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Supporting quality data and decisions for higher education.

Letter from the Editor

Nuance. It's a simple word that does not adequately seem to reflect the complexity it represents.

In reflecting upon the three articles presented in this volume, it is the first word that came to mind. The work of selecting peers, defining discounting, and discussing expectations all require attention to nuance, and these articles suggest important reasons why this is the case. As our world becomes ever-more informed by data, there is an ability to better understand the complexity of issues, yet at the same time there exists a belief that more data will make issues easier to understand and explain in simple formats.

The Obama Administration's focus on college scorecards, rankings, and shopping sheets to guide the college selection process—and the metrics that comprise these efforts—serve as examples of a perception of simplicity. Yet as D'Allegro and Zhou point out, selecting peers at the institutional level requires complex analysis. One would think that students' selection processes would consist of more exploration than simply clicking on a criteria or two as well. This assumes, of course, that the data elements have common definitions and are operationalized the same way. However, that assumption is not accurate, as highlighted by Davis and Redd and by Seifert, Wells, Saunders, and Gopaul.

I am reminded that appropriate use of data requires an appreciation for nuance. I believe that after reading the fine work presented in these three papers you will regain your appreciation for it as well.

Sincerely,

Christopher M. Mullin

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Association for Institutional Research

A CASE STUDY TO EXAMINE PEER GROUPING AND ASPIRANT SELECTION

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Abstract
Peer selection based on the similarity of a couple of institutional parameters, by itself, is insufficient. Several other considerations, including clarity of purpose, alignment of institutional information to that purpose, identification of appropriate statistical procedures, review of preliminary peer sets, and the application of additional metrics need to be part of the process.

At the heart of the paper is a detailed description of a mixed-methods approach deployed to identify institutional peer and aspirant groups for a private nonprofit 4-year liberal arts college. As part of the methodology, an aspirant index is proposed and explained by the authors. This coefficient is applied to a preliminary set of institutions to further refine the aspirant list.

This paper inventories the methods documented in other research and resources that can be used to select peers. This compendium is intended to inform customized amalgamation of methods that could potentially augment future peer selection endeavors and benchmarking studies.

INTRODUCTION

Peer comparisons have become increasingly common (Gater, 2003; Huxley, 2009; McLaughlin, Howard, & McLaughlin, 2011; Trainer, 2008). Comparative analyses address the demand for accountability, provide benchmark targets, justify budget and planning decisions, and complement competitor appraisals (McLaughlin & Howard, 2005). Accordingly, comparisons with other institutions seem to be gaining legitimacy (Eckles, 2009).

Yet there seems to be no expectation to perfectly match an institution with other colleges and universities (Anderes, 1999), hence the reliance is on identifying peers or institutions with similar characteristics. Institutions without existing associations that are similar in certain delineating factors are deemed as peers (Anderes, 1999; Trainer, 2008). Regardless, the challenge lies with the definition of "similar." This is evident from the variety of previously reported selection methodologies. Some of those methodologies—such as nearest neighbor and cluster analysis statistical techniques, as well as looking at the efficacy of only using institutional characteristics—are addressed in this paper.

The peer selection described in this paper was conducted because the existing set of peers was identified before the college revised its mission and strategic plan. Furthermore, the current strategic plan differed from previous plans. The new sets of peer and aspirant institutions were much more aligned with the college's mission, goals, and stretch targets in the case of the aspirants because of several rigorous methodologies invoked for the selection.

This research paper consists of three sections. First, the authors give an in-depth explanation of the methods and overall process of selecting a set of institutional peers, peers that are relevant and useful for comparative analysis and benchmarking. The constant exploration, examination, and deliberate choice of data and information to collect and use are evident throughout this paper. The peer selection culminates with the

two statistical methodologies, nearest neighbor to select peer institutions, and a two-step cluster analysis to determine aspirants. Second, alternative methodologies not used in the applied research project are described. Third, an inventory of existing tools is provided that may enhance a peer analysis or serve as an acceptable substitute. The paper concludes with a brief discussion on the future direction of peer selection and analysis.

METHOD

Peer selection is a multi-tier and iterative process (McLaughlin et al., 2011). This study undertook a hybrid approach, amalgamating the methodologies of previous peer analysis case studies reported in the literature. Using multiple methods for this applied research project affords a practical balance between stakeholder judgment and statistics (Trainer, 2008). The balance achieved better credibility than if either was used in isolation. Faculty and staff on the peer selection design were consulted at the beginning of the applied research project and regularly at each step. Methodology was often adjusted based on their insightful suggestions. Hence, the mixed method approach used for this case study is the result of a failed approach at discerning a relevant peer group from only a few institutional characteristics early in the process and the necessity to assert another method. Several additional methods were used in response to feedback from constituents.

For this peer selection, seven steps were undertaken: (1) determination of an initial peer set, (2) collection of data on the initial set of institutions, (3) variable standardization, (4) parsing the initial peer set into several subsets, (5) suitability determined by use of collected and transformed data elements, (6) identification of the best variables to use, and (7) selection of peers and aspirants. The ground work for the aspirant selection was laid by the first six steps. The two selection methodologies differed only by one step. A cluster analysis was substituted for the nearest neighbor strategy for the selection of aspirants. (Note that the institution under investigation will be referred to in this paper as the target institution.)

1. Determination of an Initial Peer Set

The initial set of institutions was chosen from an original list of private, nonprofit institutions that submitted data to the Integrated Postsecondary Education Data System (IPEDS) from the Data Center website (NCES, 2013b). The list was generated using the EZ group option (National Center for Education Statistics [NCES], 2012). Data for these institutions were collected for 2010 and 2011, the most recent data available at the time of the study. All 4-year private nonprofit institutions were included at this initial stage if each met the following criteria: (a) highest degree awarded a bachelor's, a master's, or both, (b) enrolled full-time undergraduate students, (c) Baccalaureate: Arts & Sciences, or Baccalaureate: Balanced Arts & Sciences, diverse fields Carnegie Classifications, (d) Title IV participant (federal financial aid eligibility), (e) located in the United States or designated as a U.S. Service School (e.g., U.S. Naval Academy), and (f) not a tribal college. This is on par with selection parameters recommended by previous studies (Anderes, 1999). As a result of applying these criteria, 285 institutions were selected.

2. Collection of Data on the Initial Set of Institutions

Key performance indicators (KPIs) are metrics used to measure quality—the institution's quality. Quality is defined within the context of the institution's mission and its priorities. Peer selection should be based on information that relates to the mission and priorities of the institution (Anderes, 1999; Cohodes & Goodman, 2012). Therefore, the data collected for the target institution's KPIs would be the information also needed for the other institutions.

Before deciding which KPIs to use, some exploratory analysis was undertaken. First, each institutional KPI was classified based on how it affected institutional quality: (a) Influencer-Input (e.g., SAT scores, admission yield rates), (b) Influencer-Concurrent (e.g., academic engagement, crime statistics), or (c) Performance Indicator – Output (e.g., retention rates, number of conferred bachelor's degrees). Next, a group of faculty and staff were asked to rate the importance of each KPI as it related to institutional quality. Data slated to be collected, hence, were informed by the KPI classifications and the faculty and staff importance ratings.

The caveat was that these data had to be readily available and easily accessed for the other 285 institutions. For this

institution, KPI data were gathered from a variety of sources, primarily from national consortiums, surveys, and IPEDS. Data from the former included (a) National Survey of Student Engagement (NSSE) benchmarks, (b) American Association of University Professors (AAUP) faculty salary data, (c) Noel Levitz Student Satisfaction Inventory (NLSSI), and (d) U.S. News & World Report rankings (U.S. News & World Report, 2011). However, not all 285 institutions participate in the NSSE or NLSSI, and AAUP data at the individual institution level are not available. Consequently, the variables used in the peer analysis were primarily sourced from IPEDS and the U.S. News & World Report rankings. Those variables are shown in Appendix A. Descriptions of each are provided in Appendix B. Examples of data that were collected as a result of availability include tuition, total price of attendance, total enrollment, financial expenditures, SAT scores, admit yield, and quality of faculty.

3. Variable Standardization

After a preliminary examination of the data, it was discovered that the enrollment and number of applicants at the target institution were almost double that of most of the other institutions. To control for institutional size, each institution's reported full-time equivalent (FTE) enrollment was divided into some of the data elements to eliminate the bias that may result from differences in enrollment size (Gater, 2003; Huxley, 2009). Examples of data elements that were standardized by dividing by FTE include the number of conferred bachelor's degrees, number of applicants, unduplicated annual enrollment, instructional expenses, and endowment.

The researchers had access to both full-time and part-time faculty counts. These were combined into one data element—the proportion of full-time faculty to full-time plus part-time faculty. Some variables were not converted. Retention and graduation rates were not altered. The percent of classes with 20 or fewer students was not changed; the data element is not affected by the differences in size of enrollment among institutions. Likewise, admissions yield and alumni giving rates, expressed as proportions, were not transformed. Faculty salaries were already reported as an average and, therefore, were not changed. Similarly, downloaded SAT score percentiles remained unaltered. The percent of transfer students was classified into two categories—low and high.

4. Parsing the Initial Peer Set into Several Subsets

A workable peer group size was sought to abet further analysis and peer selection. Depending on purpose, a reasonable peer group size has been identified to be between 5 and 40 institutions (McLaughlin et al., 2011). Five subgroups were assembled based on institutional characteristics gleaned from the school's Carnegie Classification: (a) Catholic affiliation, (b) primarily baccalaureate, (c) highly residential, (d) low proportion of transfer students, and (e) more selective (Carnegie Foundation, 2010). Previously identified peer and competitor groups formed the basis for these subgroup categories. Aggregate information was compiled for the data elements collected in Step 2, and standardized if appropriate, for all 285 institutions and the five institution subsets.

5. Suitability Determined by Use of Collected and Transformed Data Elements

To better clarify the many comparisons to be made in the following steps, a mean was computed for the data elements listed in Appendix A and standardized when applicable for each subgroup. These means were compared to the target institution's data.

The target institution was similar to the subgroups in some aspects but noticeably different on other parameters. As such, no group clearly emerged as comparable. For example, total price of attendance was similar to the target institution for all subgroups, but the target institution had better 1-year retention rates and 6-year graduation rates for all subgroups except for the more-selective subgroup. On the other hand, the target institution had a smaller proportion of full-time faculty and alumni giving rate than the institutions in the more selective sub-group. Although no tests of significance were used, statistical testing could have quantified these differences and possibly better determined the adequacy of each subgroup as a potential peer set.

Therefore, an additional reference group was formed by combining three of the above criteria: (a) low proportion of transfer students, (b) highly residential, and (c) more selective.

Again, no definitive peer set emerged. As these comparisons demonstrate, selecting an initial set of peers based on institutional characteristics may seem to be a practical and logical approach, but can be ineffectual (Shin, 2009).

6. Identification of the Best Variables to Use

The committee of faculty and staff was instructed to identify the KPI performance measures that best aligned with the priorities of the college. Three KPIs were identified: (a) 1-year retention rate, (b) 6-year graduation rate, and (c) proportion of students to bachelor's degrees awarded. Variables for peer selection would be determined by their predictive power of the three KPI performance measures.

Several regression models were identified for each KPI. This was accomplished in two phases. First, the data elements were classified into five categories: (a) admissions, (b) faculty, (c) enrollment, (d) institutional characteristics, and (e) finance. Ordinary least square (OLS) regression models using a single-step enter method in SPSS were compiled separately for the five variable categories for each KPI, a total of fifteen models. Because the analysis was still exploratory at this stage, the single-step enter method was preferred over other models. This afforded the inclusion of all category variables in the model, enabling comparisons among the variables (SPSS, 2008). Directed by previous research, the resulting regression coefficients were the determinants of data elements that would be used for peer selection (Hom, 2008).

In the second phase, an overall regression model for each KPI was computed using the best predictor or predictors from each of the five category regressions. The variable with the smallest significance level associated with the standardized beta coefficient was deemed to be the best predictor. The significance of a beta weight indicates if the variable is a predictor relative to the variable's absence in the model (Cohen & Cohen, 1983). In most cases, only one variable from each category was chosen for the three overall models because of the relatively high correlations among the variables within their categories. In effect, this reduced the relatedness or redundancy of the variables in the three overall models. It also maximized the potential predictive strength of each variable. Additionally, a balance

Table 1. Overall OLS Regression Models for the Three Performance Indicators: Ratio of Conferred Bachelor's Degrees to FTE, 1-Year Retention Rate, and 6-Year Graduation Rate

Category	Variable*	Standardized Beta Weight
Ratio of Conferred Bachelor's Degrees to FTE		
Admissions	25th Percentile Mathematics SAT	.348*
Faculty	Average Faculty Salary	–.142
Enrollment	Estimated Fall Enrollment to FTE	–.053
Institutional Characteristics	Selectivity	.282**
Finance	Instructional Expenses	.166
1-Year Retention Rate		
Admissions	25th Percentile Mathematics SAT	.465***
Faculty	Average Faculty Salary	.135
Enrollment	FTE	.064
Institutional Characteristics	Selectivity	.301***
Finance	Instructional Expenses	.065
6-Year Graduation Rate		
Admissions	Percent of First Time Federal Grant Aid Students	–.145**
Faculty	Average Faculty Salary	.211**
Enrollment	FTE	.090
Institutional Characteristics	Selectivity	.178***
	Proportion of Transfer Students	–.104**
Finance	Total Price of Attendance	.007
	Instructional Expenses	.224***
	Alumni Giving Rate	.186*

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

of institutional metrics for peer selection was sought by using the best predictors from each of the five variable categories rather than five best predictors regardless of category. The best predictors for each KPI regression model by category are listed in Table 1.

Two different admissions data elements were identified for the overall models. The 25th percentile Mathematics SAT variable was the best predictor for both the ratio of conferred bachelor's degree to FTE and the 1-year retention rate overall models. For the 6-year graduation rate, percent of first-time federal grant aid students was best.

Curiously, average faculty salary reigned supreme for all three overall models. In fact, this faculty data element was the only significant data element for the bachelor's degree to FTE regression model ($\beta = .400$, $p \leq .001$). The standardized beta weight far exceeded the other faculty data elements in the 1-year retention rate model ($\beta = .622$, $p \leq .001$). The faculty data element with the next-largest standardized beta weight in the 1-year retention rate model, percent of full-time instructors, was perceptibly smaller ($\beta = .165$, $p \leq .01$). Similar results were observed for the 6-year graduation rate model with the standardized beta weight for percent of full-time instructors smaller than the average faculty salary standardized beta weight ($\beta = .176$, $p \leq .001$, $\beta = .630$, $p \leq .001$, respectively).

In the enrollment category, FTE was the best predictor for two of the models: 1-year retention rate and 6-year graduation rates. The transformed variable, estimated fall enrollment to FTE, had the best beta coefficient significance level for the ratio of conferred bachelor's degree to FTE. Not surprisingly, selectivity was the institutional characteristic with the best beta coefficient significance level for all three overall models. The proportion of transfer students was also an equally significant institutional characteristic for the 6-year graduation rate overall model. For the finance category, instructional expenses bubbled to the top for ratio of conferred bachelor's degree to FTE and 1-year retention rate models. Three finance variables fared best for the 6-year graduation model: (a) total price of attendance, (b) instructional expenses, and (c) alumni giving rate.

The data elements, FTE, and estimated fall enrollment to FTE, are highly correlated. ($r = .874$, $p \leq .001$). The latter data element may be perceived as confusing and is not as commonly used as FTE. Therefore, estimated fall enrollment to FTE was eliminated from further consideration. Nine data elements, the strongest predictors of the three KPIs, remained and were the basis for the analysis in the next and final step: (a) 25th percentile Mathematics SAT, (b) percent of first-time students receiving federal grant aid, (c) average faculty salary, (d) FTE, (e) selectivity, (f) proportion of transfer students, (g) instructional expenses, (h) total price of attendance, and (i) alumni giving rate. In short, nine variables that were statistically the best predictors of the college's priorities as deemed by a consensus of faculty and staff will be the basis of the peer selection. Moreover, these predictors are representative of the inputs and outputs that affect institutional quality.

7. Selection of Peers and Aspirants

Use of the nearest neighbor statistical technique to compute proximity index. Nearest neighbor methodology is a multi-step process: (a) determining the most relevant parameter calculations, (b) computing the numerical difference between the reference and target institutions on each of those parameters, and (c) deciding the range that constitutes a proximate or "near neighbor" difference. As such, peer institutions are determined by having metrics that are proximate to the target institution (McLaughlin et al., 2011).

For the peer selection, the numeric difference between the target and each comparison institution was determined for the nine variables. In turn, these differences determined peer proximity or nearest neighbor. A proximity score was compiled using the standard deviation of each predictor to measure nearness as shown in Figure 1. Specifically, a proximity score of 1 was assigned to any institution that was between one-half and one standard deviation of target institution's metric, and a score of 2 if the institution was within one-half standard deviation. The average of the nine equally weighted proximity scores derived the proximity index. Generically, these computations can be represented by two simple equations:

$$PS_{var1} = (TI_{varx} - CI_{varx}) / SD_{varx} \quad (1)$$
$$varx \in \{1, \ldots 9\}$$

$$PI_{institution} = \text{average } (PS_{var1} \ldots PS_{var9}) \quad (2)$$
$$institution \in \{1, \ldots 285\}$$

Where:

PS = Proximity Score

PI = Proximity Index

TI = Target Institution

CI = Comparison Institution

Var1 – Var9 = Predictors

0 reassigned to PS when: PS > 1 or PS < –1

1 reassigned to PS when: –1 < PS < –.5 or .5 < PS < 1

2 reassigned to PS when: —.5 < PS < .5

This case study departs from the nearest neighbor methodology (McLaughlin et al., 2011). A small number of data elements was used to compute the proximity index, which is an aggregate score of the nine predictor variables. Furthermore, the variables were weighted equally, a decision made by the researchers. Nevertheless, these changes are warranted. A large number of variables that are highly correlated may make the meaning of the proximity index difficult to decipher and obscure the advantage of its use (Gater, 2003; Lorr, 1983).

The average proximity scores—the proximity indices—for the 285 institutions range from 0 to 1.78. Examining first the range of proximity indices and then the resulting percentiles for these institutions, two peer sets emerged. The first set of peers, given the moniker "near peers," comprised the 19 institutions having proximity indices corresponding to the 95th percentile or higher. Another 19 institutions constituted the next tier of peer institutions, dubbed "almost near peers." These almost near peers had proximity indices between the 90th and 95th percentiles. These two sets of peers are shown in Appendix C.

Figure 1. Proximity and Aspirant Index Numeric Assignments for Differences Between Reference College and Institution

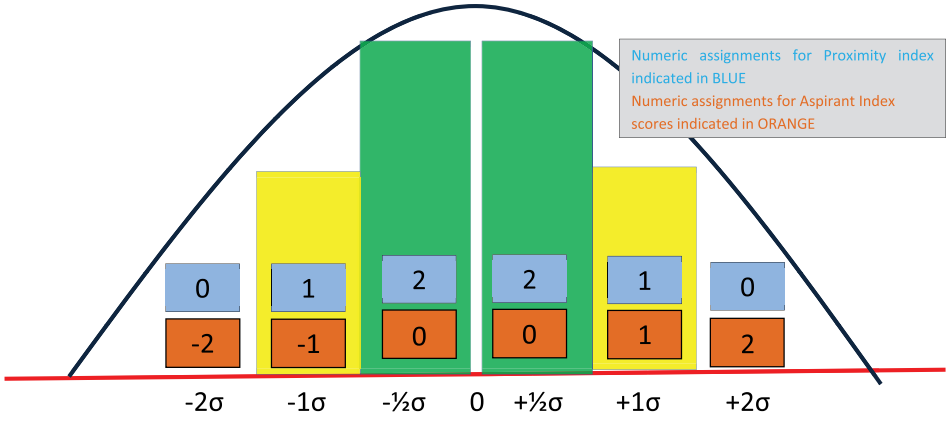
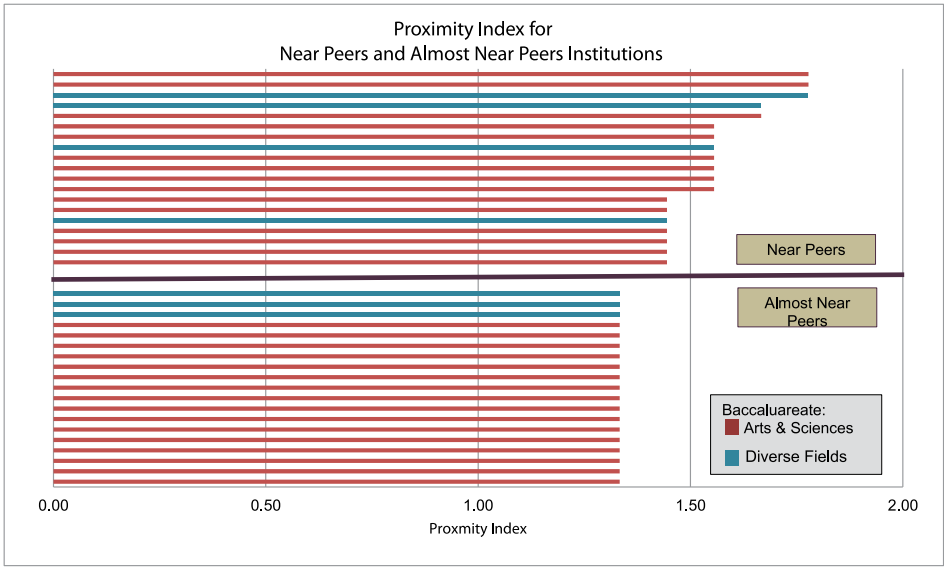


Figure 2. Proximity Index and Carnegie Classification for Near Peer and Almost Near Peer Institutions



As seen in Figure 2, the basic Carnegie Classification for four of the near peer institutions and three of the almost near peers are Baccalaureate: Diverse Fields. The remaining peers are Baccalaureate: Arts and Sciences, which is the same as the target institution.

Aspirant selection determined by cluster analysis. Most studies evaluated for this paper had a singular focus (peer selection or aspirant identification, but not both). Accordingly, none distinguished the differences between

peer group formation methodology and the process to determine aspirant institutions. In this respect, this case study differs from previous research. A different statistical method—cluster analysis—was used to determine a list of aspirant institutions. That said, the same nine predictor variables and KPIs used for the nearest neighbor analysis were used for the aspirant analysis.

In preparation, quartile cut scores were identified for each KPI for the initial set of institutions. Institutions were then assigned to their corresponding quartiles, one for each KPI. Next, a two-step cluster analysis using the likelihood distance method was performed for each KPI. This was accomplished by using the best predictors for each KPI from the five categories listed in Table 1. In a two-step cluster analysis, individual institutions are consecutively combined to form clusters subsequent to an initial pass (SPSS, 2008). Figure 3 shows the three cluster panels, one for each KPI. Each panel consists of two or three columns, one for each cluster. Listed in each column are the predictor means or variables used to construct the cluster followed by the average KPI quartile category assignment, designated as the evaluation field.

The ratio of conferred bachelor's degree to FTE and 1-year retention rate KPIs yielded three clusters, whereas the 6-year graduation KPI cluster analysis was less discerning and produced only two clusters. For these first two KPIs, approximately one-third (35.4%) of the institutions were in the cluster with the best KPI quartile category average, the aspirant cluster. The 6-year graduation rate cluster rate was less distinguishing. For this KPI, the aspirant cluster represented more than half (52.5%) of the institutions as possible aspirants.

The same cluster variables were used for the ratio of conferred bachelor's degrees to FTE and 1-year retention rate KPI cluster analyses. The cluster assignments among the institutions were the same for these two cluster analyses and, therefore, the cluster analyses are essentially identical. Because the underlying goal is to identify a reasonable number of aspirants, and two of the cluster analyses produced a smaller identical set of aspirant institutions than the third, the clusters from the two identical clusters were examined further.

Figure 4 depicts the distance of the predictor variables among the clusters graphically. Since the clusters were redundant, only one set of clusters is portrayed but with seven

Figure 3. Cluster Size and Means for Each Cluster Associated with the Evaluation Fields
Note: Orange highlight indicates best or "aspirant" cluster.

KPI: Bachelor's Degree to FTE			
Cluster	3	2	1
Description	3. ABOVE the Mean: Bachelor's Degree to FTE	2. AT the Mean: Bachelor's Degree to FTE	1. BELOW the Mean: Bachelor's Degree to FTE
Size	35.4% (n=80)	44.47% (n=101)	19.9% (n=45)
Inputs	Selectivity: More Selective	Selectivity: Selective	Selectivity: Inclusive
	SAT Math 25th Percentile Score, 2010-11: Mean= 571.55	SAT Math 25th Percentile Score, 2010-11: Mean= 465.15	SAT Math 25th Percentile Score, 2010-11: Mean= 406.44
	Instructional Expenses per FTE: Mean= $15,724.06	Instructional Expenses per FTE, Mean-= $7,628.18	Instructional Expenses per FTE: Mean= $5,782.85
	Average Full-Time Faculty Salary (All ranks): Mean= $76,156.18	Average Full-Time Faculty Salary (All ranks): Mean= $56,271.03	Average Full-Time Faculty Salary (All ranks): Mean= $51,876.53
	FTE, Fall 2010: Mean= 1,966.21	FTE, Fall 2010: Mean= 1,584.70	FTE, Fall 2010: Mean= 1,455.20
Evaluation Field (KPI)	Bachelor's Degree to FTE	Bachelor's Degree to FTE	Bachelor's Degree to FTE

Bold indicates most frequent category or mean for cluster. Darker shades indicate more important inputs

KPI: 1 Year Retention Rate			
Cluster	3	2	1
Description	3. ABOVE the Mean: 1 Year Retention Rate	2. AT the Mean: 1 Year Retention Rate	1. BELOW the Mean: 1 Year Retention Rate
Size	35.4% (n=80)	44.47% (n=101)	19.9% (n=45)
Inputs	Selectivity: More Selective	Selectivity: Selective	Selectivity: Inclusive
	SAT Math 25th Percentile Score, 2010-11: Mean= 571.55	SAT Math 25th Percentile Score, 2010-11: Mean= 465.15	SAT Math 25th Percentile Score, 2010-11: Mean= 406.44
	Instructional Expenses per FTE: Mean= $15,724.06	Instructional Expenses per FTE, Mean= $7,628.18	Instructional Expenses per FTE: Mean= $5,782.85
	Average Full-Time Faculty Salary (All ranks): Mean= $76,156.18	Average Full-Time Faculty Salary (All ranks): Mean= $56,271.03	Average Full-Time Faculty Salary (All ranks): Mean= $51,876.53
	FTE, Fall 2010: Mean= 1,966.21	FTE, Fall 2010: Mean= 1,584.70	FTE, Fall 2010: Mean= 1,455.20
Evaluation Field (KPI)	1 Year Retention Rate	1 Year Retention Rate	1 Year Retention Rate

Bold indicates most frequent category or mean for cluster. Darker shades indicate more important inputs

KPI: 6 Year Graduation Rate		
Cluster	2	1
Description	2. ABOVE the Mean: 6 Year Graduation Rate	1. BELOW the Mean: 6 Year Graduation Rate
Size	47.5% (n=96)	52.5% (n=106)
Inputs	Selectivity: More Selective	Selectivity: Selective
	Total Price (In-District Students), 2011-12: Mean= $49,411.96	Total Price (In-District Students), 2011-12: Mean= $37,474.40
	Instructional Expenses per FTE: Mean= $15,663.95	Instructional Expenses per FTE, Mean-= $7,749.11
	Average Full-Time Faculty Salary (All ranks): Mean= $76,441.92	Average Full-Time Faculty Salary (All ranks): Mean= $56,838.32
	% FT Students Receiving Federal Aid: Mean= 22.02%	% FT Students Receiving Federal Aid: Mean= 41.75%
	Alumni Giving Rate: Mean= 31.11	Alumni Giving Rate: Mean= 18.31
	Transfer Proportion: Low Transfer	Transfer Proportion: Low Transfer
	FTE, Fall 2010: Mean= 1,964.60	FTE, Fall 2010: Mean= 1,611.24
Evaluation Field (KPI)	6 Year Graduation Rate	6 Year Graduation Rate

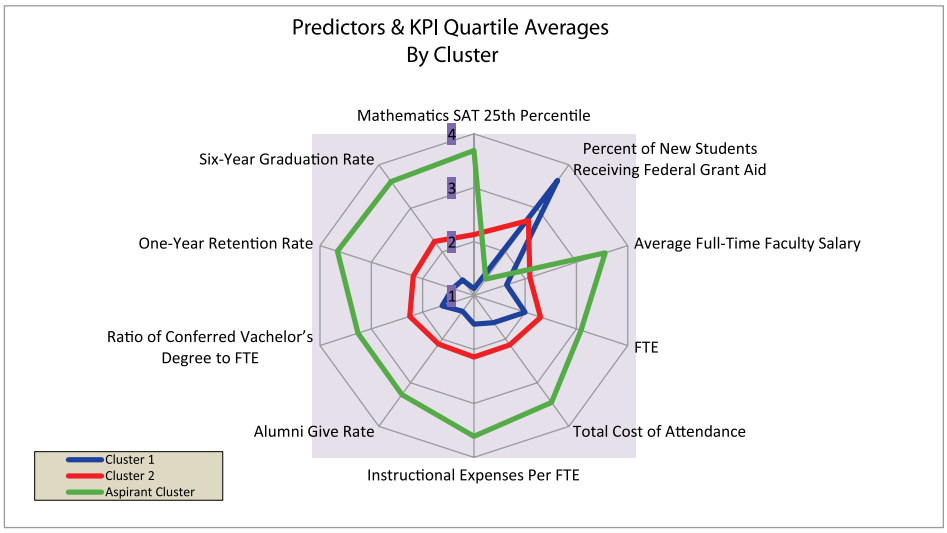
Bold indicates most frequent category or mean for cluster. Darker shades indicate more important inputs

cluster variables from the two cluster models. Specifically, the seven cluster continuous scaled variables were each separately converted to quartile categories similar to the transformation made for the three KPIs (McLaughlin et al., 2001; Merisotis & Shedd, 2001). Selectivity and proportion of transfer students, both ordinal scale variables, were not included in this graphical representation. The resulting average quartile category for each cluster for the seven cluster variables and three KPIs is plotted using the cluster categories assigned to the institution. The distinction among clusters is noticeable and much clearer in the radar chart in Figure 4 than discerned in the separate cluster panels in Figure 2.

The aspirant cluster has the largest quartile averages for every predictor except for percent of new students receiving federal grant aid. Conversely, Cluster 1 has the smallest average for nine of the ten plotted variables. This cluster has the largest quartile average for the percent of new students receiving federal grant aid.

Although the two identical cluster analyses yielded a smaller set of aspirant institutions than the 6-year graduation rate cluster analyses, not all were part of the latter aspirant group. Therefore, only the 52 institutions that were in all three aspirant clusters would be considered as potential aspirants. Somewhat unmanageable in size, an aspirant index was computed for these 52 schools. In concept, the aspirant index is similar to the proximity index with four germane distinctions: First, nine KPI predictors were the basis of the proximity index, but the proximity scores for the actual KPIs were excluded from the proximity index. However, the aspirant scores for each KPI were included in the aspirant index calculations. Second, the proximity index gave more credence to small differences, and the aspirant index more weight to large positive differences. For the proximity index, larger numerical values were assigned to institutions that were close to the target institution than to those that were not. However, the aspirant schema awarded larger absolute values to large differences between the target and comparison institutions than those that had small differences. Third, the direction of that difference is unimportant in the proximity index calculation but is at the heart of the aspirant index calculation. That is, if the aspirant metric was greater than the target institution's value, a positive aspirant score was assigned. Fourth, the standard deviations used to determine aspirant scores were only compiled for the 52 schools in the aspirant clusters.

Figure 4. Quartile Means for Each Cluster



As such, standard deviation was computed for each KPI for the aspirant cluster institutions. An aspirant score of one was assigned to any institution that was between one-half and one standard deviation above the target institution's metric, and a score of two was given if the institution was greater than one standard deviation. Correspondingly, if the institution's value was between one-half and one standard deviation below the target institution's score, a negative one was assigned, and if the institution was greater than one standard deviation below the target institution a negative two was assigned. A zero was given to an institution's metric within one-half the standard deviation above or below the target institution. Figure 1 provides a visual depiction of the numerical assignments.

The average of the three equally weighted aspirant scores comprised the aspirant index. The equations used in the aspirant score described above and aspirant index computations

are similar to the proximity index calculations. That is,

$$AS_{KPIx} = (TI_{KPIx} - CI_{KPIx}) / SD_{KPIx} \quad x \in \{1, 2, 3\} \tag{3}$$

$$AI_{aspirant\ institution} = \text{average}\ (AS_{KPI1} \ldots AS_{KPI3}) \quad \text{aspirant institution} \in \{1, \ldots 52\} \tag{4}$$

Where:

AS = Aspirant Score

AI = Aspirant Index

TI = Target Institution

CI = Comparison Institution

Var1 – Var9 = Predictors

–2 reassigned to AS when AS: < -1

–1 reassigned to AS when AS: $-1 < AS < -.5$

0 reassigned to AS when AS: $-.5 < AS < .5$

1 reassigned to AS when AS: $.5 < AS < 1$

2 reassigned to AS when AS: > 1

Results were as follows: 12 institutions had a negative aspirant index and were removed from the initial aspirant list, 27 institutions posted a zero aspirational index, and 13 institutions of the preliminary 52 aspirant institutions had an aspirant index greater than zero. The latter constituted the aspirant list or Tier I aspirant institutions. The former set of institutions is ancillary and comprises the Tier II aspirant list. These lists are shown in Appendix C. The basic Carnegie Classification for all institutions on the two aspirant lists is Baccalaureate: Arts and Sciences.

OTHER REFERENCE GROUP SELECTION METHODOLOGIES

Deciding on the most appropriate method requires both the knowledge of the statistical procedure and the purpose of the eventual comparison(s). Two statistical methodologies were used for this case study: (a) nearest neighbor and (b) two-step cluster analysis. However, other techniques should be considered either singularly, or as a mixed methods approach as with this case study. Other techniques may be better suited to the anticipated purposes of the peer analysis. Although not exhaustive, other techniques documented in the literature are provided below. This listing provides a more comprehensive collection of peer and aspirant selection techniques than has been discussed thus far in this paper and in the literature.

Cluster analysis. At least two cluster analysis techniques have been employed to determine peer institutions. First, as the name implies, two-step cluster analysis entails two iterations—one to decipher the cluster and corresponding cluster centers and another to determine cluster assignment among institutions. Second, hierarchical cluster analysis can be deployed when a small number of initial institutions are being considered. In this method, the distance between institutions on a set of parameters is computed (Hom, 2008). Euclidean distance and correlations are the most common, although the latter is discouraged (Lorr, 1983). Based on these distance designations, the researcher can determine clusters by assigning membership, often manually.

Data envelopment analysis (DEA). This statistical procedure determines the most efficient institutions, often indicated by financial indicators (Eckles, 2009). A disadvantage of this selection tool is that the identification of benchmark institutions is relative to the original list of selected institutions regardless of their actual efficiency (Taylor & Harris, 2004).

Discriminant analysis. This statistical technique classifies institutions into one or more mutually exclusive groups. Accomplished in two steps, a classification rule is first developed using institutions for which group membership is known. Next, institutions are sorted into groups based on the classification rule (SPSS, 2008). The first phase may render this technique unworkable. For peer selection, group membership is seldom established or known, rendering this technique impractical (Huxley, 2009).

Factor analysis. Institutions are classified by factors determined by the correlations or covariances among institutional parameters. As with discriminant analysis, prior knowledge of the institutions and the associations among institutional parameters is necessary.

Nearest neighbor. The determination of the best matches or nearest neighbors varies but the crux of this methodology is to decipher the extent to which an institution is a peer (McLaughlin et al., 2011). This is accomplished by computing the distance between institutions on targeted predetermined parameters.

Subject matter experts (SME). Engaging faculty and staff that have a vested interest in assembling a set of peers not only is a sound method to validate a proposed set of peer institutions, but also may increase the likelihood of the reference group's acceptability and use. This method is recommended for specific purposes rather than as a general institutional peer selection.

Variable match. Reference group formation does not necessarily require sophisticated statistical procedures, making this technique popular. In fact, alignment by a few institutional parameters may be sufficient (Anderes, 1999). This review should start with the mission of each institution under consideration. Subsequently, an examination of comparability of other institutional characteristics should ensue. This may include enrollment size, degree level and program mix, type of students served, setting (urban, suburban, rural), expenditures, and selectivity.

EXTERNAL PEER SELECTION TOOLS

Web peer selection applications have proliferated recently. The authors posit that these tools can also be useful and certainly provide data and comparative analysis beyond that described for this applied research project. In fact, many of the applications were discovered during the design of this case study and some were used for preliminary investigations.

The purpose of including a brief mention of these web sources is threefold. First, knowing the existence of these resources may save time and the effort of conducting a peer selection from scratch. Most of these websites have comparative capabilities, and therefore may be perfectly capable and sufficient for the intended purpose. Second, awareness of these resources equates to knowing where to locate needed data and information. In turn, this will help to lessen the time needed for one of the most time-consuming of the steps of a peer selection: finding the data elements and acquiring that information for the institutions under consideration. Third, exploration of the resources could uncover additional data elements not mentioned in this applied research study. For ease of reference, brief descriptions and the web addresses for each are provided in Appendix D.

CONCLUSIONS

Self-labeled as mixed methods, eight steps in total were needed to select a set of institutional peers and aspirants. This was partially due to modifications made during the study based on stakeholder feedback, and in part due to trial and error. For example, the subsets of peers in Step 4 were collectively subpar, and were not comparable to the target institution. Subsequently, however, a superior set of peers was determined by a multi-layered statistical approach that helps to unearth the institutional characteristics that best aligned with the college's priorities. To that end, the following techniques were used: (a) data element standardization, (b) parsing standardized data elements into several categories, (c) using several regression models to determine the standardized data elements that are best correlated with key institutional attributes, (d) computing proximity scores with the standardized data elements determined from the regression models to be the most appropriate, and (e) compiling a cumulative proximity index. This study does not, per se, add to the list of selection methodologies, but rather reinforces the value of using multiple methods. Furthermore, this study demonstrates that a multi-method approach is preferable to a single-method approach.

The change in process during the course of the study illustrates both the ease and the flexibility of the process itself. Importantly, examining the set of institutions gleaned by each method affords both a comparison of the appropriateness of each institution as a peer and the set of institutions as a reasonable peer group. The researchers conjecture that the latter analyses further strengthen the utility of the final set of peers and/or aspirants.

Therefore, and as this study demonstrates, peer selection based on institutional characteristics alone is inferior to a multi-staged approach. Determining institutional peers based on both the parameters that reflect institutional performance priorities and data elements that are indicative of those priorities may be a better approach. The engagement of faculty and staff to identify the information and procedures used in this applied research project helped to select peers that were better aligned with those institutional imperatives. Moreover, the inclusiveness of the process improved the credibility and eventual use of the final peer and aspirant lists. Tangentially, the inclusion of several stakeholders in the process had the added benefit of debunking the perceived superiority of several data elements. For example, previous to this study endowment, percentage of faculty holding terminal degrees, percentage of classes enrolling fewer than 20 students, and total price

of students living on campus were frequently cited as determinants of student success. Furthermore, the U.S. News & World Report rankings are often cited as an indicator of quality. As this study has shown for this set of initial peers, these institutional characteristics all contribute to an institution's U.S. News & World Report ranking but are not necessarily indicative of quality.

Admittedly, the data elements, especially the variables chosen for the peer and aspirant selection statistical procedures, were highly correlated. For example, the correlation between instructional expenses per FTE and alumni giving rate was fairly high ($r = .76$, $p < .001$) as was the correlation between average faculty salaries and percent of full-time faculty with terminal degree ($r = .617$, $p < .001$). The five variable classifications and the designation of one or a few variables from each in the final regression models were designed to mitigate this phenomenon. Hence, the potential multi-collinearity among the variables was diminished somewhat by instituting five categories and limiting variable inclusion.

Availability of data from IPEDS and other sources continues to expand. In addition, linked information from diverse resources is readily available (Trainer, 2008). This expansion of data access may be the provocation responsible for the increase in the popularity of peer analysis. Additionally, institutions and state systems of higher education have responded to public scrutiny by using peer comparisons, a familiar embodiment of quality.

RECOMMENDATIONS

The importance of the selection of data elements and statistical techniques cannot be overstated. It is imperative to consider both the type of institution and the purpose of the peer selection (Shin, 2009). In short, five factors that should be considered before selecting a set of peers were identified in this applied research project: (a) target institution mission and institutional type, (b) ultimate purpose of peer analysis, (c) ease of the collection of data and information, (d) stakeholder understanding and perception of alignment to campus priorities, and (e) timing. To the last point, use of historical information, data trends, or the most current data are posited as options but may not all be appropriate.

Engaging multiple methods may address the limitations of a single approach. As with this study, a mixed-methods paradigm yielded the most appropriate fit of potentially disparate purposes of the peer and aspirant lists. Moreover, the iterative process revealed the weakness of selecting peer institutions on appearances or similar characteristics versus choosing peers based on performance and indicators of quality. Collectively, each peer and the peer set as a whole can be explicitly justified. Furthermore, the list is validated by informed and interested stakeholders. Likewise, the choice of aspirant institutions is unambiguous, based on institutional providence. Importantly, mixed-methodologies glean peers and aspirants that are meaningful and practical.

Despite data availability, data element selection, and breadth of methodologies, the cluster analysis identified more than 50 aspirant institutions, an impractical size. This reinforces that even the most sophisticated statistical techniques and unfettered availability of data can replace neither a clearly stated purpose of the comparison nor input from various stakeholder groups. The former provides irreplaceable selection criteria, and the latter helps to confirm the legitimacy of institutions as members of the peer or aspirant groups. For this applied research study, an aspirant index was devised to further pinpoint a reasonable number of aspirants. Following the logic of the nearest neighbor, the aspirant index was changed slightly to identify the best-performing institutions. Because of its similarity to the nearest neighbor and its simplicity, the aspirant index should be considered as another potential valuable statistical technique.

Published studies about peer selection are scarce; as a result, clear direction on peer selection methodology is limited. Peer selection models, differentiated by institutional type and function, could evolve with additional evidence. Furthermore, the impact of peer comparisons on institutional quality and improvement is unknown. Little guidance exists on the evaluation of peer selection and subsequent peer comparisons (Powell, Gilleland Suitt, & Pearson, 2012). Further research should evaluate the effects of peer comparisons, if any, on institutional quality. Only with further investigation will the impact of peer comparisons on institutional quality be known.

REFERENCES

American Association of University Professors (AAUP). (2012). Almanac of higher education 2012. Retrieved from http://chronicle.com/article/faculty-salaries-data-2012/131431#id=144050

Anderes, T. (1999). Using peer institutions in financial and budgetary analyses. *New Directions for Higher Education*, 107, 117–123.

Association of Governing Boards (AGB). (2012). Benchmarking service. Retrieved from http://agb.org/benchmarking-service

Carnegie Foundation. (2010). The Carnegie Classification of institutions of higher education™. Retrieved from http://classifications.carnegiefoundation.org/

Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavior sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohodes, S., & Goodman, J. (2012). First degree earns: The impact of college quality on college completion rates. Retrieved from http://nrs.harvard.edu/urn-3:HUL.InstRepos:9396433

CollegeBoard. (2012). Compare colleges. Retrieved from https://bigfuture.collegeboard.org/compare-colleges

College Factual. (2013). College factual. Retrieved from www.collegefactual.com

College Measures. (2013). College measures. Retrieved from http://www.collegemeasures.org/

College Miner. (2013). Welcome to the college trailhead. Retrieved from http://collegeminer.com/research/outcomestool.aspx

College News. (2013). Compare colleges. Retrieved from http://www.collegenews.com/

Eckles, J. E. (2009). Evaluating the efficiency of top liberal arts colleges. *Research in Higher Education*, 51(3), 266–293.

Gater, D. S. (2003). Using national data in university rankings and comparisons. Paper presented at the Association for Institutional Research International Forum, Tampa, FL.

Hom, W. (2008). Peer grouping: The refinement of performance indicators. *Journal of Applied Research in the Community College 16*(1), 45–51.

Huxley, R. G. (2009). Formation of community college clusters using the CCSSE [Community College Survey of Student Engagement] benchmarks for extra-large community colleges. *Journal of Applied Research in Community College, 16*(2), 103–108.

Lorr, M. (1983). *Cluster analysis for the social sciences*. San Francisco, CA: Jossey-Bass.

McLaughlin, G., & Howard, R. (2005). Comparison groups: Data and decisions. Workshop presented at the Association for Institutional Research International Forum, San Diego, CA.

McLaughlin, G., Howard, R., & McLaughlin, J. (2011). Forming and using peer groups. Paper presented at the Association for Institutional Research International Forum, Toronto, ON.

Merisotis, J. P., & Shedd, J. M. (2001). Using IPEDS to develop a classification system for two-year postsecondary institutions. *New Directions for Community Colleges, 122*, 47–61.

National Assessment of Service and Community Engagement (NASCE). (2012). National assessment of service and community engagement. Retrieved from http://www.siena.edu/pages/5628.asp

National Association of College and University Business Officers (NACUBO). (2012). Research home. Retrieved from http://www.nacubo.org/research/NACUBO_benchmarking_tool.html

National Center for Education Statistics (NCES). (2012). Compare individual institutions: Select institutions. Retrieved from http://nces.ed.gov/ipeds/datacenter/InstitutionByGroup.aspx

National Center for Educational Statistics (NCES). (2013a). College navigator. Retrieved from http://nces.ed.gov/collegenavigator/

National Center for Educational Statistics (NCES). (2013b). IPEDS data center. Retrieved from http://nces.ed.gov/ipeds/datacenter/

Powell, B. A., Gilleland Suitt, D., & Pearson, L. C. (2012). Expenditures, efficiency, and effectiveness in U.S. undergraduate higher Education: A national benchmark model. *The Journal of Higher Education, 83*(1), 102–127.

Shin, J. C. (2009). Classifying higher education institutions in Korea: A performance-based approach. *Higher Education, 57*(2), 247–266.

SPSS. (2008). PASW Statistics 18 command syntax reference. Author, Chicago, IL.

Taylor, B., & Harris, G. (2004). Relative efficiency among South African universities: A data envelopment analysis. *Higher Education, 47*(1), 73–89.

The Education Trust. (2012). College results online. Retrieved from http://www.collegeresults.org/search_group.aspx

The Institute for College Access & Success (TICAS). (2013). CollegeInsight. Retrieved from http://college-insight.org/#

Trainer, J. F. (2008). The role of institutional research in conducting comparative analysis of peers. *New Directions for Higher Education, 2008(141)*, 21–30. Doi: 10.1002/he.290

U.S. News & World Report. (2011). College rankings and lists. Retrieved from http://premium.usnews.com/best-colleges

Appendix B. Data Element Used for Peer and Aspirant Selection: Descriptions

Admissions

Admit Yield: Number of enrolled divided by number admitted.

Number of Applicants, Total: Number of first-time, degree- or certificate-seeking undergraduate students who applied (full or part time). Includes early decision, early action, and students who began studies during the summer prior to that fall.

Percent of Applicants Admitted: Number of admitted divided by total applicants.
SAT Critical Reading 25th Percentile Score: Includes new students admitted the summer prior to that fall.
SAT Critical Reading 75th Percentile Score: Includes new students admitted the summer prior to that fall.

SAT Math 25th Percentile Score: Includes new students admitted the summer prior to that fall.

Appendix A. Data Elements Used for Peer and Aspirant Selection: Time Frame, Indicator Type, and Source

Variable	Time Frame	Indicator Type	Indicator Source
Admit Yield	2011-12	Admissions	IPEDS
Number of Applicants, Total	2011-12	Admissions	IPEDS
Percent of Applicants Admitted	2011-12	Admissions	IPEDS
SAT Critical Reading 25th Percentile Score	2010-11	Admissions	IPEDS
SAT Critical Reading 75th Percentile Score	2010-11	Admissions	IPEDS
SAT Math 25th Percentile Score	2010-11	Admissions	IPEDS
SAT Math 75th Percentile Score	2010-11	Admissions	IPEDS
Bachelors Degrees Conferred	2010-11	Completions	IPEDS
Estimated Fall Enrollment	Fall 2010	Enrollment	IPEDS
Full-Time Equivalent (FTE)	Fall 2010	Enrollment	IPEDS
Total Enrollment, Unduplicated	2010-11	Enrollment	IPEDS
Percentage of Classes Enrolling Fewer Than 20 Students	2011-12	Enrollment	US News & World Report
Average Salary Equated to 9-Month Contracts of Full-Time Instructional Staff - All Ranks	2011-12	Faculty	IPEDS
Full-Time Primary Instruction Head Count	Fall 2011	Faculty	IPEDS
Part-Time Primary Instruction Head Count	Fall 2011	Faculty	IPEDS
Percentage of Faculty Holding Terminal Degrees	2011-12	Faculty	US News & World Report
Endowment (FASB)	2009-10	Financial	IPEDS
Instructional Expenses Per FTE (FASB)	2009-10	Financial	IPEDS
Tuition- Total Price for In-District Students Living on Campus	2011-12	Financial	IPEDS
Alumni Giving Rate	2011-12	Financial	US News & World Report
Percent of Full-Time Undergraduates Receiving Federal Grant Aid	2010-11	Financial Aid	IPEDS
Carnegie Classification- Basic (Arts & Sciences or Diverse Fields)	——	Institutional Characteristic	IPEDS
Carnegie Classification- Enrollment Size & Setting	——	Institutional Characteristic	IPEDS
Carnegie Classification- Undergraduate Profile (Transfer and Full-Time proportions)	——	Institutional Characteristic	IPEDS
Geographic Region	——	Institutional Characteristic	IPEDS
Level	——	Institutional Characteristic	IPEDS
Religious Affiliation	——	Institutional Characteristic	IPEDS
Tribal College	——	Institutional Characteristic	IPEDS
Graduation Rates, Total Cohort (6Years)	As of 8/31/10	Student Success	IPEDS
Retention Rates, Total Cohort (1 Year)	Fall 2010	Student Success	IPEDS

SAT Math 75th Percentile Score: Includes new students admitted the summer prior to that fall.

Completions

Bachelor's Degrees Conferred: Awards/degrees conferred.

Enrollment

Estimated Fall Enrollment: Early estimate of enrollment for all levels for full- and part-time students.

Full-Time Equivalent (FTE): The FTE of the institution's part-time enrollment is estimated and then added to the full-time enrollment of the institution. The FTE of part-time enrollment is estimated by multiplying the part-time enrollment by factors that vary by control and level of institution and level of student.

Total Enrollment, Unduplicated: The sum of students enrolled for credit with each student counted only once during the reporting period, regardless of when the student enrolled.

Percentage of Classes Enrolling Fewer than 20 Students: The percentage of undergraduate classes, excluding class subsections, with fewer than 20 students enrolled during fall semester.

Faculty

Average Salary Equated to 9-Month Contracts of Full-Time Instructional Staff–All Ranks: Derived by summing the equated 9-month outlays for each rank and dividing by the total faculty on both 9/10 month and 11/12 month contracts.

Full-Time Primary Instruction Head Count: Instructional faculty are instruction/research staff employed full time (as defined by the institution) whose major regular assignment is instruction, including those with released time for research.

Part-Time Primary Instruction Head Count: Faculty reported to have a primary function of instruction that does not exceed 50 percent.
Percentage of Faculty Holding Terminal Degrees: The percentage of full-time faculty members with a doctorate or the highest degree possible in their field or specialty during the academic year.

Financial
Endowment (FASB): Endowment assets (year-end) per FTE enrollment for public and private not-for-profit institutions using Financial Accounting Standards Board (FASB) standards is derived as follows: Endowment assets (year-end) divided by 12-month FTE enrollment. Endowment assets are gross investments of endowment funds, term endowment funds, and funds functioning as endowment for the institution and any of its foundations and other affiliated organizations. Endowment funds are funds whose principal is nonexpendable (true endowment) and that are intended to be invested to provide earnings for institutional use. Term endowment funds with the following stipulation by the donor: the principal may be expended after a stated period or on the occurrence of a certain event. Funds functioning as endowment (quasi-endowment funds) are established by the governing board to function like an endowment fund but that may be totally expended at any time at the discretion of the governing board. These funds represent nonmandatory transfers from the current fund rather than a direct addition to the endowment fund, as occurs for the true endowment categories.

Instructional Expenses per FTE (FASB): Includes all expenses of the colleges, schools, departments, and other instructional divisions of the institution and expenses for departmental research and public services that are not separately budgeted. Includes general academic instruction, occupational and vocational instruction, special session instruction, community education, preparatory and adult basic education, and remedial and tutorial instruction conducted by the teaching faculty. Also, includes expenses for both credit and noncredit activities. Excludes expenses for academic administration if the primary function is administration (e.g., academic deans).

Tuition—Total Price for In-District Students Living on Campus: Cost of attendance for full-time, first-time degree/certificate seeking in-district undergraduate students living on campus for the academic year. It includes in-district tuition and fees, books and supplies, on-campus room and board, and other on-campus expenses.

Alumni Giving Rate: The average percentage of undergraduate alumni (full- or part-time students) who donated money to the college or university for either current operations or capital expenses during the specified academic year. Rate is calculated by dividing the number of alumni donors during a given academic year by the number of alumni of record for that same year.

Financial Aid
Percent of Full-Time Undergraduates Receiving Federal Grant Aid: Percent of undergraduate students receiving grant aid from the federal government. Undergraduates are students enrolled in a 4- or 5-year bachelor's degree program, an associate degree program, or a vocational or technical program below the baccalaureate.

Institutional Characteristics
Carnegie Classification–Basic (Arts & Sciences or Diverse Fields): Includes institutions where baccalaureate degrees represent at least 10 percent of all undergraduate degrees, institutions that award fewer than 50 master's degrees or fewer than 20 doctoral degrees per year. Excludes special focus institutions and tribal colleges.

Carnegie Classification–Enrollment Size & Setting: School sizes are classified by very small, small, medium, large. Also indicates proportion of students living in campus housing.

Carnegie Classification–Undergraduate Profile (Transfer and Full-Time Proportions): Used in this case study to determine selectivity.

Geographic Region: U.S. region school where institution is located.

Level: A classification of whether an institution's programs are 4-year or higher (4 year), 2-year and less than 4-year (2 year), or less than 2-year.
Religious Affiliation: Indicates religious affiliation (denomination) for private nonprofit institutions that are religiously affiliated.

Tribal College: These institutions, with few exceptions, are tribally controlled and located on reservations, and are all members of the American Indian Higher Education Consortium.

Appendix C. Siena College Peers and Aspirant Lists

Near Peers	Almost Peers
Institution	Institution
Allegheny College	Augustana College
Cedarville University	Birmingham Southern College
Champlain College	Calvin College
College of Saint Benedict	Carroll College
Concordia College at Moorhead	Goucher College
Cornell College	Hampshire College
Gordon College	Houghton College
Hartwick College	Lake Forest College
Hope College	Lasell College
Juniata College	Linfield College-McMinnville Campus
Messiah College	Luther College
Oglethorpe University	Muhlenberg College
Saint Michael's College	Saint Anselm College
Stonehill College	Saint Vincent College
Susquehanna University	Southwestern University
Transylvania University	St. Olaf College
Wentworth Institute of Technology	Trine University
William Jewell College	Washington College
Wofford College	Westmont College

Tier I Aspirants	Tier II Aspirants
Institution	Institution
Amherst College	Barnard College
Bowdoin College	Beloit College
Carleton College	Bucknell University
Claremont McKenna College	Centre College
Colby College	Davidson College
Gustavus Adolphus College	Denison University
Hamilton College	DePauw University
Kenyon College	Dickinson College
Pomona College	Furman University
Saint Mary's College	Grinnell College
Swarthmore College	Kalamazoo College
Vassar College	Macalester College
Williams College	Rhodes College
	Saint John's University
	Skidmore College
	The College of Wooster
	Skidmore College
	Wellesley College
	Whitman College

Student Success

Graduation Rates, Total Cohort (6 Years): The number of students from the adjusted conferred bachelor's degree–seeking cohort who completed a bachelor's degree within 150 percent of normal time (6 years) divided by the adjusted cohort. The adjusted cohort is the revised cohort minus exclusions as reported by the institution as of 150 percent of normal time (6 years).

Retention Rates, Total Cohort (1 Year): The full-time retention rate is the percent of the (fall full-time cohort from the prior year minus exclusions from the fall full-time cohort) that reenrolled at the institution as either full- or part-time in the current year.

Appendix D. Peer Selection Websites

American Association of University Professors (AAUP): One of the most frequently requested comparisons is that of faculty compensation. The AAUP provides aggregated information from the Faculty Salaries Survey (AAUP, 2012). The provided link is a user-friendly interface developed by the Chronicle of Higher Education. http://chronicle.com/article/faculty-salaries-data-2012/131431#id=144050

Association of Governing Boards (AGB): This subscription service provides financial metrics primarily sourced from IPEDS (AGB, 2012). Multiple years of data are available for over 4,000 institutions. http://agb.org/benchmarking-service

CollegeBoard: Both search and comparison capabilities are available on bigfuture by the CollegeBoard©: Compare Colleges website (CollegeBoard, 2012). Information is limited, probably due to the fact that the primary audience is prospective

students and their parents. For example, information about faculty or instructional expenses is not available. Additionally, a maximum of only three colleges can be compared simultaneously. https://bigfuture.collegeboard.org/compare-colleges

College Factual: The website provides a rating based on a scorecard of statistics of user selected colleges (College Factual, 2013). Ratings are based on metrics weighted by the user. Again, the intended audience is prospective students and their parents. http://www.collegefactual.com/

CollegeInsight: Hosted by The Institute for College Access & Success (TICAS), this website provides aggregated financial aid information (TICAS, 2013). Although the focus of this application is affordability, information on enrollment, diversity, and student success is also available. The search engine is flexible, affording selection on multiple values for one or more of the following: sector, geographic location, enrollment sizes, percent of Pell recipients, and tuition. Additionally, several years of data are available. http://ticas.org/

College Measures: Several key institutional indicators are automatically aggregated by state and nationally on this website (College Measures, 2013). Institutional information is displayed as a performance scorecard that must be viewed separately for each school. http://www.collegemeasures.org/

College Miner: This website is unique because it reports alumni salary information (College Miner, 2013). Simultaneous comparisons can only be made for a maximum of three institutions. The target audience is prospective students and parents. Priority of this application is ease of use and colorful graphics over data. http://collegeminer.com/research/outcomestool.aspx

College Navigator: Provided by NCES, this tool narrows college peers by level of award, institutional type, and geographic location (NCES, 2013a). Because of the information available and the interface, this tool and the IPEDS Data Center website described below are recommended by the authors. http://nces.ed.gov/collegenavigator/

College News: As with the CollegeBoard, College News has a repository of college information named Compare Colleges. The online application provides the rankings of several publications, including the U.S. News & World Report (College News, 2013). Also shown is information about enrollment size, acceptance rates, and tuition. Although visually appealing, the interface is somewhat confusing and cumbersome. http://www.collegenews.com/

College Results Online: Sponsored by The Education Trust, the origin of the data is the same as for this case study, primarily IPEDS (The Education Trust, 2012). Institution type and geographic location limits the number of peers that can be selected at one time. http://www.collegeresults.org/search_group.aspx

IPEDS Data Center: The IPEDS Data Center, also supported by NCES, provides access to data for multiple institutions simultaneously (NCES, 2013b). The list of frequently used and derived variables makes access to an otherwise vast and unwieldy inventory of data elements somewhat easier. Early released data to IPEDS key holders can be obtained by request. Most of the data for this case study are from the IPEDS Data Center. http://nces.ed.gov/ipeds/datacenter/

National Assessment of Service and Community Engagement (NASCE): NASCE provides comparisons among participants regarding student service engagement (NASCE, 2012). Available data are derived from a survey of student service activities and attitudes. http://www.siena.edu/pages/5628.asp National Association of College and University Business Officers (NACUBO): Comparative information sourced from several NACUBO surveys is available to member institutions (NACUBO, 2012). A peer selection tool is among the site's capabilities. http://www.nacubo.org/research/NACUBO_benchmarking_tool.html

U.S. News & World Report: For a fee, additional data provided to U.S. News & World Report can be downloaded for participating institutions (U.S. News & World Report, 2011). Rankings aside, some of the information that can be acquired from U.S. News & World Report is not readily available elsewhere. Among the data elements unique to the U.S. News & World Report ranking are (a) awarded financial aid packages, (b) class size, and (c) high school GPA of entering students. http://premium.usnews.com/best-colleges.

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