using ten years of cohort data*, RR 2013-02). Retention after one year was related most highly to first semester GPA. However, in the final model most other variables also were significant. These included age, Idaho residency, residing on-campus, credits attempted first term, taking both math and English during the first year, withdrawing from courses in the first term, and having larger amounts of unmet financial need. The only variables that did not reach significance were index score and Pell eligibility.

The study also found that in the final analysis first semester GPA showed the strongest relationship to graduation followed by admissions index scores when predicting graduation after four years. A number of other variables, however, were again related to four-year graduation in including residency, course withdrawals, Pell eligibility, living on-campus, and credits attempted. Age, taking math and English in the first year, and unmet financial need were unrelated to graduation in four years.

When predicting graduation after six (6) years the study again found that first semester GPA had the strongest relationship to graduating in the final model. All of the other factors previously mentioned also were significant with the exception of age and residency.

The purpose of this study is to examine the possible influences related to the change in retention and four-year graduation rates by looking at the patterns of change and the extent that those patterns match the retention shifts. Selection of the variables for analysis is based on the prior retention and graduation study and includes those variables most likely to be related to retention after one year and graduation after four years. The study will not address graduation after six years because the significant lag between implementing changes and seeing the results. While we are beginning to see the same positive effects in six-year graduation rates that we are already seeing for retention and four-year graduation rates, the effect is too new for this analysis.

Methodology

The study is based on the same set of data that was used for the prior study. This study, however, is limited to the fall 2005 first-time full-time bachelor's degree-seeking cohort through the fall 2011 cohort. These cohorts were selected because retention rates began their upward trajectory with the fall 2007 cohort, so the prior two cohorts (2005 and 2006) serve as base years for comparisons. The analysis includes comparing the means over time for index scores, credits attempted in the first semester, and grades as measured by first math grade, first English grade, and first term GPA. The process involves using ANOVA to first address the question of whether at least two cohorts differ on the variable being analyzed (e.g., admissions index scores). When the ANOVAs are statistically significant, post hoc tests using Dunnett's *t* two-sided test are conducted, using 2005 as the control year and comparing all other cohort years to the fall 2005 cohort. This approach answers the question of when the difference in the means became significant compared to the base year.

A somewhat different approach is taken with dichotomous variables such as" living on campus" and "withdrawing from courses." In this case, a series of chi-squares were run with 2005 as the base year compared to each other cohort year. The relationship was considered statistically significant if $p<=.05$.

Results

Comparing the retention rate by cohort year using chi-square shows a statistically significant difference compared to 2005 beginning with the 2007 cohort and continuing through 2011 (see Table 1). Therefore, variables that display a similar pattern across the cohort years are considered likely candidates to be more strongly related to retention compared to variables that do not.

All of the academic scaled variables (math grade, English grade, first term GPA, credits attempted first semester) reached statistical significance using ANOVA, indicating that there were differences for at least two of the cohort

years. The post hoc tests showed that math grades and first term GPA shifted in a similar pattern to the retention data. That is, the 2006 cohort was similar to 2005, but after that year, the succeeding cohorts showed better academic performance compared to 2005. English grades showed a significant difference compared to 2005 beginning with the 2008 cohort, while the number of credits attempted began to show differences with the 2009 cohort. The means by year and summary of results can be found in Table 2.

The entering academic preparedness of new students as measured by their index scores showed a different pattern. The ANOVA reached statistical significance, but the differences compared to 2005 only reached statistical significance for the 2011 cohort. It appears, therefore, that the academic success that students experienced after they reached the campus was more important to retention than the academic preparation they brought with them as measured by index scores. See Table 2 for details.

Using chi-square to compare the proportion of students who withdrew from one or more courses revealed that compared to 2005, the proportion who withdrew steadily declined and was significantly lower than 2005 starting with the 2008 cohort year. It appears, therefore, that course withdrawals followed a similar pattern to the changes in retention (i.e., as fewer students withdraw by cohort the retention rate increases). See Table 3 for details.

The remaining variables tested did not follow this pattern. Living on-campus steadily increased each year starting with 2006. Enrollment in English steadily *decreased*, which is opposite from the trend we might expect. Enrollment in math steadily increased starting with 2006 and remained significantly higher than 2005 with the exception of a non-significant result for 2009 when the proportion dropped slightly. None of these variables follow the same pattern of change seen for retention, indicating that they are less likely to be affecting the changes in retention.

Discussion

The retention rates of new first-time full-time cohorts have been steadily improving, especially since the fall of 2007. To what do we owe these improvements? Changes made to the student's academic experience? Improvements in the quality of students we admit? Although all of these efforts are important, the variables that showed patterns of change similar to the change in retention rates were all related to the student academic experience. The two variables that showed the same pattern of change as retention rates were math grades and first semester GPA. Course withdrawals and English grades also were similar but lagged by an additional year.

A review of the changes that have been implemented since 2006 shows that emphasis was placed on improving students' math experience and increasing the monitoring of students who showed early signs of academic difficulty so these findings make sense. In particular, the major improvement in students' math grades should be celebrated as the main key to improving retention.

Of course, looking at patterns of change for variables related to retention provides evidence but not proof of which factors had the greatest impact on retention. The variables may only be a stand-in for factors that could not be measured. The impact might not be as immediate has expected (e.g., two or three years may be required to actual see the effect). Nevertheless, we can be fairly certain that the improvement of the quality of students coming to Boise State is NOT the *only* factor to explain the improvements in retention and graduation. Focused effort over time to the student experience must be a key to the marked improvements in student success at Boise State.

Table 2. Descriptive information for variables by cohort year with comparisons to the 2005 cohort

Variable	Cohort	N	Mean	Std. Deviation	Std. Error	Significant compared to 2005?
Credits taken 1st term	2005	1764	13.74	1.65	0.04	
	2006	1880	13.73	1.62	0.04	N
	2007	1904	13.83	1.65	0.04	N
	2008	2048	13.86	1.69	0.04	N
	2009	2093	13.89	1.65	0.04	Y
	2010	2306	13.97	1.72	0.04	Y
	2011	2147	14.05	1.65	0.04	Y
English grade points	2005	1636	2.75	1.35	0.03	
	2006	1718	2.73	1.35	0.03	N
	2007	1703	2.82	1.27	0.03	N
	2008	1856	2.94	1.23	0.03	Y
	2009	1812	2.87	1.25	0.03	Y
	2010	2032	2.91	1.25	0.03	Y
	2011	1948	2.94	1.23	0.03	Y
Math grade points	2005	1279	1.41	1.40	0.04	
	2006	1444	1.45	1.38	0.04	N
	2007	1442	1.66	1.43	0.04	Y
	2008	1567	2.17	1.42	0.04	Y
	2009	1572	2.18	1.42	0.04	Y
	2010	1822	2.12	1.46	0.03	Y
	2011	1755	2.23	1.40	0.03	Y
1st term GPA	2005	1764	2.34	1.14	0.03	
	2006	1880	2.29	1.17	0.03	N
	2007	1904	2.45	1.10	0.03	Y
	2008	2048	2.59	1.08	0.02	Y
	2009	2093	2.54	1.11	0.02	Y
	2010	2306	2.46	1.12	0.02	Y
	2011	2147	2.56	1.09	0.02	Y
Index score	2005	1445	53.72	16.71	0.44	
	2006	1586	53.04	17.27	0.43	N
	2007	1623	53.66	17.32	0.43	N
	2008	1742	54.57	17.07	0.41	N
	2009	1702	54.46	17.43	0.42	N
	2010	1975	54.46	17.42	0.39	N
	2011	1854	56.56	15.94	0.37	Y

Table 3. Comparisons to 2005 for categorical variables

Cohort year :	Lived on-campus		Took math in 1st year		Took English in 1st year		Withdrew from 1 or more courses	
	Percent	Significant	Percent	Significant	Percent	Significant?	Percent	Significant?
2005	32.8		72.5		92.7		11.4	
2006	39.2	Y	76.8	Y	91.4	N	12.1	N
2007	44.3	Y	75.7	Y	89.4	Y	9.7	N
2008	42.3	Y	76.5	Y	90.6	Y	8.5	Y
2009	43.2	Y	75.1	N	86.6	Y	6.9	Y
2010	47.2	Y	79	Y	88.1	Y	5.3	Y
2011	52.7	Y	81.7	Y	90.7	Y	5.9	Y