

PEER AND ASPIRANT ANALYSIS

A Case Study to Examine Peer Grouping and Aspirant Selection

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Abstract

The case study demonstrated that the use of institutional characteristics, alone, may be an insufficient peer selection strategy. 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 improved the accuracy of the institutional peer and aspirant lists created for this college. As such, this applied research describes how institutional peer and aspirant groups were identified for a private non-profit four-year liberal arts college. At the heart of the peer analyses are the nearest neighbor and cluster analysis statistical procedures. In addition, an aspirant index, proposed by the authors, was applied to a preliminary set of institutions to further refine the aspirant list.

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Peer comparisons have become increasingly more 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 seems to be gaining credibility (Eckles, 2010).

Yet, there seems to be no expectation to perfectly match an institution with other colleges and universities (Andres, 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 (Andres, 1999; Trainer, 2008). Regardless, the challenge lies with the definition of similar. This is evident from the variety of previously reported selection methodologies. Some will be addressed in this paper. Likewise, there is no clear delineation of the most appropriate methods or under the best circumstances and intentions to implement.

Method

Data Elements

Selection of Data Elements. Identification of institutional characteristics and relevant data elements is an iterative process of classifying and reorganizing the information by role and function. First, key institutional characteristics are determined to select the initial set of institutions. This includes Carnegie Classifications such as type of institution, size, and setting. Also location and enrollment factors may be engaged at this stage (Carnegie Foundation., 2011). Second, alternate institutional characteristics help to reduce the number of peers from that initial

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set. For this case study, religious affiliation, transfer mix, and residential proportion were among the data elements used to potentially reduce the number of institutions in the initial set. Third, key institutional performance indicators (KPIs) are identified for both peer and aspirant groups. Finally, deliberation about the factors that influence the KPIs and, hence, academic quality must be collected (Cohodes & Goodman, 2012). Among the influencers considered in this study were tuition, total price of attendance, total enrollment, financial expenditures, SAT scores, admit yield, and quality of faculty were collected. Predictive ability, determined by regression models, determine inclusion (Hom, 2008). All data elements should be chosen within the context and priorities of the institution, confounding factors eliminated, and the list reviewed and revised by college constituents.

Variable choice was informed by several sources. All data elements used in a previous Siena College peer analysis were also included in this case study. Data from that peer selection originated from the National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS) and US News & World Report rankings. A review of the literature confirmed the appropriateness of these variables but also brought to light additional institutional factors to consider (Merisotis & Shedd, 2001). Other variables were included at this stage consequential to a comprehensive exploration of the IPEDS Data Center. The relevance of some of these data elements were confirmed by college stakeholders and aligned with the College's KPIs (Siena College, 2012).

Information from several national survey projects were also considered including : (a) National Survey of Student Engagement (NSSE) benchmarks, (b) Association of University Professors (AAUP) faculty salary data, and (c) Noel Levitz Student Satisfaction Inventory (NLSI). Data from these sources were not used because of at least two limitations. First, some

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of the information is duplicative to IPEDS and US News & World Report rankings data.

Second, several potential peer institutions do not administer the NSSE and NLSI. With this in mind, the variables were primarily sourced from IPEDS and the US News & World Report rankings. A list of 32 variables resulted, listed in Appendix A. Descriptions of each are provided in Appendix B.

Data Element Conversion. The enrollment and number of applicants at Siena College were almost double that of the other institutions. To control for institutional size, each institution's reported full-time equivalent (FTE) were divided into many of the data elements. This computation mitigated the size discrepancy among institutions (Gater, 2003; Huxley, 2009). Variables expressed as proportions were not converted. For example, full time faculty proportions were computed by using the sum of both full and part time instructional faculty. Faculty salaries were already reported as an average and, therefore, not changed. Similarly, downloaded SAT scores remained unaltered. The percent of transfers were classified into two categories, low and high.

Selection of Institutions

Initial Peer Formation. Peer analysis is a multitier and iterative process (McLaughlin, Howard, & McLaughlin, 2011). Moreover, this study undertook a hybrid approach, amalgamating the methodologies of previous peer analyses case studies reported in the literature. Using multiple methods in this study affords a practical balance between analytical and stakeholder judgment (Trainer, 2008). The initial set of institutions was chosen from an original list of private, non-profit institutions that submitted data to IPEDS from the Data Center website: <http://nces.ed.gov/ipeds/datacenter/>. The list was generated using the EZ group option. Data for these institutions were collected for 2010 and 2011, the most recent data available. All four year

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private non-profit institutions were included at this initial stage if it met the following criteria: (a) highest degree awarded is Bachelor's or Master's or both, (b) enrolled full-time undergraduate students, (c) Baccalaureate College- Arts & Sciences or Baccalaureate Balanced Arts & Sciences, diverse fields Carnegie classifications, (d) Title IV participant (federal financial aid eligibility), (e) located in US or designated as US Service School (ex. US Naval Academy), and (f) not a tribal college. This is on par with selection parameters recommended by previous studies (Andres, 1999). As a result of applying these criteria, 286 institutions were selected. In general, the initial selection of peers is colleges and universities were attentive to liberal arts disciplines and enrolled between 1,000 and 9,999 students.

Peer Affiliation Determined by Institutional Characteristics. 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, Howard, & McLaughlin, 2011). Five sub-groups were assembled based on institutional characteristics: (a) Catholic affiliation, (b) primarily baccalaureate, (c) highly residential, (d) low transfer proportion, and (e) more selective. Previously identified peer and competitor groups were the basis for the sub-groups. Aggregate information was compiled for 22 standardized data elements for all 286 institutions, the five institution sub-sets, and for Siena College. Results are shown in Table 1.

A precursory examination reveals that Siena College is similar to the sub-groups in some aspects but no group is predominantly comparable to the institution. The mean instructional expenses for Catholic institutions are less disparate to Siena College than the other sub-groups. Siena College's endowment and alumni giving rate is most like the Catholic institutions and other baccalaureate schools. Siena College is most like the more selective schools with respect

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to the percent admitted, admissions yield, SAT percentiles, proportion of first time students receiving federal grant aid. On the other hand, Siena College's total price of attendance, full-time faculty proportion, and the percent of full-time faculty with terminal degrees are similar to the low transfer school group. Siena College exceeds the all the peer sets for average full-time faculty salary with more selective schools having the second highest average salary. Retention and graduation rates make the task of peer selection more impenetrable. Siena College exceeds all but more selective schools in retention rate. Siena College also exceeds all groups in graduation rates.

Based on the inconclusiveness of these comparisons, a peer set was formed by combining three of the above criteria: (a) low transfer, (b) highly residential, and (c) more selective.

Revealed from these additional selection criteria is that more selective schools are also low transfer schools but low transfer schools include 85 selective institutions. Regardless, the means and standard deviations compiled for the data elements were not necessarily more similar to Siena College than the other five potential peer sets. Results are shown in Table 2. In fact, the differences between Siena College and the new group means were only smaller for seven variables than any of the first five proposed reference groups: (a) applicants per FTE, (b) percent of full-time faculty with terminal degree, (c) 25th percentile Mathematics SAT score, (d) FTE, (e) classes with 20 or less students, (f) total price of attendance, and (g) one-year retention rate.

In this case study, the use of institutional parameters both singularly and in combination failed to produce a convincingly valid set of peers. 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).

Peer Affiliation Determined by Nearest Neighbors. Because no definitive peer set for was discerned from the use of specific institutional parameters a more scrupulous evaluation of the variables and their potential value was undertaken. Specifically, institutional KPIs and corresponding sets of potential predictors were discerned. Institutional KPIs denote output or productivity. Predictors are input variables or resources that would be expected to affect those outcomes (Eckles, 2010). Three KPIs emerged from the list of 22 data elements engaged thus far: (a) ratio of conferred Bachelor's Degree to FTE, (b) one-year retention rate, and (c) six-year graduation rate. Definitions for these KPIs can be found in Appendix B. Opportunely, these three productivity measures are representative of the College's KPIs. The remaining data elements were deemed as influencers and parsed into five categories: (a) admissions, (b) faculty, (c) enrollment, (d) institutional characteristics, and (e) finance.

Correlations among the three KPIs and each of the nineteen influencers were computed. As suggested by Hom (2008), the correlations served as a preliminary step to detect potential multicollinearity among the variables. The correlations by category are shown in Table 3 through Table 7 respectively.

With the exception of the SAT indicators, the finance data elements had the highest intra-category correlations with endowment per FTE and instructional expenses per FTE having the highest correlation among the finance variables ($r = .78$, $n = 282$, $p < .001$). Although moderate associations among the variables were expected, care interpreting the results is warranted.

Unsurprisingly, correlations were fairly high among the performance predictors with one-year retention rate and six-year graduation rate posting the largest correlation ($r = .862$, $n = 286$, $p < .001$). The first quartile Mathematics SAT score had the highest correlation with both one-year retention and six-year graduation rate than any of the other nineteen variables

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($r = .85$, $n = 231$, $p < .001$ and $r = .88$, $n = 231$, $p < .001$ respectively). The institutional characteristic, size and setting Carnegie Classification, was best associated with the ratio of Bachelor's degrees to FTE compared to the other criteria ($r = .56$, $n = 282$, $p < .001$).

An ordinary least square (OLS) regression analyses determined the best combination of data element predictors for each KPI. Regressions using the enter method in SPSS were compiled separately for the five variable categories for each KPI, a total of fifteen models. The enter method was preferred over other models because it ensured that all category variables were placed in the model enabling comparisons among the variables (SPSS, 2008). An overall model was also computed using the best predictor or predictors from each of the five category regressions. The variable with the best significance of the standardized beta coefficients was deemed as 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). Because of the high correlations among the variables, the statistical design intended only one variable to be chosen from each category for each KPI. Note that the interpretation of the four institutional characteristics may be problematic because unlike the other variables these are ordinal scale variables.

The variables in each category that emerged as the best predictor for the ratio of conferred Bachelor's degree to FTE are shown in Table 8. Although not significant, the 25th percentile Mathematics SAT score had the highest beta coefficient for the admissions variables ($\beta = .416$, $p \geq .05$). Unexpectedly, average faculty salary emerged as the best predictor for the faculty variables and estimated fall enrollment to FTE for the enrollment category ($\beta = .400$, $p \leq .001$ and $\beta = -.296$, $p \leq .05$ respectively). Selectivity had the largest standardized beta coefficient among the institutional characteristics and the only variable that was significant in the regression

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model. ($\beta = .453, p \leq .001$). Instructional expenses per FTE had the highest standardized beta coefficient among the finance variables ($\beta = .468, p \leq .001$).

As seen in Table 8, the 25th percentile Mathematics SAT score was also the best predictor for one-year retention rate ($\beta = .311, p \geq .05$). As with the ratio for conferred Bachelor's degree to FTE, average faculty salary was the best predictor of the faculty variables ($\beta = .622, p \leq .001$), FTE for the enrollment category ($\beta = .315, p \leq .001$), and selectivity among the institutional characteristics ($\beta = .616, p \leq .001$). Likewise, instructional expenses per FTE was also the best predictor for the finance variables ($\beta = .395, p \leq .001$).

Results for the six-year graduation rate OLS regression model are also posted in Table 8. For the six-year graduation rate, the percent of students receiving federal grant aid posted the largest absolute beta coefficient among the admissions variables ($\beta = -2.654, p \leq .01$). Again, average faculty salary was the best predictor of the faculty variables and FTE fared best for the enrollment categories ($\beta = .630, p \leq .001$; $\beta = .303, p \leq .001$ respectively). Both selectivity and transfer proportion were significant institutional characteristics ($\beta = .613, p \leq .001$; $\beta = -.184, p \leq .001$ respectively). For the finance variables, total price of attendance, instructional expenses per FTE, and alumni giving posted the lowest significance ($\beta = .303, p \leq .001$; $\beta = .361, p \leq .001$; and $\beta = .338, p \leq .001$ respectively).

Ideally, the fewest variables that can best reflect the institution's priorities should be used for determining comparison institutions (Hom, 2008). A balance 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. Therefore, three additional OLS regression models were generated using the best predictor(s) from each of the five variable categories. Results are shown in Table 9.

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Only the 25th percentile Mathematics SAT score and selectivity variables posted a significant result for the ratio of conferred Bachelor's degree to FTE ($\beta = .348, p \leq .001$; $\beta = .282, p \leq .001$ respectively). The 25th percentile Mathematics SAT score and selectivity variables were also the lone significant predictors for the one-year retention rate ($\beta = .465, p \leq .001$; $\beta = .301, p \leq .001$ respectively). On the other hand, of the eight potential predictors that were entered into the regression equation for the six-year graduation rate, all but two were significant, FTE and total price of attendance ($\beta = .090, p \geq .05$ and $\beta = .006, p \geq .05$ respectively).

The previous step identified the variables that were best associated and predicted the three KPIs most aligned with Siena College's priorities: (a) ratio of conferred Bachelor's degree to FTE, (b) one-year retention rate, and (c) six-year graduation rate. A collective examination of these KPIs was undertaken to determine their value to the peer selection process. The three regression models that correspond to three KPIs are very similar. One difference was the enrollment variables that were entered, notably FTE versus estimated fall enrollment to FTE that emerged as the best predictor of six-year graduation rates. Since the latter did not post a significant result, it was eliminated from further consideration. Another exception was the six-year graduation rate regression model that included percent of new students receiving federal grant aid instead of the 25th percentile Mathematics SAT score parameter. In fact, the six-year graduation rate OLS models included three other variables not in the two other regression models: (a) transfer proportion, (b) total price of attendance, and (c) alumni giving rate. Consequently, the five variables used in the conferred Bachelor's degree to FTE and one-year retention rate regression models: (a) 25th percentile Mathematics SAT score, (b) average faculty

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salary, (c) FTE, (d) selectivity, and (e) instructional expenses along with the additional four six-year graduation rate model variables were deemed the most credible data elements.

Nearest neighbor methodology is a multi-step process that consists of determining the most relevant parameters, the numerical difference between the reference and comparative institution on each of those parameters, and 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, Howard, & McLaughlin, 2011). The numeric difference between Siena College and each institution was determined for these nine variables. In turn, these differences determined peer proximity or nearest neighbor. A proximity score was compiled using the standard deviation of each performance measure and variable as reference to the extent of nearness. Specifically, a proximity score of 1 was assigned to any institution that was between one-half and one standard deviation of Siena’s metric, a score of 2 was given if the institution was within one-half a standard deviation. The average of the nine equally weighted proximity scores derived the proximity index.

This case study departs from the nearest neighbor methodology in at least two ways. First, a small number of data elements were used to compute the proximity index, an aggregate score across nine predictor variables. Nevertheless, a large number of variables that are highly correlated make the interpretation difficult to interpret (Gater, 2003). Second, no data element weighting scheme was devised as reported by previous studies (Hom, 2008; McLaughlin, Howard, & McLaughlin, 2011).

The proximity indices for these institutions range from 0 to 1.78. Two peer sets emerged from examining the proximity index percentiles. The first set of peers, near peers, comprised the 19 institutions that had proximity indices that corresponded to the 95th percentile or higher.

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Another 19 institutions constituted the next tier of peer institutions. These “almost peers” had proximity indices between the 90th and 95th percentiles. The two peer groups are listed in Appendix C.

Aspirant Selection Determined by Cluster Analysis. Most studies focus on a single methodology to select a peer set of institutions or an aspirant group. Seldom, do these studies distinguish 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 in the peer selection, were slated for the aspirant analyses.

A cluster analysis was performed for each KPI using the predictors corresponding to each KPI regression model. The likelihood distance method was used to determine the institutional clusters. In a two-step cluster analysis, individual institutions are consecutively being combined to form clusters subsequent to an initial pass to find the cluster centers (SPSS, 2008). KPIs and corresponding KPI quartile means for each cluster were calculated to ascertain the distinctiveness of each cluster. Means for the predictors that were most relevant to the cluster formation and the average KPI quartile assignment for each cluster are shown in Figure 1.

The aspirant cluster is shaded red in Figure 1. The means for this cluster for the ratio of conferred Bachelor’s Degree to FTE quartile categories are noticeably larger than the other two clusters. For example, the 25th percentile Mathematics SAT score is over 100 points higher for the aspirant cluster than the next best cluster, cluster 2 (M= 571.55; M=465.15 respectively). Instructional expenses per FTE for the aspirant cluster are twice as large as the next largest cluster, cluster 2 (M= \$15,724.06; M= \$7,628.16 respectively). Similarly, the average faculty

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salary is highest for the aspirant cluster (aspirant cluster: $M = \$76,156.18$; cluster 2: $M = \$56,271.03$; cluster 1: $M = \$51,876.53$). The aspirant cluster contains schools that are more selective. The predictor means among the categories are equally spaced with the aspirant cluster at almost one standard deviation above the mean, cluster 2, at the mean, and the lowest performing cluster, cluster 1, at a distance that is almost one standard deviation below the mean ($M = .23$, $M = .20$, and $M = .17$ respectively). The KPI quartile category means accentuate the cluster differences. As such, the cluster with the lowest performance KPI quartile category mean, cluster 1, aligns with the smallest variable means. On the other hand, the aspirant cluster is markedly larger than the middle cluster, cluster 2 ($M = 3.61$ and $M = 2.25$ respectively).

The results of cluster analysis for the one-year retention rate quartile categories are identical to the Bachelor's degree to FTE quartile categories because the same set of predictors were used. The aspirant cluster has a mean one-year retention rate that is greater than one standard deviation from the mean compared to cluster one that is distanced one standard deviation below the mean ($M = 88.73\%$ and $M = 73.75\%$ respectively). The dispersion of the predictor quartile category means among clusters is indicative of the of the clusters' ability to discern among the different one-year retention rate means (cluster 1: $M = 1.42$; cluster 2: $M = 2.18$; aspirant cluster: $M = 3.66$).

There is marked difference between the two clusters' six-year graduation rates ($M = 57.68\%$ and $M = 79.33\%$ respectively). However, only two clusters were classified mitigating the effectiveness of the cluster analysis with a substantial 96 institutions in the smallest cluster.

A joint investigation of the Bachelor's degree to FTE and one-year retention rate cluster analyses is illustrated in the radar chart in Figure 2. To improve the interpretation of the radar chart, variables should be transformed into scales with similar magnitudes (McLaughlin,

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Howard, &McLaughlin, 2001; Meristosis & Shedd, 2001). Accordingly, all ratio scaled predictors used in the three cluster analyses were converted to quartile categories. The resulting average quartile categories for each cluster is plotted. The distinction among clusters are graphically apparent in the radar chart depicted in Figure 2. The aspirant cluster outperforms the other two clusters on all predictor and KPIs with the exception of the percent of new students receiving federal grant aid. Cluster 1, the cluster with the smallest average for all three KPIs, has the largest average quartile for the percent of new students receiving federal grant aid.

Using all three aspirant clusters as the basis for the selection criteria and eliminating any school that were marked as a peer, resulted in 51 potential aspirant institutions. Somewhat unmanageable in size, an aspirant index was computed for these 51 schools. In concept, the aspirant index is similar to the proximity index with the following germane differences. First, the KPIs are the basis of the aspirant index mainly because it is institutional performance that Siena College aspires. On the other hand, the nine KPI predictors determined potential peer institutions. Second, the peer index gives more credence to small differences; the aspirant index awards large positive differences. Third, as mentioned, the direction of that difference is unimportant to the proximity index calculation, it is at the heart of the aspirant index calculation. That is, if the aspirant metric was greater than the reference institution's value, a positive aspirant score was assigned. Fourth, the standard deviations used for comparisons were only compiled for those schools that met the aspirant selection criteria. The differences between the two indices are illustrated in Figure 3.

An aspirant score of 1 was assigned to any institution that was between one-half and one standard deviation above Siena College's metric, a score of 2 was given if the institution was

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greater than one-standard deviation. If an institution's metric was within one-half the standard deviation or less of Siena College, the aspirant score was 0.

The aspirant index was the average of the equally weighted aspirant scores. Twelve institutions had a negative aspirant index and were removed from the initial aspirant list. Twenty-seven institutions posted a zero aspirational index and thirteen institutions in the preliminary aspirant set 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.

Other Reference Group Selection Methodologies

Overview

Peer or reference group formation research and protocols are sparse but a variety of techniques do exist. Deciding on the most appropriate method requires both the knowledge of the statistical procedure and the purpose of the eventual comparison(s). Some of those methodologies are listed below. The two methodologies used for this case study, nearest neighbor and cluster analysis, are included.

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. Second, *hierarchal 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 are computed (Hom, 2008). Euclidean distance and correlations are the most

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common. Based on these distance designations, the researcher can determine clusters by assigning membership, often manually.

Data Envelop Analysis

This statistical procedure is best for finding aspirant institutions by determining the most efficient institutions, often indicated by financial indicators (Eckles, 2010). 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. Multi-phased, a classification rule is first developed using institutions for which group membership is known. Then, the rule is used to classify institutions for which group membership is not known (SPSS, 2008). The former phase may render this technique impractical. Regardless, discriminant analysis has also been used to ascertain the accuracy of cluster classifications (Huxley, 2009).

Factor Analysis

Institutions are classified by factors determined by the correlations or co-variances among the institutional parameters. As with discriminant analyses, prior knowledge of the institutions and the associations among institutional parameters are essential.

Nearest Neighbor

The determination of the best matches or nearest neighbors varies but the crux of this methodology is deciphering the extent an institution is a peer (McLaughlin, Howard, & McLaughlin, 2011). This is accomplished by computing the distance between institutions on targeted predetermined parameters.

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Subject Matter Experts (SMES)

Engaging faculty and staff that have a vested interest in assembling a set of peers is not only a sound method to validate a proposed set of peer institutions but subsequently may increase adoption of the reference group.

Variable Match

Reference group formation does not necessarily require sophisticated statistical procedures. 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 but may also include degree level, program mix, type of students served, urban setting, expenditures, and selectivity.

External Peer Selection Tools

Peer selection tools available on the web have proliferated recently. Albeit, some of these tools can be useful and certainly provide information and capabilities not availed by this case study. Listed below is a brief description of each.

American Association of University Professors (AAUP)

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

Association of Governing Boards (AGB)

<http://agb.org/benchmarking-service>. For a subscription fee of \$850, this application primarily provides financial metrics. Admittedly, the application was not tested by the authors.

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CollegeBoard

<https://bigfuture.collegeboard.org/compare-colleges>. Both search and comparison capabilities are available on the Compare Colleges website hosted by the CollegeBoard. Information is limited, partly due to the fact that the primary audience is prospective students and parents. For example, information about faculty or instructional expenses are not available. Additionally, only a maximum of three colleges can be compared simultaneously.

College Measures

<http://www.collegemeasures.org/>. Several key institutional indicators are automatically aggregated by state and nationally. Institutional information is displayed as a performance scorecard which must be viewed separately for each school.

College Miner

<http://collegeminer.com/research/outcomestool.aspx>. Although incomplete, this website is unique because it reports alumni salary information. Somewhat limited, simultaneous comparisons can only be made of a maximum of three institutions. As with College Measures, the target audience is prospective students and parents. Priority of the interface appears to be ease of use and generating colorful graphics.

College Navigator

<http://nces.ed.gov/collegenavigator/>. Provided by NCES, this tool narrows college peers by level of award, institutional type and geographic location. Recommended is use of this peer analysis tool or the *IPEDS Data Center* website described below.

College News

<http://bestcolleges.collegenews.com/>. Compare Colleges, a College News service, provides the rankings of several publications including the US News & World Report (US News

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& World Report, 2011). Also shown is information about enrollment size, acceptance rates, and tuition. Although visually appealing, interface is somewhat confusing and cumbersome.

College Results Online

http://www.collegeresults.org/search_group.aspx. Sponsored by the Education Trust, the origin of the data is the same as this case study, primarily IPEDS information. Peer set creation is limited with only type and geographic location to limit the selection.

IPEDS Data Center

<http://nces.ed.gov/ipeds/datacenter/>. The Data Center, also supported by NCES, provides access to data to multiple institutions simultaneously. The list of frequently used/derived variables makes that access easy and quick. Early released data to IPEDS key holders can be obtained by request. Most of the data for this case study is from the IPEDS Data Center.

National Assessment of Service and Community Engagement (NASE)

<http://www.siena.edu/pages/5628.asp>. Undeniably, the mention of NASCE is somewhat self-serving because it is sponsored by Siena College. However, NASCE provides comparisons among participants regarding student service engagement.

National Association of College and University Business Officers (NACUBO)

http://www.nacubo.org/Research/NACUBO_Benchmarking_Tool.html. Comparative information sourced from several NACUBO surveys is available to member institutions. A peer selection tool is among the site's capabilities.

The Institute for College Access & Success

<http://ticas.org/>. The Institute for College Access & Success also hosts CollegeInsight. The Institute for College Access & Success website aggregates financial aid information for user selected institutions. This online tool enables searches on sector, geographic location,

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enrollment size, percent of Pell recipients, and tuition. The tool also offers some data aggregation options. An unique feature is the ability to use historical data to select institutions.

US News & World Report

<http://premium.usnews.com/best-colleges>. For a fee, additional data provided to US News & World Report can be downloaded for participating institutions. Rankings aside, some of the information that can be acquired from US News & World Report is not readily available elsewhere. This information includes awarded financial aid packages, class size, and high school GPA of entering students.

Limitations

This applied research project sought to demonstrate the selection of a relevant group of institutions for comparisons. The research was conducted at a small private non-profit four-year liberal arts institution and therefore, may not be applicable to all institutions. Moreover, the functionality of the resultant reference group will differ across institutions and subject to change at Siena College depending on the purpose of the comparison (Shin, 2009).

The KPIs and predictors variables slated for this study best aligned with the institution under investigation. In addition, the case study was conducted to facilitate campus interest by allaying apprehension about the difficulty and complexity of data collection and analysis. Therefore, the college parameters were unique to this applied research study. The variables chosen were based on five categories as classified by the researchers. The investigation of other classification schemes should be investigated (Andres, 1999; Powell, Gilleland Suitt, & Pearson, 2012; Warne, Schmidtke, Vaughn, & Leonard-Getty, 2005).

The most recent data at the time of the study was used. Nevertheless, the data was singular in time frame and did not reflect historical or predicted trends. Multiple extractions

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across several time frames may have warranted alternate methodologies and, hence, different peer and aspirant groups.

Admittedly, the data elements especially the variables chosen for the peer and aspirant selection statistical procedures were highly correlated. Although the use of these variables provided a broad spectrum of institutional information, the potential multicollinearity among the variables may have diminished the selection accuracy.

Nearest neighbor and cluster analysis were the primary methods for reference group selection. This case study is unique in that it details two reference group selection methodologies. The application of these statistical techniques is also distinctive in that campus need and practicality were the primary priorities of the case study. Otherwise, a different methodology and design may have been employed. Further, these techniques were adapted to fit available data and modified to best meet the College's objectives. Institutions should consider alternative techniques that best fit the intended uses of peer and aspirant groups.

Data availability and data element selection aside, the cluster analyses identified over 50 aspirant institutions, an unreasonably large comparison group. The most sophisticated statistical techniques and unfettered availability of data cannot replace a clearly stated purpose of the comparison nor input from various stakeholder groups. The former provides irreplaceable selection criteria; the latter helps to confirm the legitimacy of institutions as members of the peer or aspirant groups.

Conclusion

A case study accompanied by a review of the literature was conducted to ascertain appropriate methodologies and tools to assemble two reference groups, peer institutions and a set of aspirants. The case study was conducted at a small private non-profit liberal arts institution.

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Nonetheless, the case study depicted a fairly generic model of reference group formation. The case study represented a structure of implementation that can be adapted to most reference group compilations.

A set of peer and aspirant institutions were identified as the result of a deliberate and comprehensive process. This included the selection of an original set of institutions and an examination of the most pertinent variables to use in the analyses. Alternatively, confounding and irrelevant information and analyses were eliminated reducing both the effort and data required. The disparity in purpose of the two reference groups necessitated the use of two different statistical procedures, nearest neighbor and cluster analysis, for their formation. That said, the cluster analysis failed to produce a reasonable number of aspirant institutions. Instead, an aspirant index was devised to further pinpoint appropriate aspirant institutions.

This case study demonstrated that institutional characteristics are not sufficient criteria to select peer institutions. A multidimensional approach of determining institutional peers that are similar on both the parameters that reflect institutional performance priorities and data elements that are indicative of those priorities is superior to peer selection based on generic institutional characteristics. Moreover, formative consultations of faculty and staff on the peer selection design validated and added credibility to the final peer and aspirant lists. As a result, stakeholder input, review of previous research, and implemented statistical techniques produced the most suitable set of peer and aspirant institutions.

Availability of data from IPEDS and other sources continues to expand. In addition, linked information from diverse resources is readily available (Trainer, 2008). Coupled with an increase in the public demand for accountability, both are complicit in the increased use of peer comparisons. However, direction on methodology is inconclusive, hindered by a paucity of

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previous studies. Posited is that the procedures documented in this case study are potentially generalizable to a wide array of institution types. Again, because of the dearth of previous studies, this can insinuated but not corroborated. Peer selection models, differentiated by institutional type and function could evolve with additional evidence.

Further, the impact of peer comparisons on institutional quality and improvement is unknown. Little guidance exists on the assessment of peer selection and subsequent peer comparisons (Powell, Gilleland Suitt, & Pearson, 2012). In other words, verification of the effectiveness of peer comparisons are lacking. Further research should evaluate the effects of peer comparisons, if any, on institutional quality.

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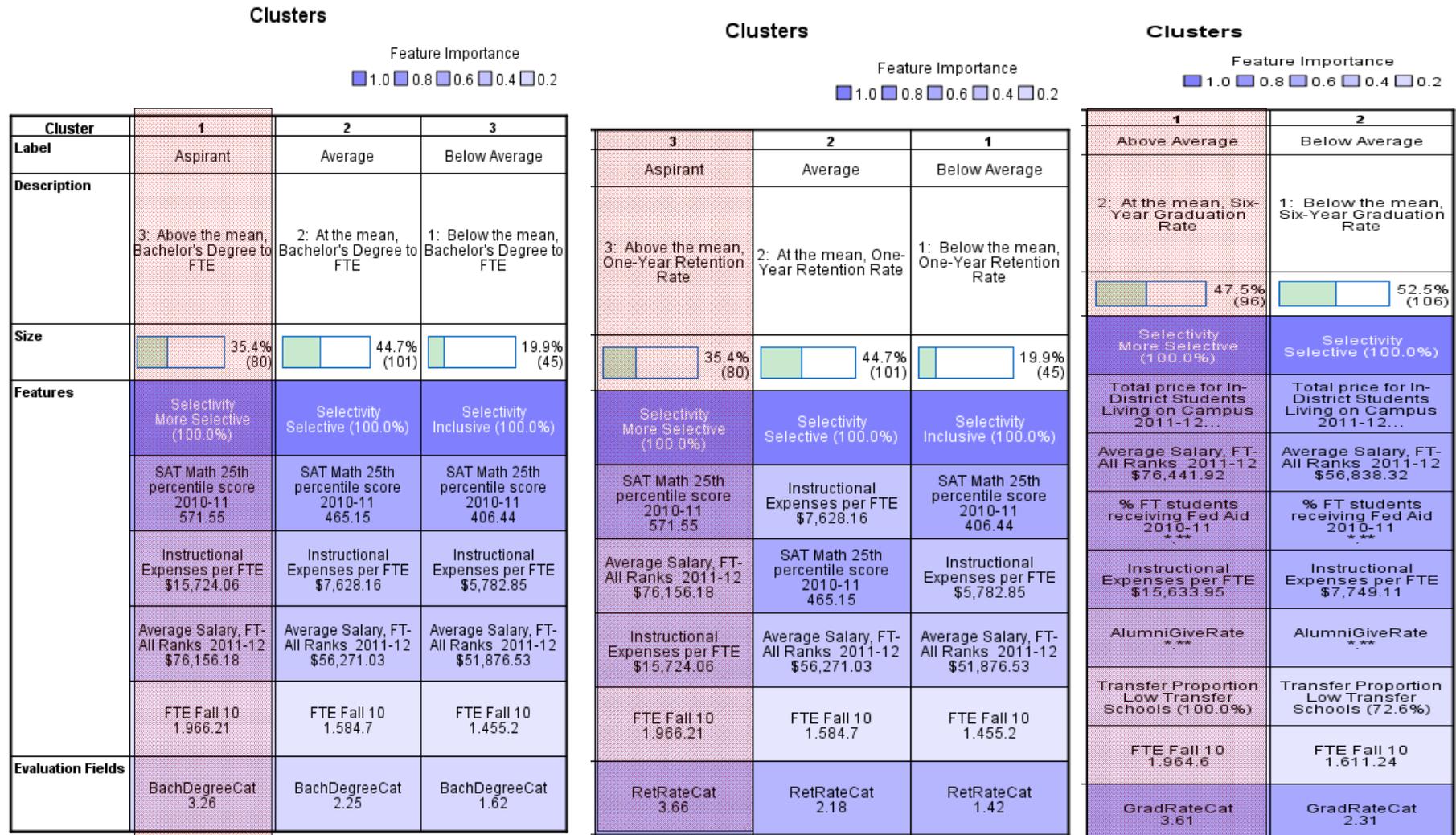
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Figure 1

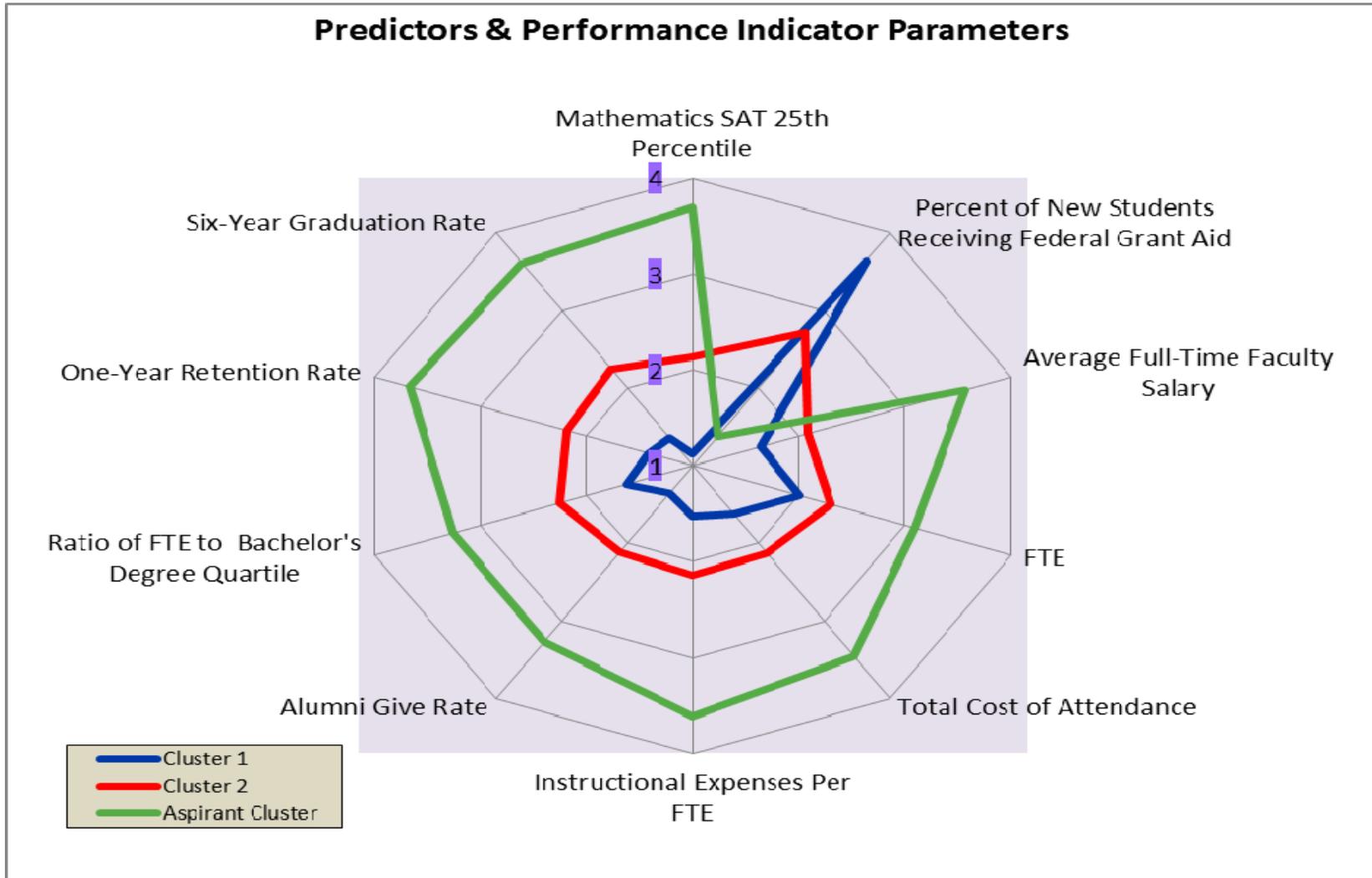
Cluster Size and Means for Each Cluster Associated with the Evaluation Fields*



* Red highlight indicates best or "aspirant" cluster

Figure 2

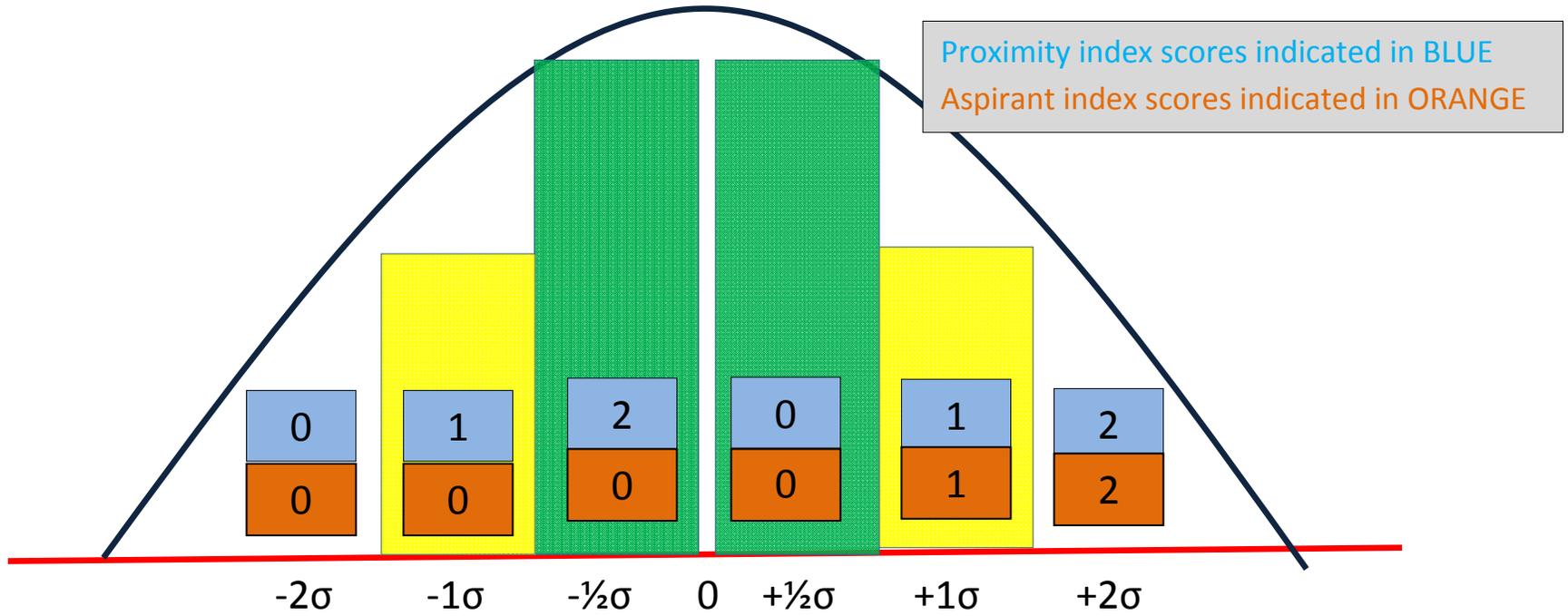
Cluster Size and Means for Each Cluster Associated with the Evaluation Fields*



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Figure 3

Proximity and Aspirant Index Numeric Assignments for Differences Between Siena College and Institution



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Table 1

Counts, Means, and Standard Deviations for the Initial Set of Peers, Potential Reference Groups, and Siena College

Variable	Reference Group-All			Siena Mean
	N	Mean	Standard Deviation	
Applicants per FTE	271	1.71	.93	2.94
Percent Admitted	271	60.40%	17.71%	48.00%
Admissions Yield	271	31.27%	13.75%	17.00%
Percent of First Time Federal Grant Aid Students	285	40.30%	20.10%	24.00%
25 th Percentile Critical Reading SAT	225	486.11	78.90	510
75 th Percentile Critical Reading SAT	225	599.57	78.59	610
25 th Percentile Mathematics SAT	231	490.10	75.22	530
75 th Percentile Mathematics SAT	231	596.09	73.82	630
Average Faculty Salary	286	\$61,955	\$15,133	\$80,668
Percent of Full-Time Faculty	278	60.89%	19.33%	64.00%
Percent of Classes with 20 or Less Students	247	63.56%	9.96%	42.00%
Percent of Faculty with Terminal Degree	240	81.95%	14.51%	89.00%
FTE	286	1,671	627	3,310
Unduplicated Total Enrollment Per FTE	286	1.09	.13	1.01
Estimated Fall Enrollment Per FTE	286	1.09	.20	1.03
Total Price of Attendance	282	\$40,328	\$9,549	\$43,874
Instruction Expenses Per FTE	295	\$10,036	\$5,976	\$8,390
Endowment FASB Per FTE	283	\$69,278	\$128,745	\$36,819
Alumni Giving Rate	240	21.89%	11.89%	17.00%
Bachelor Degrees Conferred Per FTE	286	.20	.04	.24
One-Year Retention Rate	286	76.63%	12.25%	87.23%
Six-Year Graduation Rate	286	60.67%	18.69%	84.82%

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Table 1 (continued)

Counts, Means, and Standard Deviations for the Initial Set of Peers, Potential Reference Groups, and Siena College

Variable	Reference Group-Catholic			Siena Mean
	N	Mean	Standard Deviation	
Applicants Per FTE	25	1.39	.72	2.94
Percent Admitted	25	67.60%	13.67%	48.00%
Admissions Yield	25	30.36%	13.34%	17.00%
Percent of First Time Federal Grant Aid Students	27	37.41%	14.35%	24.00%
25 th Percentile Critical Reading SAT	16	467.19	45.24	510
75 th Percentile Critical Reading SAT	16	589.25	50.00	610
25 th Percentile Mathematics SAT	18	472.56	47.59	530
75 th Percentile Mathematics SAT	18	575.72	51.26	630
Average Faculty Salary	27	\$59,480	\$11,465	\$80,668
Percent of Full-Time Faculty	27	55.75%	16.25%	64.00%
Percent of Classes with 20 or Less Students	25	60.56%	12.16%	42.00%
Percent of Faculty with Terminal Degree	24	80.17%	12.32%	89.00%
FTE	27	1,670	626	3,310
Unduplicated Total Enrollment Per FTE	27	1.14	.14	1.01
Estimated Fall Enrollment Per FTE	27	1.16	.16	1.03
Total Price of Attendance	27	\$40,463	\$5,577	\$43,874
Instruction Expenses Per FTE	27	\$7,924	\$3,247	\$8,390
Endowment FASB Per FTE	26	\$25,757	\$128,745	\$36,819
Alumni Giving Rate	25	20.12%	8.57%	17.00%
Bachelor Degrees Conferred Per FTE	286	.20	.04	.24
One-Year Retention Rate	27	78.78%	9.62%	87.23%
Six-Year Graduation Rate	27	62.33%	16.48%	84.82%

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Table 1 (continued)

Counts, Means, and Standard Deviations for the Initial Set of Peers. Potential Reference Groups, and Siena College

Variable	Reference Group-Baccalaureate*			Siena Mean
	N	Mean	Standard Deviation	
Applicants Per FTE	111	1.72	.90	2.94
Percent Admitted	108	64.54%	14.60%	48.00%
Admissions Yield	108	28.14%	11.87%	17.00%
Percent of First Time Federal Grant Aid Students	111	40.25%	18.96%	24.00%
25 th Percentile Critical Reading SAT	92	470.17	54.76	510
75 th Percentile Critical Reading SAT	92	591.05	62.97	610
25 th Percentile Mathematics SAT	93	478.28	53.52	530
75 th Percentile Mathematics SAT	93	589.54	60.00	630
Average Faculty Salary	110	\$60,506	\$9,164	\$80,668
Percent of Full-Time Faculty	110	62.32%	15.61%	64.00%
Percent of Classes with 20 or Less Students	106	60.30%	9.81%	42.00%
Percent of Faculty with Terminal Degree	103	83.53%	10.78%	89.00%
FTE	111	1,746	630	3,310
Unduplicated Total Enrollment Per FTE	111	1.07	.08	1.01
Estimated Fall Enrollment Per FTE	111	1.06	.11	1.03
Total Price of Attendance	111	\$38,920	\$7,659	\$43,874
Instruction Expenses Per FTE	111	\$8,922	\$3,038	\$8,390
Endowment FASB Per FTE	111	\$40,609	\$60,827	\$36,819
Alumni Giving Rate	101	20.20%	8.29%	17.00%
Bachelor Degrees Conferred Per FTE	111	.20	.04	.24
One-Year Retention Rate	111	76.74%	10.13%	87.23%
Six-Year Graduation Rate	111	60.90%	15.89%	84.82%

* Baccalaureate Carnegie Classifications with No or Some Graduate Coexistence

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Table 1 (continued)

Counts, Means, and Standard Deviations for the Initial Set of Peers, Potential Reference Groups, and Siena College

Variable	Reference Group-Highly Residential*			Siena Mean
	N	Mean	Standard Deviation	
Applicants Per FTE	236	1.78	.89	2.94
Percent Admitted	230	59.56%	18.20%	48.00%
Admissions Yield	230	29.44%	11.91%	17.00%
Percent of First Time Federal Grant Aid Students	236	36.60%	18.95%	24.00%
25 th Percentile Critical Reading SAT	193	496.29	78.91	510
75 th Percentile Critical Reading SAT	193	609.84	78.10	610
25 th Percentile Mathematics SAT	196	500.67	75.16	530
75 th Percentile Mathematics SAT	196	607.02	72.29	630
Average Faculty Salary	235	\$64,558	\$14,663	\$80,668
Percent of Full-Time Faculty	229	63.29%	9.34%	64.00%
Percent of Classes with 20 or Less Students	219	60.30%	9.81%	42.00%
Percent of Faculty with Terminal Degree	212	83.66%	13.02%	89.00%
FTE	236	1,788	594	3,310
Unduplicated Total Enrollment Per FTE	236	1.06	.09	1.01
Estimated Fall Enrollment Per FTE	236	1.06	.08	1.03
Total Price of Attendance	236	\$41,777	\$9,478	\$43,874
Instruction Expenses Per FTE	235	\$36,671	\$10,786	\$8,390
Endowment FASB Per FTE	236	\$79,851	\$138,209	\$36,819
Alumni Giving Rate	219	22.97%	11.82%	17.00%
Bachelor Degrees Conferred Per FTE	236	.21	.04	.24
One-Year Retention Rate	236	78.40%	11.79%	87.23%
Six-Year Graduation Rate	236	63.42%	17.91%	84.82%

* Small or Medium Size Carnegie Classifications with Highly Residential

PEER AND ASPIRANT ANALYSIS

Table 1 (continued)

Counts, Means, and Standard Deviations for the Initial Set of Peers, Potential Reference Groups, and Siena College

Variable	Reference Group-Low Transfer*			Siena Mean
	N	Mean	Standard Deviation	
Applicants Per FTE	182	1.89	.88	2.94
Percent Admitted	181	58.77%	18.58%	48.00%
Admissions Yield	181	28.92%	11.47%	17.00%
Percent of First Time Federal Grant Aid Students	182	30.77%	14.15%	24.00%
25 th Percentile Critical Reading SAT	152	518.53	72.17	510
75 th Percentile Critical Reading SAT	152	634.70	65.20	610
25 th Percentile Mathematics SAT	154	524.64	65.30	530
75 th Percentile Mathematics SAT	154	630.14	60.33	630
Average Faculty Salary	182	\$67,872	\$14,436	\$80,668
Percent of Full-Time Faculty	175	66.40%	15.72%	64.00%
Percent of Classes with 20 or Less Students	175	62.65%	8.80%	42.00%
Percent of Faculty with Terminal Degree	171	87.30%	11.00%	89.00%
FTE	182	1,814	611	3,310
Unduplicated Total Enrollment Per FTE	182	1.04	.08	1.01
Estimated Fall Enrollment Per FTE	182	1.05	.07	1.03
Total Price of Attendance	182	\$44,089	\$8,732	\$43,874
Instruction Expenses Per FTE	181	\$12,099	\$5,987	\$8,390
Endowment FASB Per FTE	182	\$951,712	\$151,678	\$36,819
Alumni Giving Rate	173	26.25%	10.54%	17.00%
Bachelor Degrees Conferred Per FTE	182	.22	.03	.24
One-Year Retention Rate	182	82.74%	8.99%	87.23%
Six-Year Graduation Rate	192	69.88%	14.04%	84.82%

* Carnegie Classifications with Low Transfer Proportions

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Table 1 (continued)

Counts, Means, and Standard Deviations for the Initial Set of Peers, Potential Reference Groups, and Siena College

Variable	Reference Group-More Selective*			Siena Mean
	N	Mean	Standard Deviation	
Applicants Per FTE	97	2.18	.91	2.94
Percent Admitted	97	52.27%	20.03%	48.00%
Admissions Yield	97	28.33%	8.56%	17.00%
Percent of First Time Federal Grant Aid Students	97	22.01%	7.35%	24.00%
25 th Percentile Critical Reading SAT	80	569.36	58.32	510
75 th Percentile Critical Reading SAT	80	682.85	42.48	610
25 th Percentile Mathematics SAT	80	571.55	54.11	530
75 th Percentile Mathematics SAT	80	675.10	44.73	630
Average Faculty Salary	97	\$76,346	\$13,620	\$80,668
Percent of Full-Time Faculty	91	74.14%	12.92%	64.00%
Percent of Classes with 20 or Less Students	96	64.04%	8.46%	42.00%
Percent of Faculty with Terminal Degree	96	92.36%	8.46%	89.00%
FTE	97	1,967	602	3,310
Unduplicated Total Enrollment Per FTE	97	1.02	.05	1.01
Estimated Fall Enrollment Per FTE	97	1.02	.04	1.03
Total Price of Attendance	95	\$49,402	\$6,716	\$43,874
Instruction Expenses Per FTE	97	\$15,596	\$5,980	\$8,390
Endowment FASB Per FTE	97	\$154,350	\$831,284	\$36,819
Alumni Giving Rate	96	31.11%	10.27%	17.00%
Bachelor Degrees Conferred Per FTE	97	.23	.02	.24
One-Year Retention Rate	97	88.86%	5.66%	87.23%
Six-Year Graduation Rate	97	79.23%	9.59%	84.82%

* More Selective Carnegie Classification

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Table 2

Counts, Means, and Standard Deviations for Schools with Low Transfer and High Selectivity for the Baccalaureate Reference Group and Siena College

Variable	Reference Group			Siena Mean
	N	Mean	Standard Deviation	
Applicants Per FTE	35	1.77	.94	2.94
Percent Admitted	35	65.71%	14.42%	48.00%
Admissions Yield	35	26.14%	8.43%	17.00%
Percent of First Time Federal Grant Aid Students	35	25.63%	7.00%	24.00%
25 th Percentile Critical Reading SAT	32	522.78	33.50	510
75 th Percentile Critical Reading SAT	32	648.84	21.17	610
25 th Percentile Mathematics SAT	32	530.19	30.68	530
75 th Percentile Mathematics SAT	32	645.97	29.88	630
Average Faculty Salary	35	\$67,489	\$7,422	\$80,668
Percent of Classes with 20 or Less Students	35	59.14%	9.32%	42.00%
Percent of Faculty with Terminal Degree	35	89.20%	5.89%	89.00%
FTE	35	2,070	731	3,310
Unduplicated Total Enrollment Per FTE	35	1.04	.04	1.01
Estimated Fall Enrollment Per FTE	35	1.02	.06	1.03
Total Price of Attendance	35	\$44,227	\$5,089	\$43,874
Instruction Expenses Per FTE	35	\$11,357	\$2,745	\$8,390
Endowment FASB Per FTE	34	\$55,080	\$57,237	\$36,819
Percent of Full-Time Faculty	34	67.76%	11.73%	64.00%
Alumni Giving Rate	34	24.68%	6.23%	17.00%
Bachelor Degrees Conferred Per FTE	35	.23	.02	.24
One-Year Retention Rate	35	85.66%	5.28%	87.23%
Six-Year Graduation Rate	35	73.54%	8.49%	84.82%

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Table 3

Correlations Among the Admissions Input Variables

	Admits per FTE	Percent Admitted	Admission Yield	SAT CR-25	SAT CR-75	SAT MA-25	SAT MA-75
Admits Per FTE		-.60	-.38	.45	.36	.45	.35
Percent Admitted			-.19	-.49	-.39	-.48	-.38
Admission Yield				-.04	-.04	-.07	-.06
25 th Percentile Critical Reading SAT (CR)					.95	.96	.91
75 th Percentile Critical Reading SAT (CR)						.93	.94
25 th Percentile Mathematics SAT (MA)							.95

All significant at $p < .001$

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Table 4

Correlations Among the Faculty Input Variables

	Average Faculty Salary	Percent Full Time Faculty	Percent of Classes < 20	Percent of Faculty with Terminal Degree
Average Faculty Salary		.42*	.10	.62*
Percent of Full-Time Instruction			-.10	.41*
Percent of Classes with 20 or Less Students				-.03

* Significant at $p < .001$

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Table 5

Correlations Among the Enrollment Input Variables

	FTE	12 Months/FTE	Fall Enrollment/FTE
FTE		-.26	-.26
12 Months/FTE			.87

All significant at $p < .001$

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Table 6

Correlations Among the Carnegie Classifications Input Variables

	Graduate Presence	Size/ Setting	Selectivity	Fall Transfer Proportion
Graduate Presence		-.12*	-.16**	.13
Size/Setting			.43***	-.33***
Selectivity				-.38***

* Significant at $p < .05$

** Significant at $p < .01$

*** Significant at $p < .001$

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Table 7

Correlations Among the Finance Input Variables

	Total Price of Attendance	Instructional Expense Per FTE	Endowment Per FTE	Alumni Give Rate
Total Price of Attendance		.76	.47	.64
Instructional Expenses Per FTE			.78	.72
Endowment Per FTE				.60

All significant at $p < .001$

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Table 8

Largest Absolute Standardized Beta Weights for the OLS Regression Models for the Three Performance Indicators: Ratio of Conferred Bachelor's Degree to FTE, One-Year Retention Rate, and Six-Year Graduation Rate for Each Variable Category

Category	Variable*	Standardized Beta Weight
Ratio of Conferred Bachelor's Degree to FTE		
Admissions	25 th Percentile Mathematics SAT	.416
Faculty	Average Faculty Salary	.416****
Enrollment	Estimated Fall Enrollment to FTE	-.296*
Institutional Characteristics	Selectivity	.453****
Finance	Instructional Expenses	.468****
One-Year Retention Rate		
Admissions	25 th Percentile Mathematics SAT	.311
Faculty	Average Faculty Salary	.622****
Enrollment	FTE	.315****
Institutional Characteristics	Selectivity	.616****
Finance	Instructional Expenses	.395****
Six-Year Graduation Rate		
Admissions	Percent of First Time	
	Federal Grant Aid Students	-2.654***
Faculty	Average Faculty Salary	.630****
Enrollment	FTE	.303****
Institutional Characteristics	Selectivity	.613****
	Transfer Proportion	-.184****
Finance	Total Price of Attendance	.303****
	Instructional Expenses	.361****
	Alumni Giving Rate	.338****

* Standardized beta weights are from different regression models

** $p \leq .05$

*** $p \leq .01$

**** $p \leq .001$

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Table 9

OLS Regression Models for the Three Performance Indicators: Ratio of Conferred Bachelor's Degree to FTE, One-Year Retention Rate, and Six-Year Graduation Rate

Category	Variable*	Standardized Beta Weight
Ratio of Conferred Bachelor's Degree to FTE		
Admissions	25 th Percentile Mathematics SAT	.348*
Faculty	Average Faculty Salary	-.142
Enrollment	Estimated Fall Enrollment to FTE	-.053
Institutional Characteristics	Selectivity	.282**
Finance	Instructional Expenses	.166
One-Year Retention Rate		
Admissions	25 th Percentile Mathematics SAT	.465***
Faculty	Average Faculty Salary	.135
Enrollment	FTE	.064
Institutional Characteristics	Selectivity	.301***
Finance	Instructional Expenses	.065
Six-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***
	Transfer Proportion	-.104**
Finance	Total Price of Attendance	.007
	Instructional Expenses	.224***
	Alumni Giving Rate	.186*

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

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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 75 th Percentile Score	2010-11	Admissions	IPEDS
Percent of Full-Time Undergraduates Receiving Federal Grant Aid	2010-11	Admissions (Financial Aid)	IPEDS
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 Full-Time Faculty Holding Terminal Degrees	2011-12	Faculty	US News & World Report
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
<i>Carnegie Classification - Basic (Arts & Sciences or Diverse Fields)</i>	--	Institutional Characteristic	IPEDS
<i>Carnegie Classification - Enrollment Size & Setting</i>	--	Institutional Characteristic	IPEDS
<i>Carnegie Classification - Focus/Extent of Graduate Focus</i>	--	Institutional Characteristic	IPEDS
<i>Carnegie Classification - Proportion of Graduate Presence</i>	--	Institutional Characteristic	IPEDS
<i>Carnegie Classification- Undergraduate Profile (Transfer and Full-Time proportions)</i>	--	Institutional Characteristic	IPEDS
Geographic Region	--	Institutional Characteristic	IPEDS
Level	--	Institutional Characteristic	IPEDS
Religious Affiliation	--	Institutional Characteristic	IPEDS
Tribal College	--	Institutional Characteristic	IPEDS
Endowment (GASB)	2009-10	Financial	IPEDS
Instructional Expenses Per FTE (GASB)	2009-10	Financial	IPEDS
Total Price for In-District Students Living on Campus	2011-12	Financial	IPEDS
Alumni Giving Rate	2011-12	Financial	US News & World Report
Bachelor's Degrees Conferred	2010-11	Performance Indicator (Completions)	IPEDS
Retention Rates, Total Cohort (One Year)	Fall 2010	Performance Indicator (Student Success)	IPEDS
Graduation Rates, Total Cohort (Six Years)	As of 8/31/10	Performance Indicator (Student Success)	IPEDS

PEER AND ASPIRANT ANALYSIS

Appendix B

Data Element Used for Peer and Aspirant Selection: Descriptions

Admissions

Admit Yield- Number of enrolled divided by the number admitted.

Number of Applicants, Total - Number of first-time, degree/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 the total applicants.

25th percentile Critical Reading SAT score- 25th percentile Critical Reading score. Includes new students admitted the summer prior to that fall.

75th percentile Critical Reading SAT score - 75th percentile Critical Reading score. Includes new students admitted the summer prior to that fall.

25th Percentile Mathematics SAT score - 25th percentile Mathematics score. Includes new students admitted the summer prior to that fall.

75th percentile Mathematics SAT score - 75th percentile Mathematics score. Includes new students admitted the summer prior to that fall.

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's degree program, or a vocational or technical program below the baccalaureate.

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%.

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.

Enrollment:

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

PEER AND ASPIRANT ANALYSIS

Full Time Equivalent (FTE)- The full-time equivalent of the institution's part-time enrollment is estimated and then added to the full-time enrollment of the institution. The full-time equivalent 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.

Institutional Characteristics

Carnegie Classification- Basic (Arts & Sciences or Diverse Fields) – (Baccalaureate Colleges). Includes institutions where baccalaureate degrees represent at least 10 percent of all undergraduate degrees and 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 is classified by very small, small, medium, large. Also indicates proportion of students living in campus housing.

Carnegie Classification- Proportion of graduate degrees conferred

Carnegie Classification- Undergraduate Profile - used in this case study to determine selectivity

Geographic Region –US 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 non-profit 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.

Financial

Endowment (FASB)- Endowment assets (yearend) per FTE enrollment for public and private not-for-profit institutions using FASB standards is derived as follows: Endowment assets (yearend) 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 are funds which the donor has stipulated that 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 which 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.

PEER AND ASPIRANT ANALYSIS

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 service 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 non-credit activities. Excludes expenses for academic administration if the primary function is administration (e.g., academic deans).

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 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.

Performance Indicators

Bachelor's Degrees Conferred- Awards/degrees conferred.

Graduation Rates, Total Cohort (Six Years)- The number of students from the adjusted 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 (One 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 re-enrolled at the institution as either full- or part-time in the current year.

PEER AND ASPIRANT ANALYSIS

Appendix C

Siena College Near Peer and Almost Peer Institutions

Near Peers		Almost Peers	
Institution	State	Institution	State
Allegheny College	PA	Augustana College	IL
Cedarville University	OH	Birmingham Southern College	AL
Champlain College	VT	Calvin College	MI
College of Saint Benedict	MN	Carroll College	MT
Concordia College at Moorhead	MN	Goucher College	MD
Cornell College	IA	Hampshire College	MA
Gordon College	MA	Houghton College	NY
Hartwick College	NY	Lake Forest College	IL
Hope College	MI	Lasell College	MA
Juniata College	PA	Linfield College-McMinnville Campus	OR
Messiah College	PA	Luther College	IA
Oglethorpe University	GA	Muhlenberg College	PA
Saint Michael's College	VT	Saint Anselm College	NH
Stonehill College	CT	Saint Vincent College	PA
Susquehanna University	PA	Southwestern University	TX
Transylvania University	KY	St Olaf College	MN
Wentworth Institute of Technology	MA	Trine University	IN
William Jewell College	MO	Washington College	MD
Wofford College	SC	Westmont College	CA

PEER AND ASPIRANT ANALYSIS

Appendix D

Siena College Aspirant Institutions

Tier I Aspirants	
Institution	State
Amherst College	MA
Bowdoin College	ME
Carleton College	MN
Claremont McKenna College	CA
Colby College	ME
Gustavus Adolphus College	MN
Hamilton College	NY
Kenyon College	OH
Pomona College	CA
Saint Mary's College	IN
Swarthmore College	PA
Vassar College	NY
Williams College	MA

Tier II Aspirants	
Institution	State
Barnard College	NY
Beloit College	WI
Bucknell University	PA
Centre College	KY
Colgate University	NY
Davidson College	NC
Denison University	OH
DePauw University	MN
Dickinson College	PA
Furman University	SC
Gettysburg	PA
Grinnell College	IA
Haverford College	PA
Kalamazoo College	MI
Lafayette College	PA
Macalester College	MN
Oberlin College	OH
Occidental College	CA
Pitzer College	CA
Reed College	OR
Rhodes College	TN
Saint Johns University	MN
Skidmore College	NY
The College of Wooster	MA
Trinity College	CT
Wellesley College	MA
Whitman College	WA