



EDUVENTURES

Learning Collaborative for Higher Education

Academic Leadership

Collaborative Research Report

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Creating a Retention Management Culture, Part I: Analysis of Retention and Graduation Performance

Data Type	Key Source
Secondary data	Integrated Postsecondary Education Data System (IPEDS)

Key Questions:

Which institutions over or underperform based on differences between predicted and actual graduation rates?

How are institutions performing across first year persistence, and 4 and 6 year graduation rates?

To what extent can institutional characteristics around academic skill, affordability, and environment predict six-year graduation rate?

Abstract

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This first report on creating a retention management culture focuses on the identification of institutions that are outperforming a predicted six-year graduation rate based on linear regression of data for more than 1,121 master's, baccalaureate and doctoral institutions.

- Eduventures research staff constructed a model for predicting six-year graduation rates based on factors that have been shown to have primary influence on retention: academics, affordability, and social environment.
- Predicted six-year graduation rates were compared with actual graduation rates in order to identify institutions within the membership that were average performers, under performers, and over performers

• These results will be used in Part II of this collaborative study in order to develop case studies for best practices in retention management, including those specific to the role of faculty.

About the Collaborative Research Process

Collaborative Research investigations address themes of interest to the membership at-large. The membership plays a role in shaping these research studies, their goals, and methodologies by reviewing and providing feedback on research proposals and survey instruments, and in many cases, by providing survey lists, benchmark data, and best practice cases. In this way, the research and its outcomes leverage the collective knowledge and effort of the membership. Participation in Collaborative Research studies is entirely voluntary, but highly encouraged.

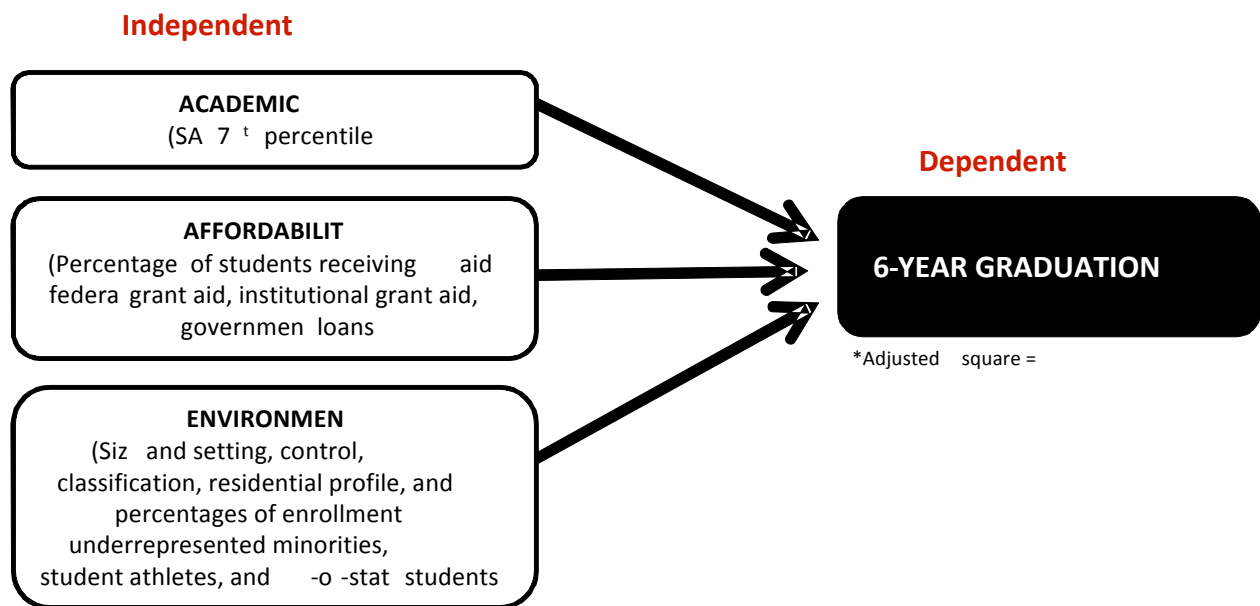
Executive Summary

Based on a theoretical framework for retention management, Eduventures research staff hypothesized that the six-year graduation rate could be, to some extent, predicted by data on academic skill, affordability, and social environment reported in IPEDS data. Through linear regression Eduventures research staff constructed a model that explains approximately 71% of the variance in six-year graduation rate for 1,121 master's, baccalaureate and doctoral institutions.

Each institution's predicted value was compared with its reported six-year graduation rate resulting in a difference score that was then categorized to identify institutions performing below expectations, institutions performing at expectations, and institutions performing above expectations. Given the characteristics of the AL membership, the results of this study will focus primarily on master's and baccalaureate institutions. The findings from this study will aid in the selection of institutions for case studies of best practices in retention management. Given the nature of this collaborative analysis, institutions are not identified by name, but rather assigned letter pseudonyms.

Description of Model

Using linear regression, Eduventures research staff constructed the following predictive model for six-year graduation rates:



If any one independent variable was missing in IPEDS, that institution was excluded from the analysis. In the case of the AL member cohort, this resulted in three current members being excluded from the analysis.

This model (adjusted R square = .707) describes a considerable amount of the variance seen in six-year graduation rates for 1,121 public and private master's, baccalaureate and doctoral institutions. The purpose of the model is to identify institutions that are performing beyond expectations in order to conduct further research that will outline other factors not captured in IPEDS that affect retention, as well as verify best practices in retention management.

Key Findings

Overall analysis of the 1,121 national master's, baccalaureate and doctoral institutions analyzed revealed that although public and private institutions' average persistence rates are comparable (public institutions retain 73% of students after the first year of matriculation and private institutions retain 72%), public institutions graduate significantly fewer (23%) of this cohort after four years compared to their private counterparts who graduate 42%. While this difference is less significant at the six-year mark, there are opportunities for institutions regardless of control to adopt better practices in retention management.

Research findings presented in this report are intended to provide AL-LC members with key insight into national persistence and retention trends, by institution type, and opportunities for comparison. Moreover, this study identifies AL members with above average performance in retention to serve as a platform for forthcoming research focused on best practices in retention management. Key takeaways from this study are highlighted as follows:

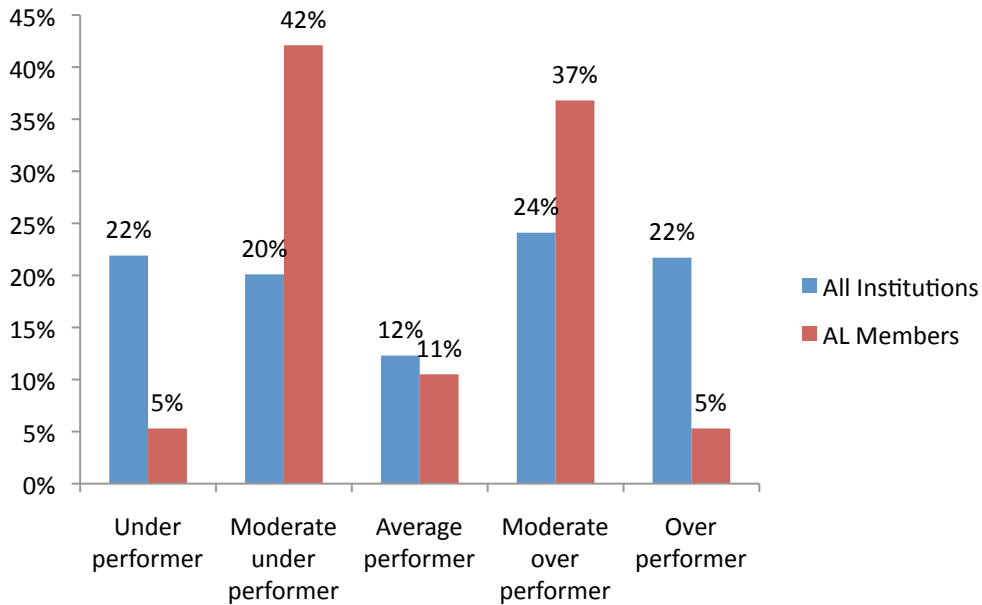
Finding 1. Regardless of institutional type or control for master's and baccalaureates, there was significant variance between predicted and actual retention performance of all 1,121 institutions. Private master's and private baccalaureate institutions had the highest residual spread with 73 and 83.8 respectively. While not as high as privates, public master's and public baccalaureates had a high residual spread as well, 48.6 and 46.9 respectively. (see Table 1).

Table 1. Distribution of Residuals for Predicted Six-Year Graduation Rate by Institution Type

	Standard Deviation	Minimum Residual	Maximum Residual
Public master's	8.5	-28.4	20.2
Private master's	9.8	-41.2	31.8
Public baccalaureate's	10.8	-24.6	22.3
Private baccalaureate's	10.2	-44.7	39.1

Finding 2. Overall, AL members perform slightly lower than the overall group of institutions in this study. 47% of AL members underperform compared to 42% in the overall group of institutions. 42% of AL members over perform compared to 46% in the overall group of institutions (Figure 1).

Figure 1. Comparison of Retention Performance Ratings of AL Members to All Institutions



Finding 3. Private master’s and private baccalaureate institutions have very similar 6 year graduation rate profiles, performing within 2% of each other across each rating category. Compared to public master’s institutions, public baccalaureates had 10% more under performers and 10% more over performers (see Table 2).

Table 2. Performance Ratings by Institutional Type

	Master’s		Baccalaureates	
	Public	Private	Public	Private
Under performer	19%	23%	29%	25%
Moderate under performer	22%	17%	14%	18%
Average performer	14%	12%	11%	10%
Moderate over performer	26%	24%	18%	24%
Over performer	19%	23%	29%	23%

Finding 4. Among 20 AL member institutions, 37% were identified as moderate over performers and 5% were defined as over performers. The one over performer was a private doctoral institution (Table 3).

Table 3. Performance Ratings for All Member Institutions, N = 20

	Percent	Mean Residual	Minimum Residual	Maximum Residual
Under performer	5%	-16.3	-16.3	-16.3
Moderate under performer	42%	-4.3	-6.2	-2.4
Average performer	11%	0.2	-0.6	0.9
Moderate over performer	37%	4.4	1.3	6.4
Over performer	5%	10.0	10.0	10.0

Retention performance for AL private master’s members is outlined below in Table 4.

Table 4. Six-Year Graduation Rates – AL Private Master’s

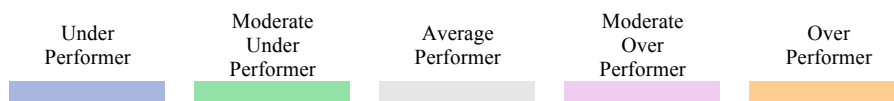
	Predicted	Actual	Residual
Institution 2	64.3	48	-16.3
Institution 3	58.6	55	-3.6
Institution 4	68.4	66	-2.4
Institution 5	56.5	61	4.5
Institution 6	60.6	67	6.4



Four public master’s institutions in the AL membership were identified as moderate over performers (see Table 5).

Table 5. Six-Year Graduation Rates – AL Public Master’s

	Predicted	Actual	Residual
Institution 8	42.2	36	-6.2
Institution 9	40	34	-6
Institution 10	48.1	43	-5.1
Institution 11	39	35	-4
Institution 12	42.7	40	-2.7
Institution 13	37.6	37	-0.6
Institution 14	51.1	52	0.9
Institution 15	45.7	47	1.3
Institution 16	38.8	43	4.2
Institution 17	53.3	58	4.7
Institution 18	50.7	56	5.3



Due to the small number of AL baccalaureates in the membership at the time of the study, publics and privates have been combined in Table 6 below.

Table 6. Six-Year Graduation Rates – AL Baccalaureates

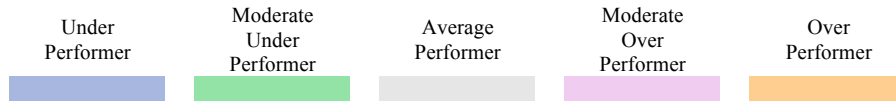
	Predicted	Actual	Residual
Institution 23	31.5	27	-4.5
Institution 25	54	58	4



One private doctoral institution in the AL membership was defined as an over performer (see Table 7).

Table 7. Six-Year Graduation Rates – AL Private Doctoral

	Predicted	Actual	Residual
Institution 53	53	63	10



Finding 5. Overall, this analysis allows Eduventures to compare institutions against themselves, as opposed to their peers, in order to rate performance on retention. The research findings identified 6 AL members who are moderately or over performing their predicted 6 year graduation rate targets.

Application of Findings

AL staff will execute the next phase of research in retention management by reaching out to institutions that are above expectations in retention. This research will further explore whether unknown institutional factors and/or retention management strategies can be linked to performance rating. This will include strategies specific to engaging faculty in supporting retention efforts at the institution.

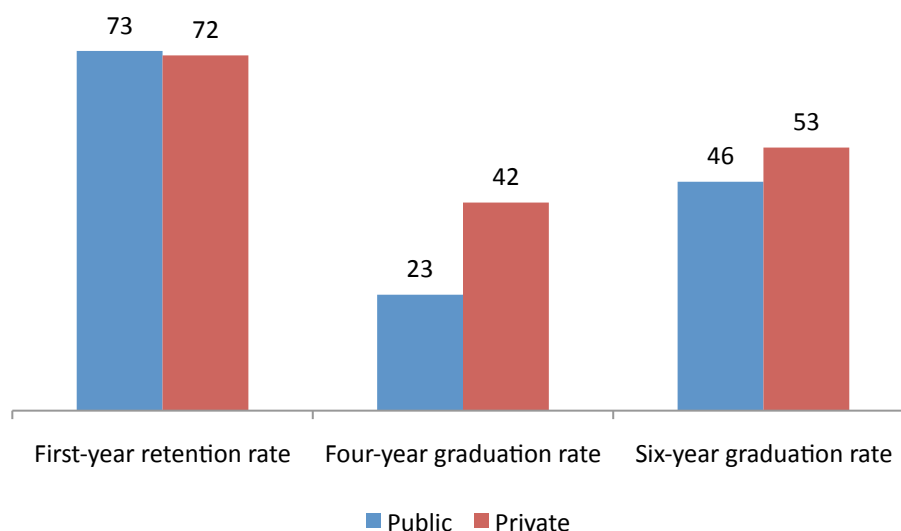
Introduction

Managing the complexities of student retention is a common challenge for all institutions. Each institution's retention performance is influenced by a number of institutional factors such as institutional control, size, and location, and at the same time, very much impacted by idiosyncratic factors that can only be discovered in the context of each individual campus. This project takes into account many of these factors in order to establish a predictive model, the sole purpose of which is to identify institutions that outperform their expected goal. The more intricate dimensions of retention, related to an institution's unique characteristics, retention management strategies, and practices, exist in the gap between what can be explained and what actually exists on campus.

National Patterns in Retention and Persistence

Nationally, among 1,121 master's, baccalaureate and doctoral institutions, public institutions retain 73% of students after the first year of matriculation; private institutions retain 72% (see Figure 2). On average, public institutions graduate 23% of this cohort after four years; this figure is significantly behind private institutions (42%). At the six-year mark, public institutions have regained some ground, graduating 46% of students, compared to private institutions' 53% graduation rate.

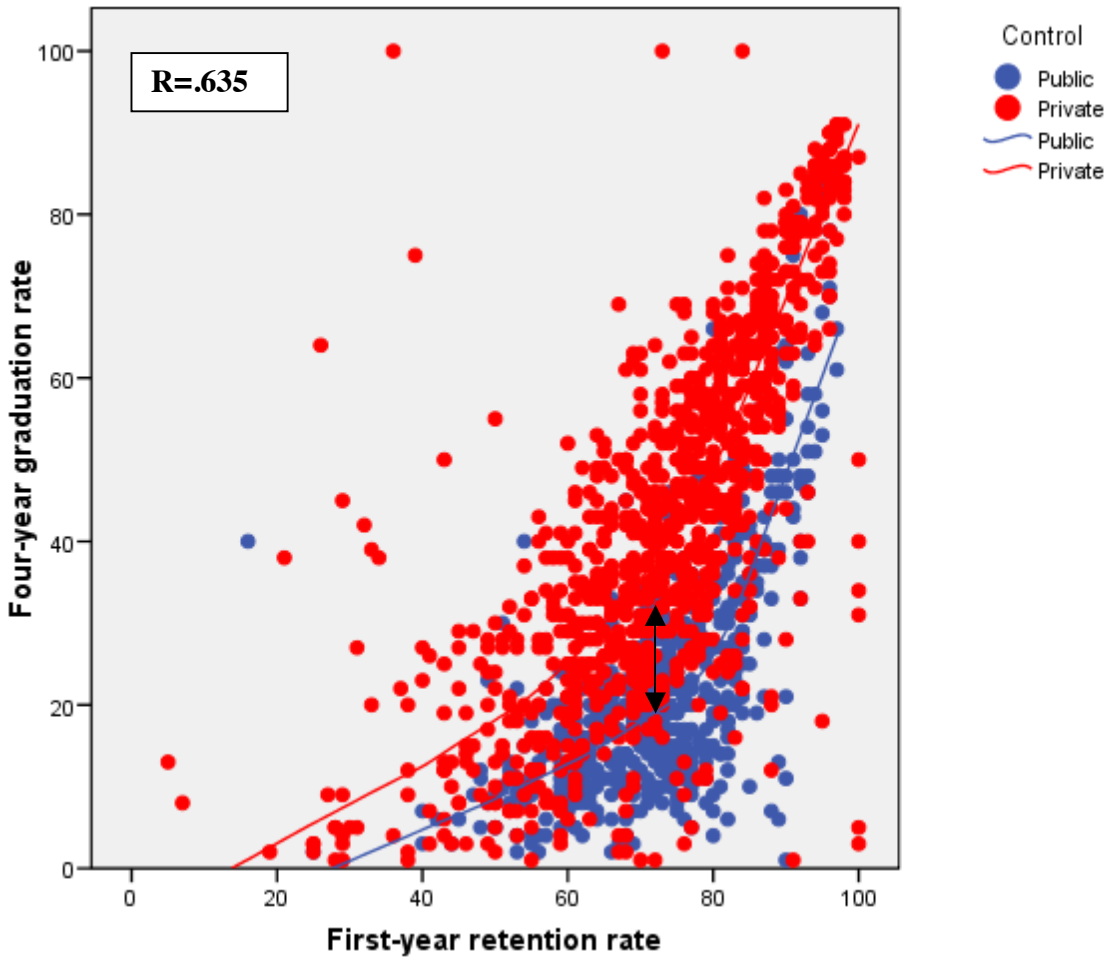
Figure 2. Mean Retention and Graduation Rates by Control



While this analysis will focus on six-year graduation rate as the bottom line performance benchmark for retention efforts, there is strong correlation between first-year retention rate and four-year and six-year graduation rate ($R=.635$). Highlighted in the scatter plot below (see Figure 3), the correlation between first-year retention and four-year graduation rate provides the following insights:

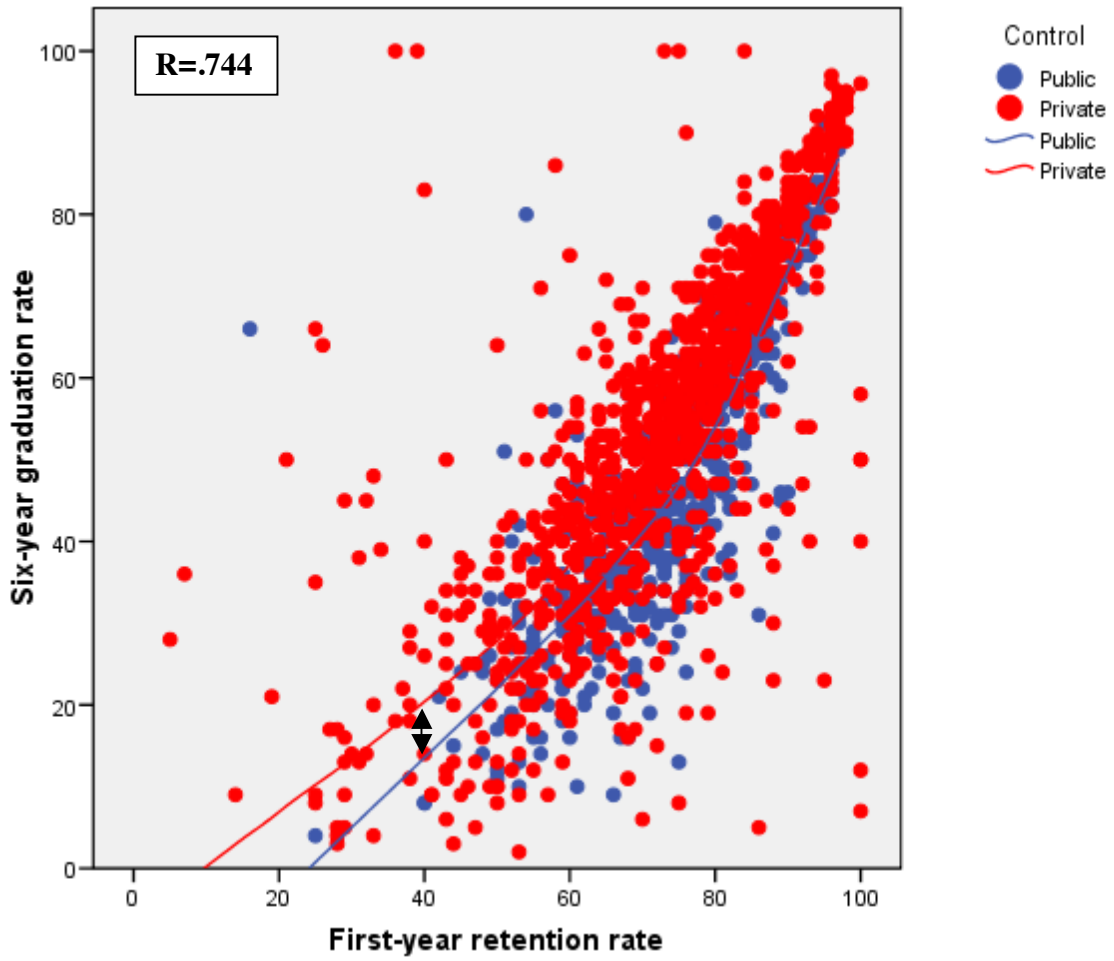
- Private institutions are slightly outperforming public institutions by a fairly consistent gap.
- It is notable that, for both public and private institutions, just beyond 70% in first-year retention rate we see an increased slope in the line of fit; which denotes increasing improvements in the four-year graduation rate for every incremental increase in the first year retention rate.

Figure 3. Correlation of First-Year Retention and Four-Year Graduation



The positive relationship between first-year retention rate and six-year graduation rate is much stronger ($R=.744$), exhibiting less variation and tighter clusters (see Figure 4). The gap between public and private institutions is much narrower, illustrating the longer time to graduation that generally occurs at public institutions. Even though this gap is narrower, public institutions still show greater spread than private institutions do.

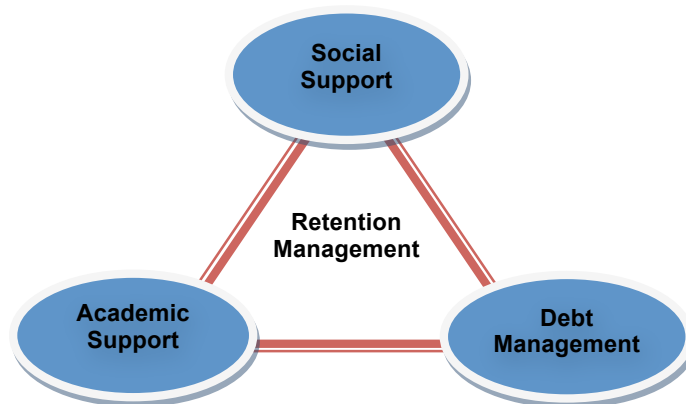
Figure 4. Correlation of First-Year Retention and Six-Year Graduation



Methodology

In previous retention studies, Eduventures has employed a three pronged model of retention¹ that takes into account academics, affordability, and environment as the main influencers on retention. As a corollary, retention management involves active monitoring and intervention in these areas (see Figure 5).

Figure 5. Model of Retention Management



Based on this theoretical model, Eduventures staff hypothesized that an institution's six-year graduation rate could be predicted, to some extent, by analyzing IPEDS data related to these three factors: academics, affordability, and environment. This model would not take into account aspects of retention that cannot be captured in IPEDS such as level of student-faculty interaction, issues with course registration and availability, and programmatic interventions in place on campus. As such, this model has been constituted only for the purpose of identifying performance ratings in order to establish a basis for further study of institutional practices.

¹ From Eduventures Custom Report (March, 2007) *Member Persistence Analysis: Identifying and Addressing Freshman Persistence Factors*. Catalog No. 28EMCRR032007

Eduventures staff identified the following set of variables, readily available in IPEDS, which speak to the prediction of six-year graduation rates based on Eduventure’s theoretical framework for retention (see Table 8).

Table 8. Independent Variables

Academic
SAT composite (Math and Critical Reading) score at 75 th percentile+
Affordability
Percentage of students receiving any financial aid
Percentage of students receiving federal grant aid
Percentage of students receiving student loan aid
Percentage of students receiving institutional grant aid
Social
Percentage of students that are underrepresented minorities (Native American, Hispanic, or Black)
Percentage of women students
Percentage of student athletes (receiving athletic scholarships)
Percentage of students under age 25
Percentage of out-of-state students (including international students)
Primarily non-residential
Highly Residential
Size of institution*
Setting of institution*
Type and control of institution – public master’s, private master’s, public doctoral, private doctoral*

+ Analyzing by 75th percentile ACT scores would have reduced the N resulting in less robust analysis.

* Represented as dummy variables for purpose of the regression analysis

One limitation to this model is that, although IPEDs contains some very good data on all aspects of retention, this data cannot capture the true complexity of retention. In addition, the limited scale of data presented as percentages in IPEDS tends to artificially inflate the value of the adjusted R square. Despite these limitations, the model is quite robust and the data presented in the findings bear out the validity of the model. In addition, it is important to note that not all institutions regularly report common data to IPEDS. Consequently, there were three AL members that could not be included in this analysis due to missing retention data in IPEDS.

Linear regression of these variables on the dependent variable of six-year graduation rate resulted in the following model with an adjusted R square value of .707 (see Table 9) indicating that this model accounts for approximately 71% of the variance in six-year graduation. Taking into consideration the data presented as percentages, the true percentage of variance explained is likely to be lower than this figure, but still quite substantial. As a corollary, this leaves at least 28% of the variance in six-year graduation rate unaccounted for and related to factors unidentified by IPEDS. These factors could potentially be related to each institution’s particular environment and practices around retention.

Table 9. Summary Table for the Model

R	R Square	Adjusted R Square	Std. Error of the Estimate
.844(a)	0.712	0.707	9.397

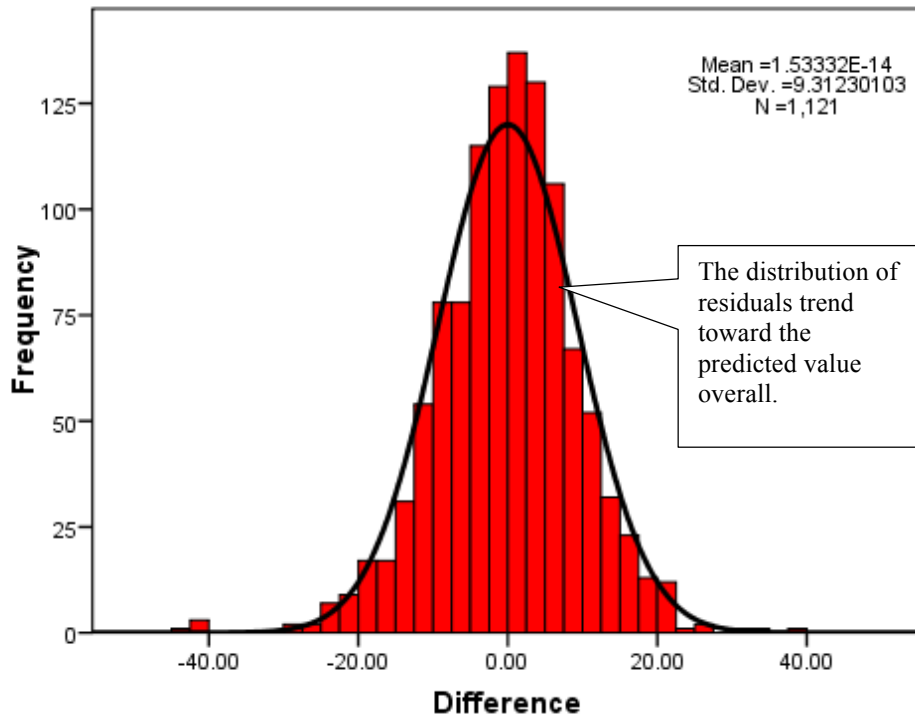
The table below shows the coefficients of each variable in the model.

Table 10. Variable Coefficients Table

	Unstandardized Coefficients			Standardized Coefficients	
	B	Std. Error	Beta	t	Sig.
(Constant)	19.457	4.667		4.169	0
SAT Composite 75th Percentile	0.044	0.003	0.525	16.493	0
Percentage receiving any financial aid(SFA0607)	-0.038	0.023	-0.052	-1.672	0.095
Percentage receiving federal grant aid(SFA0607)	-0.117	0.022	-0.161	-5.312	0
Percentage receiving student loan aid(SFA0607)	0.022	0.016	0.04	1.367	0.172
Percentage receiving institutional grant aid(SFA0607)	-0.001	0.015	-0.002	-0.04	0.968
Percent of Underrepresented Minorities	0.014	0.016	0.024	0.881	0.379
Percent Under Age 25	-0.04	0.063	-0.018	-0.636	0.525
Percent Full-Time Students	0.094	0.02	0.123	4.706	0
Percent Athletes	-0.147	0.028	-0.113	-5.29	0
Percent of total enrollment that are women(DRVEF2007)	0.039	0.02	0.043	1.976	0.048
Percent of Out-of-State Students	-0.016	0.012	-0.036	-1.31	0.191
Size - Very Small	-2.674	1.113	-0.083	-2.403	0.016
Size - Small	-1.801	0.715	-0.077	-2.521	0.012
Size - Large	2.237	0.869	0.075	2.575	0.01
Primarily non-residential	-0.205	0.656	-0.008	-0.313	0.754
Highly Residential	1.98	0.619	0.086	3.198	0.001
Public Doctoral	0.289	1.336	0.008	0.217	0.829
Private Masters	2.342	0.76	0.087	3.083	0.002
Public Masters	0.792	1.224	0.026	0.647	0.517
Private Doctoral	2.141	1.133	0.051	1.891	0.059
Public Baccalaureate	0.391	1.19	0.009	0.329	0.742

Based on this model, AL staff calculated the predicted value of each institution's six-year graduation rate for 2007-2008. This value was subtracted from the institution's reported six-year graduation rate from the same year, and a variable was computed to express this difference. The distribution of residuals in actual and predicted six-year graduation rate, for all institutions, is shown below.

Figure 6. Distribution of Residuals Between Reported and Predicted Six-Year Graduation Rate



Skew = -.272 Kurtosis= 1.571

AL staff rated each institution based on the standard error of each predicted value and the standard deviation of the distribution of residuals (see Table 11).

Table 11 Parameters for Rating Performance

Performance Rating	Parameter
Under performer	At least one standard deviation below predicted value
Moderate under performer	Below standard error, but within one standard deviation of predicted value
Average performer	Within standard error of predicted value
Moderate over performer	Above standard error, but within one standard deviation of predicted value
Over performer	At least one standard deviation above predicted value

Findings

Overall, approximately one quarter of institutions (22%) were defined as over performers, 42% of institutions were defined as moderate under performers or under performers, and 12% were defined as average performers (see Table 12). The greatest difference from predicted value for under performers was -44.7. The greatest residual from the predicted value for over performers was +39.1.

Table 12. Performance Rating All Institutions, N = 1,121

	Percent	Mean Residual	Minimum Residual	Maximum Residual
Under performer	22%	-12.6	-44.7	-6.5
Moderate under performer	20%	-3.7	-6.5	-0.9
Average performer	12%	0	-1.4	1.7
Moderate over performer	24%	3.8	1	6.5
Over performer	22%	12	6.5	39.1

AL staff calculated predicted retention rates and differences for the 20 AL member institutions for which a complete set of data was available. In the AL membership, 11% of institutions were average performers, 47% of institutions were moderate under performers or under performers, and 42% were defined as moderate over performers or over performers (see Table 13).

Table 13. Performance Ratings for All Member Institutions, N = 20

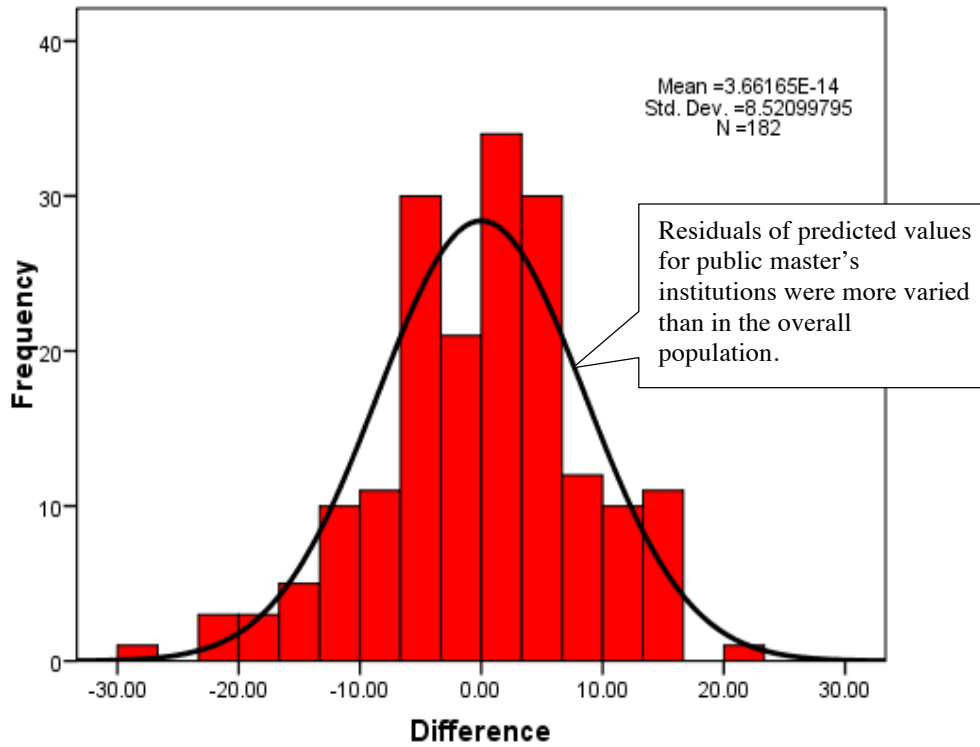
	Percent	Mean Residual	Minimum Residual	Maximum Residual
Under performer	5%	-16.3	-16.3	-16.3
Moderate under performer	42%	-4.3	-6.2	-2.4
Average performer	11%	0.2	-0.6	0.9
Moderate over performer	37%	4.4	1.3	6.4
Over performer	5%	10.0	10.0	10.0

The following sections will look more closely at the distribution of residuals from predicted six-year graduation rate overall and within the AL membership by institutional category: public master's, private master's, public and private baccalaureates.

Public Master's Institutions

One hundred-eighty two of the 1,121 institutions analyzed were public master's institutions. Public master's institutions show notable variation in differences from the predicted value indicating that this category of institution may include many different kinds of institutions that serve students with many unique characteristics (see Figure 7).

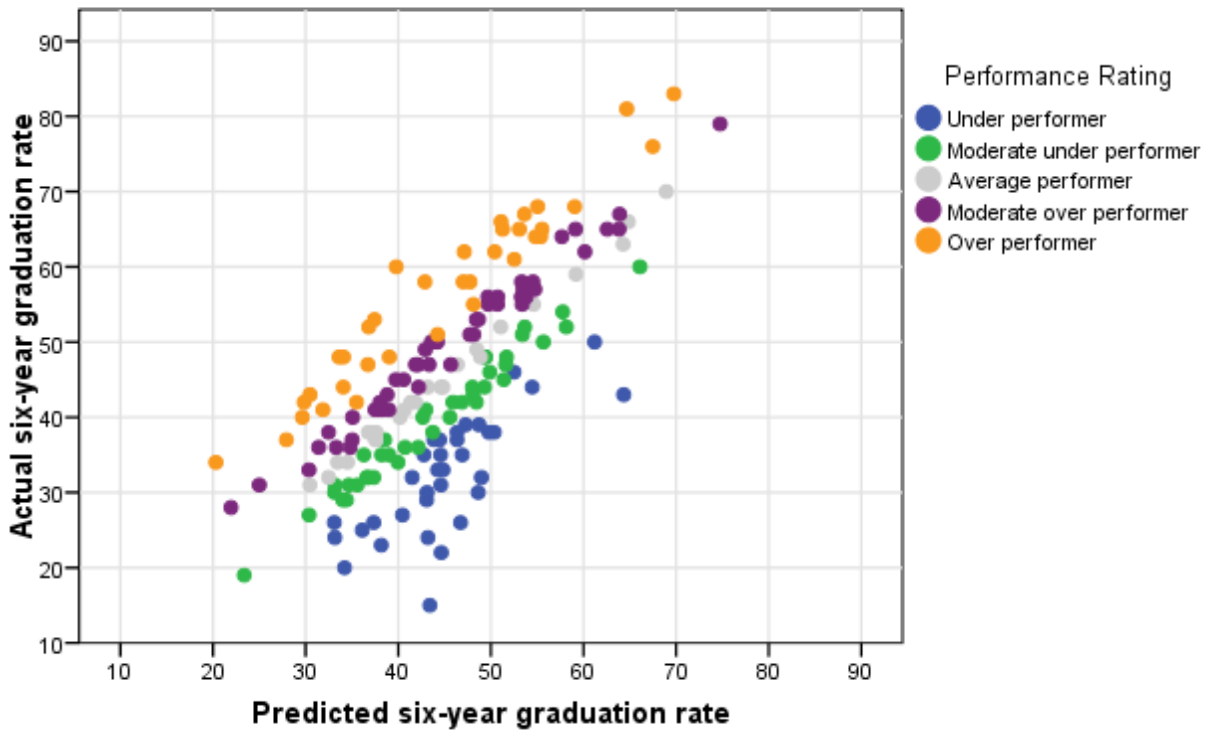
Figure 7. Distribution of Residuals – Public Master's



Skew = -.369 Kurtosis = -.295

This variation is shown when predicted values are plotted against actual values (see Figure 8).

Figure 8. Predicted Versus Actual Six-Year Graduation Rate – Public Master’s



Overall, 14% of public master’s institutions were average performers (see Table 14). In comparison to the overall group, public master’s institutions were evenly distributed between under and over performing ratings. A combined 41% of public master’s institutions were moderate under performers or under performers while 45% were moderate over performers or over performers.

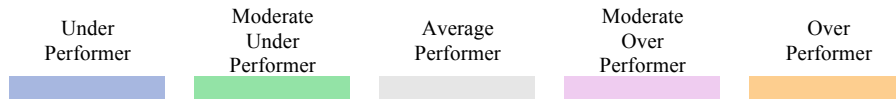
Table 14. Performance Ratings – Public Master’s, N = 182

	Percent	Mean Residual	Minimum Residual	Maximum Residual
Under performer	19%	-12.8	-28.4	-6.5
Moderate under performer	22%	-4.1	-6.4	-1.3
Average performer	14%	0.2	-1.3	1.2
Moderate over performer	26%	3.9	1.2	6.4
Over performer	19%	11.7	6.5	20.2

Eleven AL member institutions are public master's institutions (see Table 15).

Table 15. Six-Year Graduation Rates – AL Public Master's

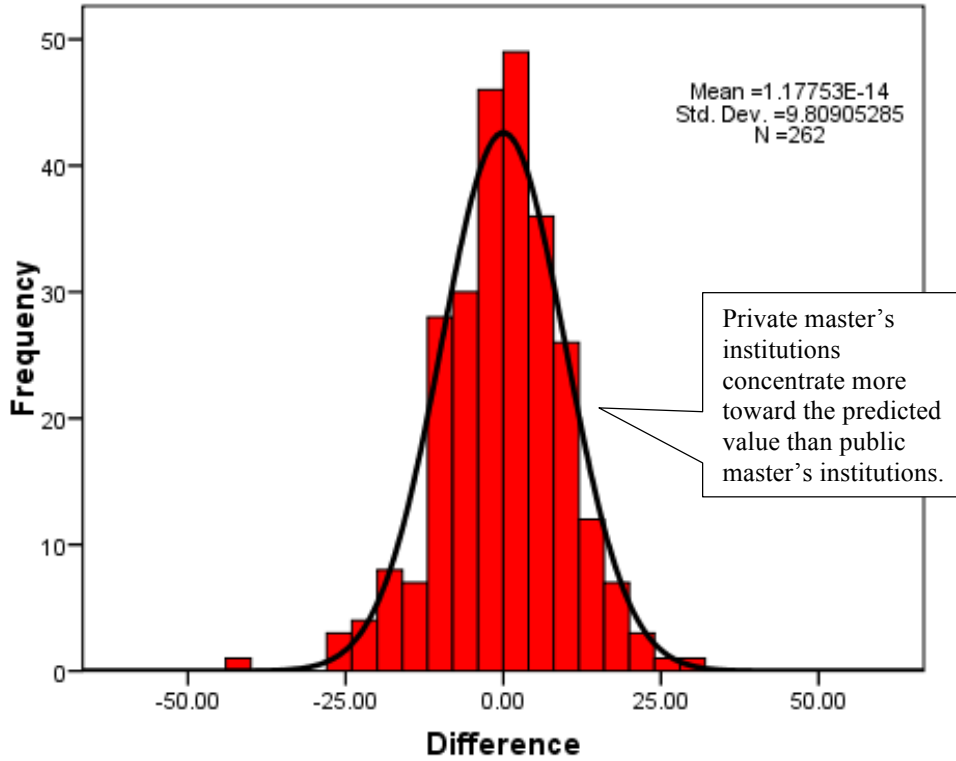
	Predicted	Actual	Residual
Institution 8	42.2	36	-6.2
Institution 9	40	34	-6
Institution 10	48.1	43	-5.1
Institution 11	39	35	-4
Institution 12	42.7	40	-2.7
Institution 13	37.6	37	-0.6
Institution 14	51.1	52	0.9
Institution 15	45.7	47	1.3
Institution 16	38.8	43	4.2
Institution 17	53.3	58	4.7
Institution 18	50.7	56	5.3



Private Master's Institutions

Private master's institutions concentrate more toward the predicted value than public master's institutions with a standard deviation of 9.8 compared to the standard deviation of 8.5 among public master's institutions (see Figure 9).

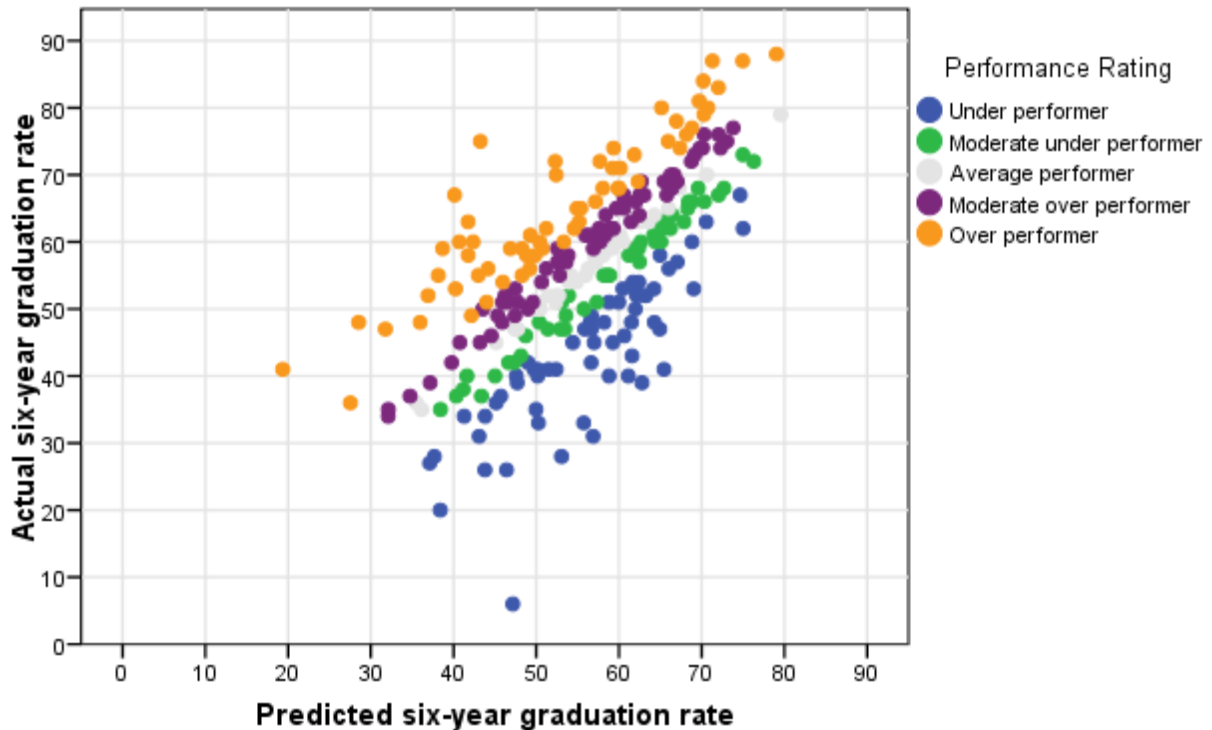
Figure 9. Distribution of Residuals – Private Master's



Skew = -.292 Kurtosis = -1.237

This can be seen in the scatter plot of predicted versus actual six-year graduation rates in this group (see Figure 10) as they begin to cluster more tightly, although, at the lower end of graduation rate, the clustering is still quite dispersed.

Figure 10. Predicted Versus Actual Six-Year Graduation Rate



This is reflected in the performance ratings for this group of institutions with 53% of institutions falling between moderate under performer and moderate over performer in contrast to 62% for public master’s institutions (see Table 16).

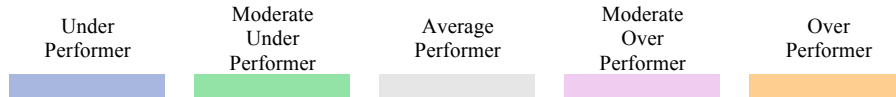
Table 16. Performance Ratings – Private Master’s, N = 262

	Percent	Mean Residual	Minimum Residual	Maximum Residual
Under performer	23%	-13	-41.2	-7
Moderate under performer	17%	-3.8	-6.5	-1.6
Average performer	12%	-0.2	-1.4	1
Moderate over performer	24%	3.5	1	6.5
Over performer	23%	12.2	6.6	31.8

Table 17 shows the predicted and actual six-year graduation rates for 5 private master’s AL member institutions.

Table 17. Six-Year Graduation Rates – AL Private Master’s

	Predicted	Actual	Residual
Institution 2	64.3	48	-16.3
Institution 3	58.6	55	-3.6
Institution 4	68.4	66	-2.4
Institution 5	56.5	61	4.5
Institution 6	60.6	67	6.4



Discussion and Next Steps

This model constructed to predict six-year graduation rate, while not ideal, is useful for placing retention in context at an appropriate level for each type of institution. As is to be expected, this analysis has confirmed much of what we intuitively understand that public master's institutions are more apt to exist in a variety of contexts which result in widely varying graduation rates.

What is unique is that this analysis has given us a powerful method for comparing institutions to themselves on the basis of performance instead of comparing to peers and non-peer institutions. In the end, given that retention cannot be easily disentangled from an institutional context, this may be a more fruitful way of exploring retention issues.

By using each institution's particular context as its own yardstick for measuring performance, Eduventures staff has begun to identify a set of institutions that, for one reason or another, are performing beyond expectation their predicted retention performance. Overall, in the AL membership, we have identified 6 institutions that are moderate over performers or over performers.

The results of this study, the identification of these institutions that outperform expectations, will lead us into our next phase of research on retention management research – case study explorations of over performing institutions. We will also synthesize existing retention best practices identified through research projects conducted in the Enrollment Management Learning Collaborative.

In this phase we hope to disentangle unknown institutional factors affecting retention from true verifiable best practices in retention management and provide AL members with specific examples of retention practices that could be effectively implemented to improve student success and contribute to the development of a retention management culture.