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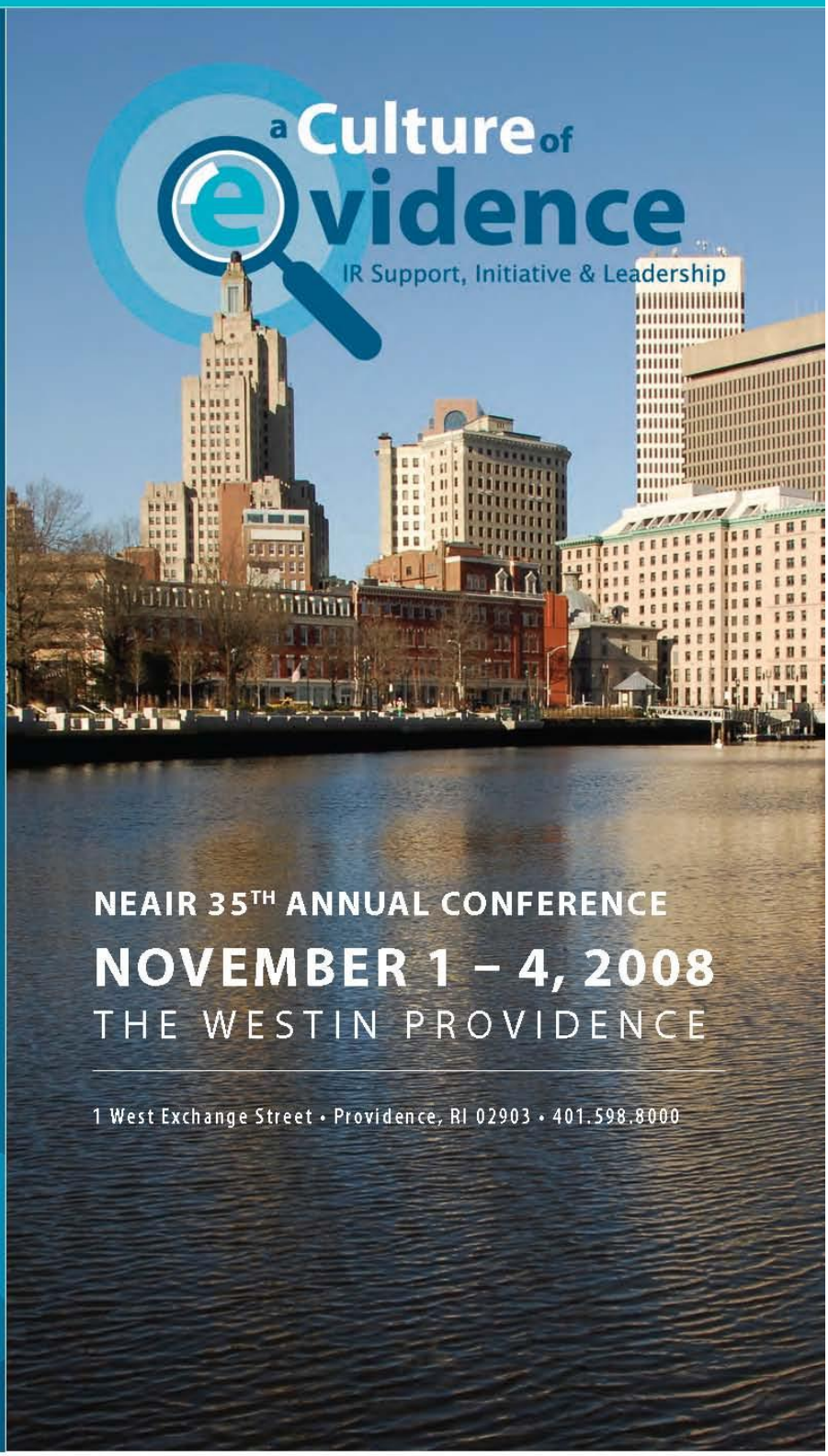

November 1, 2008

Dear NEAIR Colleagues,

Welcome to Providence and the 35th Annual NEAIR Conference!

The 2008 Conference Planning Team, led by Program Chair, Cherry Danielson; Local Arrangements Chair, Cate Rowan; Associate Program Chair, Leon Hill; Pre-conference Workshop Coordinator, Steve Thorpe; and Vendor Coordinator, Liz Deignan has put countless hours into this year's program - organizing, coordinating and planning, right down to the smallest detail. This marvelously talented team has put together a wonderful program for you. I would like to take this opportunity to thank them on behalf of NEAIR for sharing their time and talents with us. I would also like to thank Beth Simpson, our dedicated and talented administrative assistant. Beth has been invaluable in this year's conference planning process and has been immensely helpful to me and the team.

The success of the conference is now in your hands as both conference attendees and presenters. We each need to engage actively in everything that the conference has to offer. I trust that you will enjoy this year's theme "A Culture of Evidence: IR Support, Initiative, and Leadership" and I know that you will find the speakers, sessions, and networking to be positive experiences.

What can you do over the next 4 days? O Attend sessions. O Present thought provoking material. O Ask penetrating questions. O Launch new ideas. O Challenge old assumptions. O Network with colleagues. O Take time to relax, refresh, renew, reenergize. O Continue the NEAIR tradition of extending a welcoming hand of friendship to conference newcomers or if you are new to NEAIR, introduce yourself to an "old-timer." O Spend time with vendors. O Enjoy the entertainment. O Explore Providence. **But most important of all, have a good time!**

NEAIR is a wonderful organization that is made up of talented professionals such as you. It has been my pleasure to serve as your president this year. If there is anything that I can do to make your conference experience enjoyable, please stop me and ask. I extend to you my best wishes for a great conference and an enjoyable visit to Providence.

Sincerely,

Denise A. Krallman
NEAIR President
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** Winner 2008 Best New Paper*

Acknowledgment

I am proud to present the NEAIR 35th Annual Conference Proceedings that records research work compiled by our members and presented at the 2008 annual conference. This year, 14 NEAIR Colleagues and their co-authors submitted eight conference papers to be included in the Proceedings. In addition to these research papers, 19 presentations are available in the Members Only portion of the NEAIR website. I would like to thank Jean Marriott for all of her help in educating me regarding the duties of the Publication Chair. Thank you also to Beth Simpson for all of her support and help throughout the year.

Bonnie Thomas
Publications Chair, 2007-08
Carroll Community College

AN ODE TO NORTHEAST AIR ON THE OCCASION OF ITS 35TH ANNIVERSARY CONFERENCE

J. Fredericks Volkwein, Ph.D.
Professor of Education
Senior Scientist
Penn State University

In Williamstown, Mass, the year Nineteen Seventy-Four,
Thirty-three colleagues gathered to open the door.
Our own Lois Torrance was the Keynote Speaker,
She was a model information seeker.
While the annual presence of those **Charter Members** has dwindled from then until now,
We still have one in attendance – Richard Heck, please take a bow.

This organization has grown over the years, through thick and through thin,
Blessed by good leadership from above, and by good colleagueship from within.
For example, the list of national AIR Presidents
Includes nine former NEAIR residents.
And our administrative record appears rather pretty,
Especially if you like governance by Steering Committee.

Like the field itself, our conferences have been growing.
It seems there is always something new worth knowing.
And our conference Keynote speakers have been very hardy,
Including the likes of Peterson, Ewell, Gallup, Zemsky, and Lombardi.

I'm sure that this is no panacea,
But we've had multiple conferences in each city that begins with the letter "P"
-- **P**rovidence, **P**rinceton, **P**ittsburgh, **P**ortsmouth, and **P**hiladelphia.

Our organizational profile appears quite robust,
With official trappings building membership trust.
We give research and travel grants as merit affords,
Also Distinguished Service and Best Paper Awards.
AIR connectedness provides helpful tech support
And a wealth of publications to import.
To show a proper environmental scan,
We even have our very own strategic plan.
And everyday, with each organizational breath,
We should thank our lucky stars for a Simpson named Beth.

Has your Provost thrown you a curve?
Seek help on the list-serve.
Did your assessment plan flop?
Check out an upcoming workshop.
Do you need to respond to a budgetary winter?
If so, come to us for a good mentor.
Does your job security make you nervous?
We'll connect you to a career planning service.

From projecting enrollments to outcomes assessment,
Sharing our work and problems together brings refreshment.
The challenges of institutional analysis,
Also protect us from mental paralysis.

So if accreditation is your recent obsession,
Or if you need help with logistic regression,
NEAIR is the professional resource of choice,
Let it help you develop your quantitative voice.

So let us unleash celebrations galore.
Happy 35th, may there be many more.

ASSESSING INSTITUTIONAL EFFECTIVENESS: THE MISSION ENGAGEMENT INDEX AS A MEASURE OF PROGRESS ON MISSION GOALS

Ellen M. Boylan, Ph.D.
Director of Institutional Research and Assessment

Marywood University
Office of Planning and Institutional Research

Abstract

As part of continuing research supported by the Teagle Foundation on mission and student learning outcomes, this paper describes intermediate steps in the development of a new performance measure for institutions called the Mission Engagement Index (MEI). The purpose of the MEI is to enable institutions to assess the relationship between their lived mission and student learning outcomes and, further, to allow a comparison of expected versus actual outcomes on institutional results. The data obtained to develop the measure is from institutions participating in an annual mission consortium administered in conjunction with the National Survey of Student Engagement (NSSE). The member schools appended a twenty question Mission Perception Inventory (MPI) to the NSSE and administered it one or more times during the period 2004-2007. Discussed are the size and strength of the data set, the statistical approach selected for developing the model, a process for determining the dependent and independent variables to be analyzed based on respondent and institutional characteristics, and possible outcomes resulting from statistical analyses. The Mission Engagement Index (MEI) subsequently developed will help to assess activity intended to advance institutional mission on college campuses, and serve as a reflection of the impact of the institutional environment on student learning outcomes.

Introduction

The mission statement of a college or university can be rolled up in a dry scroll and lost atop a library shelf or become words of vibrant inspiration that enervate the life and purpose of an institution. The latter circumstance is much more likely when clear alignment exists between an institution's mission and goals and the ways they are realized in action. With regard to student learning outcomes, action takes form first in clearly articulated objectives for student learning and development (Chickering, 1993) and second, in the creation of an environment of instruction and activity that helps students achieve. Think of these actions as institutional inputs, however, and the question arises about how to measure their effect. The Mission Engagement Index (MEI) being developed here is intended to serve as a measure of the relationship between institutional mission and student learning outcomes. The theoretical framework and procedure for obtaining the necessary data to build the Index is described first, followed by a review of conditions that must be met before developing a statistical model, and then a discussion of possible uses of the MEI for tracking and comparing performance.

This research addresses the need of postsecondary institutions for adequate measures of mission effectiveness, particularly in relation to student learning. The fundamental assumption of the research is that a measure to assess student perception of the learning environment relative to institutional mission constructs can be devised and, further, that scores on these measures are valid indicators of institutional performance on mission objectives. A set of 20 questions called the Mission Perception Inventory (MPI) were developed in 2004 to query college students about perceptions of the mission of their college. The larger survey vehicle for appending and distributing the MPI was the National Survey of Student Engagement (NSSE), which is administered nationally each year to participating institutions. According to Pike, Kuh & Gonyea (2003), the NSSE was designed to act as a process indicator that could help colleges and universities see connections between programs and activities and student learning outcomes. Similarly, the MPI is a process indicator because its purpose is to assess activity on campus meant to enhance the learning environment and, at the same time, the context where learning occurs. Validity and reliability testing conducted in earlier studies (Boylan, 2005, 2008) has investigated and affirmed the ability of the MPI to assess and reflect the learning environment.

An important assumption of this research is that sufficient cases exist for conducting the multiple regression analysis. Table 1 appearing later will indicate whether the required number of cases per independent variable has been achieved. Another important consideration is to make sure large standard error values are not observable in results by institution, and thereby assure that the characteristic of homoscedasticity (Glass, 1996, p. 180) is present.

The purpose of this research is to develop a performance measure, or index, that will have stronger interpretive utility than MPI mean score results, alone. Using exploratory multiple regression, a prediction equation will be developed for generating residual scores on MPI scale results and individual question items. Residual score results produced by the Mission Engagement Index (MEI) will allow institutions to compare predicted versus actual outcomes on mission items, thereby providing a more meaningful way of assessing their performance. A critical step in the process of developing the prediction equation will be selecting for inclusion the most appropriate independent variables, or institutional characteristics, for the model equation. In view of this challenge, and mindful of the need for a sufficiently large and reliable data set for this analytical endeavor, this study intends to answer the following research question: Can a Mission Engagement Index (MEI) be developed to describe causal relationships among variables that affect mission perception?

Review of the Literature

Sources of information on assessment in higher education abound on shelves and electronic platforms as close as a click away. More difficult to obtain are assessment tools for measuring mission effectiveness in colleges and universities, particularly as defined by regional accreditation bodies. In addition to accreditation challenges, there are escalating stakeholder demands for accountability (Ewell, 2007), so providing evidence of fulfilling institutional mission can be a key part of assessment reporting. A statement of mission that is parsed into institutional goals becomes a much more manageable template for measuring performance and progress.

Frequently found in institutional mission statements are goals about providing professional preparation, striving for academic excellence, and developing a sense of commitment to community service. Toutkoushian and Smart (2001) suggest that a student's experiences within the institutional environment correlate strongly with learning outcomes. The relation between institutional mission and student engagement and learning has been successfully measured using a methodology developed by Pike, Kuh, and Gonyea (2002).

It is important for an institution to have clearly articulated objectives for student learning and development (Chickering 1993). If the objectives are agreed upon and emphasized in oral and written communication, and are evident in the articulation of programs, a stronger sense of the institutional mission can be present. Knowledge of shared mission can unify the educational experience of students and define purpose for them within the institutional setting.

"Mission" is operationally defined for this research as the overall purpose and activity of an institution as articulated by the goals of the mission statement. This definition more accurately reflects the character and scope of activities engaged in by the institutions participating in mission research consortia, and is unlike the Carnegie Classification definition of mission found in popular publications like *America's Best Colleges,* the annual guide to colleges published by U.S. News and World Report, (2004, p.80).

Research by Pike, Kuh, and Gonyea (2002) on institutional mission concludes that mission constructs can be measured. The methodology used by the National Survey of Student Engagement (NSSE) for producing benchmarks, or scales, of "effective educational practice" (Kuh, 2001, p.13) is reflected in this mission research in the way factor scales have been produced.

An earlier limitation of this research having to do with reliance on a single closed consortium of participants for administration of the questions has been ameliorated. In 2008, a second and characteristically different consortium was added, allowing for further comparisons of outcomes by group. These data will be added to the inventory of study data for 2004-2007 consisting of more than 30,000 respondent cases obtained in 143 administrations from 83 unique institutions across the United States.

Table 1: Count of participating institutions and respondents by administration year.

	Institutions	First Year	Senior
2004	15	2,000	1,827
2005	16	1,279	1,332
2006	24	2,684	2,854
2007	36	4,533	4,331
	91	10,496	10,344
	(83 unique)		

Methodology

The Mission Perception Inventory was developed using a mixed method qualitative and quantitative research analysis. The question items were derived from mission statements of colleges initially participating in a 2004 NSSE mission consortium. Scale-format questions like those used in the NSSE instrument were used for the mission research questions, as well. After verifying the clarity of questions with constituents, the instrument was administered by appending it to the main NSSE questionnaire.

Giving evidence of mission effectiveness is requested of all member colleges by regional accreditation bodies (Middle States Commission, 2006). A deliberate effort was made to originate mission questions with equal utility for institutions of any affiliation or status.

Table 2: Items by subscales and overall Mission Perception Inventory (MPI) by administration year.

	2004	2005	2006	2007
	Number of items in factors			
Sense of Mission	8	10	10	10
Respect for Diversity	5	5	5	5
Individual Actions	2	0	0	0
Religious Practice	2	3	3	2
Mission Perception Inventory	17	18	18	19

The factor analytic method used in previous analysis leading to the current research on mission has been described (Boylan, 2008). For each year of administration of the mission questions, factor analysis of results employing Thompson's (2004) methodology indicates the presence of a highly reliable overall Mission Perception Inventory (MPI) scale consisting of up to19 items and two to four subscales within the MPI (figure 2). Strong subscales contain multiple items, but caution is advised when interpreting factors consisting of just two items (Tabachnick & Fidell, 1996).

The reliability of the MPI scale and subscales of Sense of Mission and Respect for Diversity were consistently high as measured via internal consistency coefficient alpha (Cronbach, 1951), as indicated in figure 3. To interpret the results of factor analysis, the rule of thumb is followed wherein only variables with loadings of .32 and above are interpreted (Tabachnick & Fidell, 1996). The greater the loading, the more the variable is a pure measure of the factor. Comrey and

Lee (1992) suggest that loadings in excess of .71 are considered excellent, .63 very good, .55 good, .45 fair, and .32 poor.

Table 3: Cronbach's reliability analysis of the Mission Perception Inventory (MPI) and subscales 2004-2007

Subscales	**2004**	**2005**	**2006**	**2007**
Sense of Mission	.87	.88	.88	.90
Respect for Diversity	.85	.84	.87	.86
Individual Actions	.67	n/a	n/a	n/a
Religious Practice	.62	.55	.54	.62
MPI scale	**.88**	**.89**	**.90**	**.91**

Until 2005, the National Survey of Student Engagement (NSSE) results by institution featured an Engagement Index showing predicted versus actual performance by institutions on the five NSSE benchmarks. The Engagement Index provided an added way of assessing institutional performance based on institutional characteristics and what might be expected considering a school's profile. The change in reporting was based on the decision by NSSE researchers to reflect participant results on the student level, rather than by the average institutional scores that were previously the basis of comparison (NSSE, 2008). Observations over several years of administering the NSSE revealed that between-institution variance had been small compared to within institution differences among students, a problem for schools with larger standard errors. Larger standard errors are usually the result of a lower number of respondents (2008). Consider, however, that the NSSE institute conducts analysis on tens of thousands of cases of data in one year, alone, far exceeding the mission data collected to date. Therefore, for this research, where participating schools have smaller enrollments and institutional characteristics are similar, it can still be considered a worthwhile exploration to develop an Engagement Index for mission effectiveness to assist institutional assessment initiatives.

An Engagement Index (EI) was developed for first-year college chemistry instruction online (Trasker et al, 2003) with the purpose of measuring student engagement with different instruction modes. The independent variables selected for the regression model include student characteristics, design of online delivery of instruction, and performance behaviors. Age, gender, enrollment status, learning styles, cognitive preference, teaching style for presenting material, time on reading feedback, and performance assessment were all independent variables selected to predict "engagement" in learning.

Developing the Prediction Equation

Independent variables to be explored for developing the Mission Engagement Index will be based on institutional characteristics of consortia participants. Two characteristics of participating institutions in consortia from 2004 to 2007 are illustrated in figure 1.

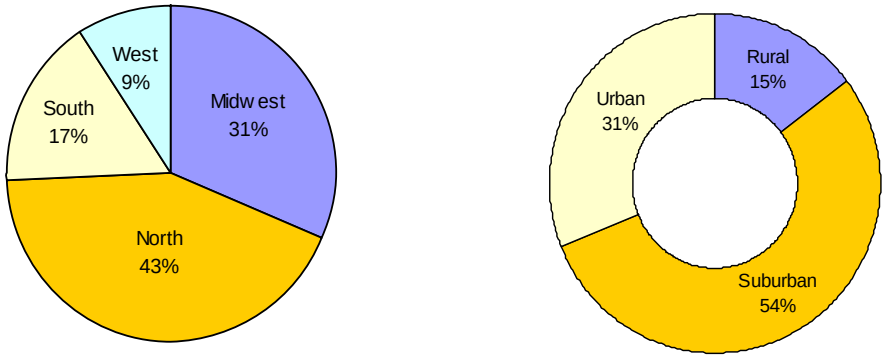

figure 1: Consortia institutions by region and ubanicity 2004-2007

The dependent variable for the prediction equation, or Mission Engagement Index (MEI), is the institution score on the Mission Perception Inventory factor. To determine independent variables and have confidence in the ability to conduct regression analysis, there must be a sufficient number of cases, or institutions, per each independent variable. According to Stevens (1992), "a recommended ratio of subjects to IV's of at least 15 to 1 will provide a reliable regression equation." With 83 unique institutions having participated, there is a sufficient number of "cases" for five IV's.

Table 4 shows the choices among independent variables that are available. Stepwise regression analysis will reveal the statistics on the variables which make the highest contribution to variance in the prediction and therefore make possible the determination of the most salient components of the index.

Table 4: Selecting independent variables (IVs) for regression analysis.

Institution	region	Carnegie Class	% resident	% female	% ethnic/ cau	UG enroll	% Part-time	Setting	% Accept
a	North	U Master's	39	61	95	2119	25	Suburb	74
b	Midwest	U Master's	33	67	70	928	40	Suburb	57
c	South	National U	32	68	39	4130	42	Suburb	54
d	South	Bacc.. Coll	43	57	76	1011	21	Rural	66
e	Midwest	U Master's	43	57	70	1692	23	Suburb	85
f	Midwest	Bacc. Coll	42	58	89	978	83	Urban	70
g	Midwest	U Master's	31	69	78	2985	37	Suburb	93
h	West	U Master's	32	68	23	1096	60	Urban	94
i	North	Bacc. Coll	92	58	62	8568	16	Suburb	42
j	Midwest	U Master's	28	72	91	1502	37	Urban	79
l	North	U Master's	24	76	79	1320	815	Suburb	60

Discussion

The conditions required for conducting regression analysis to develop a Mission Engagement Index (MEI) have required several years of consortium data collection in conjunction with the administration of the annual National Survey of Student Engagement (NSSE). This research promises to have utility and elegance for future applications as a result of several conditions that have been achieved: the internal consistency of the factors has been affirmed through repeat administrations and factor analysis of the data by year, the institution sizes relative to enrollment are reasonably varied and geographically diverse, and there are data sufficient to conduct regression analysis. It is concluded that a Mission Engagement Index can be developed and serve as a viable indicator of mission effectiveness for those institutions participating in mission research.

Future steps include, first, an *a priori* selection of independent variables for the regression analysis and subsequent exploration of alternatives. Once the best selection of variables has been made, further exploration of differences among institutions can be conducted and conclusions drawn about characteristics of strongest influence on student learning outcomes.

Acknowledgments: A two-year grant from the Teagle Foundation begun in 2007 makes possible the administrative and financial support to continue this research.

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BUILDING, SUSTAINING AND DEVELOPING RESEARCH UNIVERSITY FACULTY

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Introduction

This paper takes an institutional research perspective on the interconnected phenomena of recruitment, retention, and utilization of faculty at research universities, with particular emphasis on the changing mix of tenure track and contingent (i.e., fixed term) faculty members.[1] In this paper, we have three objectives. The first is to present both broad national data and detailed information from a particular institution – Penn State University – on powerful forces that are prompting research universities to rethink fundamental strategies about the core academic workforce. Our second objective is to offer ideas about how institutional researchers can support the work of provosts, deans, and department heads to address challenges in faculty recruitment, retention, and development, and the optimization of faculty workload and productivity. Our third objective, frankly, is to bring the attention of institutional researchers to what is emerging as a substantial and possibly transformative change facing public research universities.

This paper draws upon national data for United States research universities. While there is overlap among community colleges, liberal arts colleges, comprehensive

[1] A note on nomenclature: We use the term "tenure track" to refer to faculty members who have either been awarded tenure or who are eligible for tenure and who are working toward a tenure review. We use the terms "non-tenure track," "contingent," and "fixed term" interchangeably.

universities, and research universities, contextual factors are often specific to different academic market segments. We examine data and practices at Penn State in some depth, partly because we have access to the relevant data, and partly because it is useful and necessary to focus the discussion, and to provide examples of how institutional researchers can contribute at the institution level.

The topic has a strong practical component, addressing questions that are relevant to both scholars and academic administrators in higher education. What can academic administrators and researchers do to better understand faculty labor markets and the structure of faculty work? How can they help strengthen, continually renew, and effectively utilize their institutions' professoriate?

Faculty *Are* the University

There is a story that about 60 years ago, the president of Columbia University finished an address to the university community by presenting some of his ideas on the role of faculty within the university and better managing the faculty. A faculty member stood up and said, "Mr. President, with all due respect, the faculty *are* the university." The faculty member was professor Tsung-Dao Lee, a physicist who won the Nobel Prize in 1957. The president of Columbia at that time was the former Supreme Commander of the Allied forces in Europe, Dwight D. Eisenhower.

Another university president made an almost identical comment in an address at a different institution in the 1950s. That university president, who gave the faculty full recognition as "the backbone of every great institution," was Milton S. Eisenhower, Dwight's brother and the president of Penn State from 1950 – 1956 (Penn State, 1996).

There are reasons that these stories resonate, and why they provide a helpful starting point for this discussion of building, sustaining, and developing research university faculty. All organizations define and structure relationships with their labor force in some way – there is work to be done, and employees do it. However, faculty members in research universities are and are not "employees" in the same sense as in most other organizations. Academicians have considerable autonomy in deciding how they will spend their time and which courses they will teach, selecting research projects, choosing and evaluating their colleagues, and even influencing the criteria for performance evaluation. Faculty members are not necessarily "managed" in the way that we think of employees being managed in corporations or civil service or (as General Eisenhower learned) the military.

In this paper we will draw on some information that the planning and institutional research office at our university develops and shares, through various mechanisms, with audiences such as the provost and vice provosts, deans, the faculty senate, department heads, trustees, and more.

We will begin by very briefly highlighting findings from one of these analyses: a faculty exit study.

Faculty Exit Study

There is a substantial literature on faculty satisfaction which spans decades (e.g., Caplow & McGee, 1958; Toombs & Marlier, 1981; Garshore, Hibbard & Stocking, 1983; Moore & Gardner, 1992; Collaborative on Academic Careers in Higher Education 2007). We cannot adequately review that literature here. But in brief, it strongly suggests that institutions can learn much about and act upon the determinants of faculty satisfaction and behavior. Effective practices should draw, in part, on an understanding of what matters to faculty members, and how institutional policies affect decisions about career choices, personal and family concerns, professional mobility, and productivity.

For such reasons, in 1997-98 Penn State instituted an exit survey and interview process for all departing tenure track faculty members. That effort has been and continues to be led by the vice provost for academic affairs and supported by the institutional research and planning office. The goal is to better understand the experiences of tenure track faculty members and to respond to faculty concerns.

The Penn State faculty exit study uses two data gathering mechanisms. One is that exit interview officers (current or recently retired faculty members) appointed by the respective colleges conduct interviews; additionally, confidential exit surveys are made available. Departing faculty members can choose one, both, or neither option.

In any given year, about 120 tenured and pre-tenure faculty members exit Penn State, and about two-thirds typically participate in the exit study via the interview and/or the survey. Over the past ten years, 420 faculty members have participated in interviews and 368 have completed and returned surveys. The survey respondents include 167 retirees and 182 individuals who indicate that they are leaving for some other reason.

The findings of this process have in many ways been consistent with those of other researchers (such as Harvard's COACHE project) already cited. In general, Penn State faculty members have been satisfied with their careers and with the policies and environment at this university. They have reported that institutional practices (on salary, benefits, workload assignment, support, and the like) have influenced – mostly in positive ways, but sometimes negatively – their satisfaction, ability to be productive, and decisions about leaving. Also, there are some essential differences across demographic groups (male/female, minority/non-minority, junior/senior), but the commonalities are greater than the differences.

The exit study process asks faculty about many aspects of their academic lives (such as, for example, the climate for diversity, university awards and recognition, the quality of facilities, spousal employment opportunities, and so on). In general and in summary, the exit survey process finds faculty placing greatest importance on the following four factors:

- An academically strong department

- Professional autonomy
- Salary level and salary increases
- Course teaching assignments

We use Penn State's faculty exit results as our first data point because these factors – that is, what our exiting faculty have identified as the most important dimensions of academic life – map well onto the changes and challenges explored in the remainder of this paper. The paper discusses what some observers believe is a transformation in the nature of the academic research economy, which may redefine what academic excellence means for public research universities. The paper examines the competitive market for top scholars, highlighting in particular the growing disparity between public and private university salary levels. And the paper provides data on the evolving nature of faculty composition and how that relates to substantial shifts in faculty instructional workload.

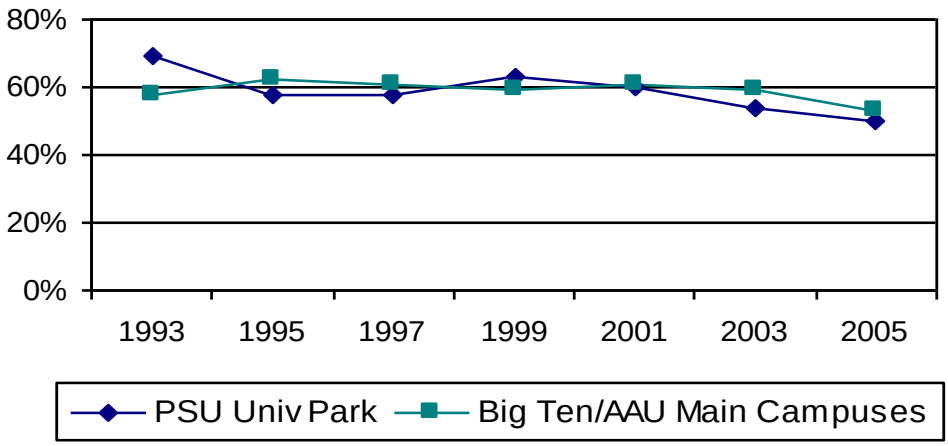
The Evolving Nature of Faculty Composition and Faculty Workload

There are approximately 1.3 million faculty members employed in United States colleges and universities. In 2005-06, according to data from the United States Department of Education (August 2007), 917,000 or 71% of these faculty members were in four-year colleges and 373,000 were in two-year colleges. Those proportions have not changed in a generation; in 1985, 71% of the United States faculty members were also located in four-year colleges.

What has changed dramatically is the distribution of full-time versus part-time appointments. The data show 676,000 (of 1.3 million) or 52% of these faculty members holding full-time appointments in 2005-06 compared to 64% in 1985. The decline in the full-time share is even more dramatic when a longer time period is examined; 78% of the faculty in U.S. colleges and university were full-time in 1970.

Tenure Track versus Fixed Term Faculty Appointments

As recently as the late 1960s, fewer than five percent of full-time faculty hires nationally were for non-tenure track positions; today, over half of full-time hires are for non-tenure track positions (Finkelstein and Schuster, 2001 and Schuster and Finkelstein, 2006). This represents a sea change in the structure of the professoriate in the United States.

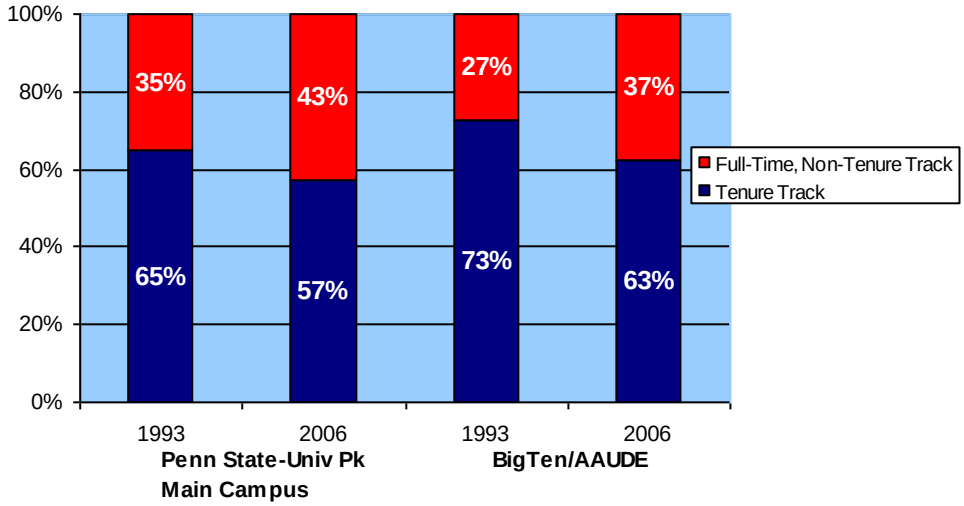


Source: IPEDS, December 2007.

Figure 1. New Non-Tenure Hires as a Percentage of All New Full-Time Hires, Penn State-University Park and Big Ten/AAU Peers[2]

When we look at Penn State and its peer institutions, we also see clear evidence of an increasing reliance on contingent faculty. Figure 1 shows the extent to which this practice has taken hold at Penn State and at its peers. Until recent decades, hiring full-time faculty off the tenure track was exceptional rather than a common practice. Consistent with that national shift, the majority of new hires each year since at least 1993 in these universities have been in non-tenure track appointments.

[2] Member universities of the AAU – the Association of American Universities – typically benchmark among their respective main campuses, excluding medical schools, to optimize comparability; University Park is that main campus for Penn State University.



Source: IPEDS, December 2007.

Figure 2. Contingent and Tenure Track Faculty, 1993 - 2006

Since the majority of full-time hires have, since the early 1990s, been off the tenure track, it is not surprising that contingent faculty represent a growing share of full-time faculty. As shown in Figure 2, the proportion of the full-time faculty who are in contingent appointments grew in this time period from 35% to 43% for Penn State and from 27% to 37% for the research universities in its peer group.[3]

Faculty Workload

The tenure track status of a faculty appointment naturally has an important bearing on the nature of the work being performed. Those appointed to tenure track positions are expected to develop active and successful research programs that complement their teaching, while those with non-tenure track appointments typically have more extensive teaching responsibilities. Moreover, teaching responsibilities may be further reduced for those tenure track faculty members who succeed at receiving external grant support for their research. The time needed to work on grants and contracts can come at the expense of time for teaching. External grants are competitive, and there are more opportunities for external funding in some fields than others. Thus, there is variation across disciplines in the average teaching workload for tenure track faculty members.

Given the growing share of faculty members on fixed-term contracts, it is not surprising to see drops in the percentage of student credit hours being generated by tenure track faculty members. As represented in Figure 3, at Penn State, from 1999 through 2006, the percentage of student credit hours delivered by full-time tenure track faculty

[3] We suspect that the higher percentages of contingent faculty at Penn State are due to differences in how universities categorize their faculty. At Penn State, many faculty members who are hired strictly for work on grants are non-tenure track faculty members.

declined from 48% to 40% (and annual research activity – mainly generated by tenure track faculty – rose from $393 million to $657 million). While many people may believe that graduate assistants and part-time faculty members are delivering a large and increasing share of undergraduate instruction, this is not true at Penn State. In fact, the proportion of teaching by part-time faculty and by graduate assistants (who are usually advanced doctoral students) has actually fallen. On the other hand, the proportion of student credit hours delivered by contingent faculty members rose from 21% to 32%.

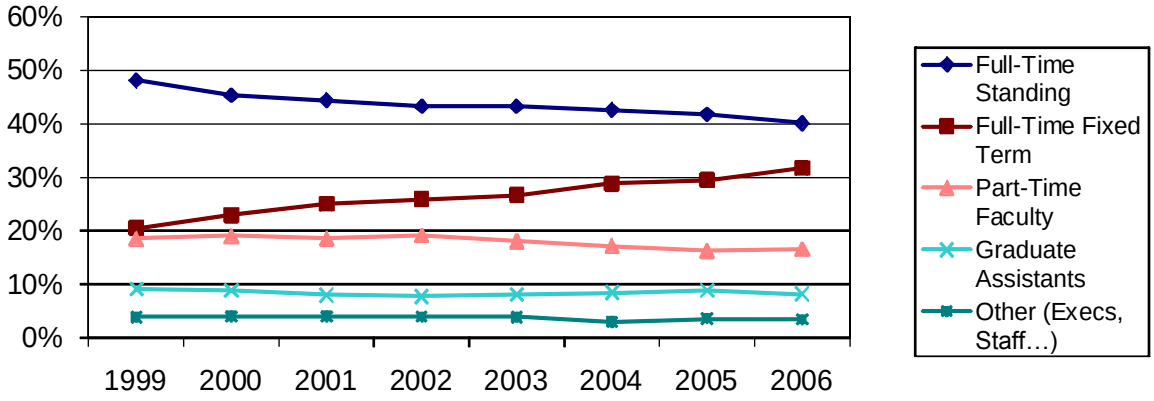


Figure 3. Percentage of Student Credit Hours Taught by Appointment Type: Penn State

What is less obvious regarding changes in the shares of student credit hours being delivered by different types of faculty members is the degree to which the average tenure track faculty member is changing the amount of teaching being contributed. To obtain insight into this trend, we examined the number of student credit hours being delivered by tenure track faculty members relative to the number of tenure track faculty members at Penn State, over time. In the fall of 1992, the average number of student credit hours per tenure track faculty member was 208. This ratio has decreased steadily to 191 student credit hours in 1999 and to 157 student credit hours in the fall of 2007. The corresponding figure for the average full-time fixed term faculty member in the fall of 2007 was 358 credit hours.

Given these differences in the nature of the work being performed, it is not surprising to find differences in compensation. Salaries for tenure track faculty tend to be higher than for their non-tenure track counterparts and the differences are driven largely by market forces. Research talent, particularly top research talent that generates external grants and contracts, is in limited supply in most fields and research universities are willing to pay a premium for it. Ehrenberg and Zhang (2004) conducted an econometric analysis for a sample of four-year institutions to estimate demand functions for tenure track versus contingent faculty. Their analysis of salary differences revealed that the average salary of lecturers (a common academic title for contingent faculty) compared to

the average salary of all professorial faculty members at four-year colleges and universities in the United States declined from .642 to .607 between 1989 and 1997. They attribute these declining relative salaries to the large supply of Ph.D.'s seeking work in higher education. They see the growing salary gap between contingent and tenure track faculty as one of the forces prompting efforts to unionize full-time contingent faculty members (Ehrenberg and Zhang, 2004).

At Penn State, the median salary for a tenure track faculty member at the University Park campus in the fall of 2007 was approximately $89,800. The corresponding figure for a full-time fixed term faculty member was approximately $45,400. Thus the ratio (using medians) at Penn State was about .51 in the most recent period.

Economic Pressures

Research universities pursue ambitious and seemingly open-ended missions through which they simultaneously aspire to generate ever larger amounts of new and highly valuable knowledge along with meeting their responsibility to meaningfully extend existing knowledge to variously defined constituencies. Public research universities have additional responsibilities for serving the immediate as well as longer term needs of taxpayers who help cover costs. In some states, student population growth is robust, adding further pressures on public universities. Budgets for these institutions vary substantially but are always finite, and basic economics teaches that open-ended ambitions in the face of finite resources give rise to fiscal stress.

While feelings of fiscal stress may be widespread within higher education, the precise magnitude and nature of the stress varies considerably across institutions. We single out three dimensions (there are no doubt more) of fiscally related pressures: a) declining state general appropriations support; b) growing gaps in endowment income; and c) transformations in the research economy.

Declining State Support

There is great variation in the level and nature of general appropriation state support coming to research universities in the United States. At one extreme, there are states such as Florida where state support in per capita terms historically has been comparatively high, although Florida in the past several years has been making significant reductions. At the other extreme are states such as Pennsylvania where there is a history of low levels of per capita support for public higher education. What is more generally true is that a significant downturn has taken place during the past 10 years in the percentage of state support to public research university funding that is contributed by state appropriations. Regardless of whether state support historically has been high or low, it is in relative decline.

Figure 4 dramatically illustrates how this decline has affected Penn State. At this university, the cumulative long-term impact of the slowly growing (in nominal dollars)

state appropriation, which translates into a decline as a percentage of the University's total budget, has fundamentally altered the economic environment in which the institution operates.

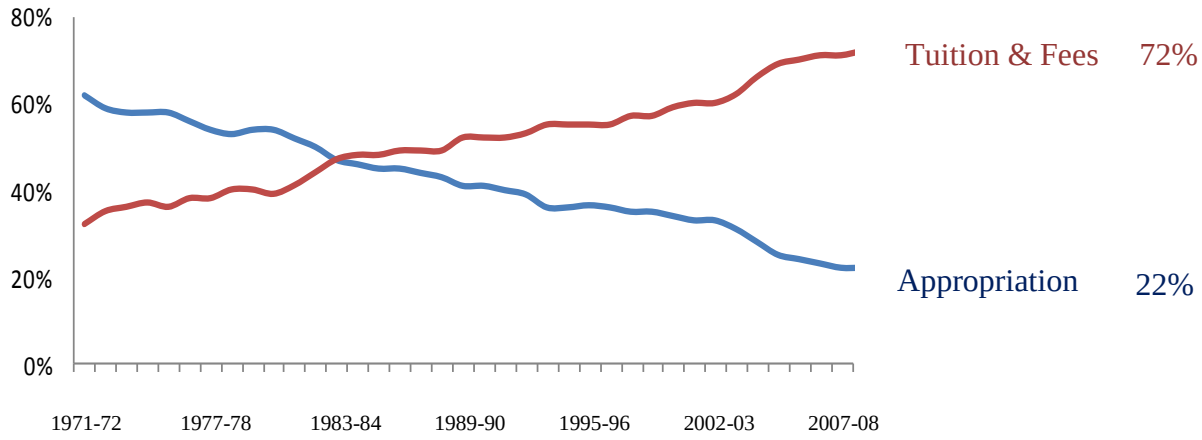


Figure 4. State Appropriation vs. Tuition & Fees as a Percentage of Penn State's General Funds Budget[4]

Four decades ago, state appropriations provided for roughly 70% of the University's general funds operations. Today, state appropriations account for only 22% of the general funds budget and less than 10% of its total budget. Figure 4 shows the extent to which Penn State has turned to tuition as its main source of general funds.

Penn State has been able to rely more heavily on tuition revenues as a means of offsetting reductions in state support. Other public research universities in the United States have less independent authority over the setting of tuition. Nevertheless, national data reveal similar shifts toward greater reliance on tuition revenues for the sector as a whole.

The State Higher Education Executive Officers (SHEEO) organization has compiled and published the relevant data gathered from sources including the National Center for Education Statistics, the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the U.S. Census Bureau. According to the 2007 SHEEO report, state and local higher education appropriations nationally fell from 78% to 64% of total educational revenue from 1982 to 2007. During that same 25-year period, net tuition revenues rose from 22% to 36% of total educational revenue. In other words, the data represented by what might be called the "X-graph" in Figure 4 are unique to Penn State, but nationally higher education is similarly relying more upon tuition and less upon state appropriations.

[4] General funds are dollars used for educational and general purposes; the other two large budget components are restricted funds which support contract research, and auxiliary enterprises which include break-even operations such as housing and food services.

Research universities face market realities which translate into worries over competition from less expensive alternatives like community colleges. They must credibly make the case to prospective students and their families that the additional costs associated with their programs are worth bearing.

Growing Differences in Endowments

Financial pressures also arise from the large and growing differences in levels of endowment income available to research universities in the United States. Data describing the rank order distribution of endowments, shown in Table 1, provide one clear illustration of how differentially wealth is distributed across United States universities and support the proposition that major research universities face fundamentally different resource realities. Even for the 30 most well-endowed institutions in the nation, the differences are striking. Endowment values tail off very quickly from #1 Harvard's $34.6 billion down to #30 University of North Carolina's $2.2 billion. (Penn State ranked #46 in 2007 with an endowment valued at $1.6 billion.) One way to appreciate this profound difference is to realize that most universities in the United States have total endowments smaller than the annual amount realized in the *growth* of the Harvard or Yale or Stanford endowment in a typical year.

It is also the case that the great disparity in wealth is growing; in other words, each year it falls off more and more quickly from the top. Even among the top 30 institutions, the endowment gap – the differences between the elite few and the rest of colleges and universities – is visibly widening. In 2007, Harvard's endowment was 16 times greater than that of #30 North Carolina's. Ten years ago (that is, using 1997 endowment values), Harvard was also #1, but its $10.9 billion endowment was 12 times the value of then #30 Purdue's endowment of $856,000. If these comparisons are extended to a broader group, by comparing #1 to #100, the widening gap is equally apparent. In 2007, the largest endowment was 48 times the value of the #100 endowment, up from 36 times larger in 1997 (*The Chronicle of Higher Education*, 2008; National Association of College and University Business Officers, 2008).

The widening differences in levels of wealth need to be viewed in light of these institutions' common commitment to the conduct of cutting-edge research. Universities with endowments in the range of one to two billion dollars (such as Penn State) are competing head-to-head with universities in the $10+ billion range (such as MIT), and this sets in motion powerful forces to enhance the competitiveness, through alternative means, of less wealthy institutions.

Table 1. Fiscal Year 2007 Endowment Values and Percentage Change from 2006

	2007 Value	Percent Change
1. Harvard	$34.6	19.8%
2. Yale	$22.5	25.0%
3. Stanford	$17.2	21.9%
4. Princeton	$15.8	21.0%
5. Texas	$15.6	18.0%
6. M.I.T.	$10.0	19.3%
7. Columbia	$7.1	20.4%
8. Michigan	$7.1	25.4%
9. Pennsylvania	$6.6	24.9%
10. Texas A&M	$6.6	16.8%
11. Northwestern	$6.6	26.5%
12. California	$6.4	16.2%
13. Chicago	$6.2	27.5%
14. Notre Dame	$6.0	34.7%
15. Duke	$5.9	31.4%
16. Washington University (St. Louis)	$5.6	18.9%
17. Emory	$5.6	14.2%
18. Cornell	$5.4	25.5%
19. Rice	$4.7	17.1%
20. Virginia	$4.4	20.8%
21. Dartmouth	$3.8	21.6%
22. Southern California	$3.7	21.2%
23. Vanderbilt	$3.5	18.4%
24. Minnesota	$2.8	26.1%
25. Johns Hopkins	$2.8	19.1%
26. Brown	$2.8	21.4%
27. Ohio State	$2.3	17.1%
28. Pittsburgh	$2.3	25.0%
29. University of Washington	$2.2	21.7%
30. North Carolina – Chapel Hill	$2.2	32.1%

Source: National Association of College and University Business Officers, 2008.

Transformations in the Research Economy

An analysis recently completed by Roger Geiger (based in part upon his analysis of changes in teaching, research, and spending at 33 private and 66 public universities from 1980 through 2000) has led him to conclude that the expansion of academic research since the late 1990s has driven, and continues to drive, a substantive and transformational restructuring of faculty work (Geiger, 2008).

Geiger's case can be summarized in terms of four factors. First, a consensus has emerged that the contribution of university research to economic development is crucial

to the competitiveness of the U.S. economy, and federal support policies have strongly encouraged (directly or indirectly) an expectation that faculty work will contribute to economic development through research. Second, while interdisciplinarity has long been in fashion for teaching and research, the practical impact in terms of hiring and funding decisions have been vastly weighted toward the research side. Third, Geiger has documented the proliferation of university centers and institutes whose essential function is to facilitate research. He notes that they do this both with their own core faculty and through the provision of research support to other faculty members, to the extent that increasingly, research university faculty define themselves by membership in departments and by affiliation with one or more research units. Fourth, Geiger notes that the bar of research accomplishment has been raised for new Ph.D.'s seeking to obtain academic appointments, and for subsequent promotion and tenure.

The argument is, in short, that perceptions of excellence and the responsibilities of regular faculty are becoming more research-oriented, and the function of teaching is increasingly shifted to non-tenure track faculty members. We find these arguments compelling, and we are persuaded by Geiger's conclusion that at this time – early in the 21st century – higher education is likely at or near a tipping point, in which a transformation is occurring in the roles, responsibilities, and structure of the faculty for research universities.

Responses and Consequences

We have outlined several contextual pressures that we believe have encouraged research universities to respond by substantially increasing reliance on non-tenure track members of the faculty. At first glance, this might appear to be a straightforward matter of cost-cutting. We have seen that non-tenure track faculty members are less expensive to hire and that they generate more student credit hours per capita than is the case for their tenure track colleagues. Indeed, our first approximation is that non-tenure track faculty generate about twice as many student credit hours at approximately half the salary.

However, the underlying economic forces are more complicated than this, since these institutions are also aggressively seeking external grant and contract support for their research missions. It is the tenure track faculty that has explicit responsibility for leading research efforts, and it could be very shortsighted indeed for a research university to pull away substantially from its investment in tenure track faculty members.

As a consequence, decision makers at research universities are being pulled in different directions, and delicate and difficult balances must be reached. We suspect great variation exists across the disciplines in how these balances are struck and that much will depend on factors such as the degree to which external funding opportunities exist for a particular unit, the unit's history of success at competing for external funds, and judgments about future prospects for success.

We looked more carefully at the Penn State data in an effort to ascertain the degree to which this University has substituted tenure track for non-tenure track faculty appointments. We found that even though the percentage of faculty appointments on the tenure track has been dropping, the absolute numbers of tenure track faculty members has increased, albeit modestly. Between the fall of 1998 and the fall of 2007, the number of tenure track appointments at Penn State (University Park) increased from 1,612 to 1,646 or 2.1%. It follows that Penn State has not back-tracked on its investment in tenure track faculty positions, presumably because of its commitment to be competitive for grants and contracts that are well aligned with the faculty's intellectual interests. It is nevertheless true that much greater growth has taken place at Penn State with respect to its fixed term faculty appointments which grew from 609 to 999 or 64% during the same period.

We also divided the category of fixed term appointments into its two components, multi-year fixed term and single-year fixed term, and found a substantial difference in the growth rates. In particular, between 1998 and 2007 the multi-year fixed term group grew from 98 to 285 (191.8%) while the single-year fixed term group grew from 511 to 714 (39.7%). Penn State is more heavily invested in the single-year fixed term type of appointment, but is shifting in the direction of greater emphasis on multi-year fixed term appointments.

Educational Consequences

Should we be concerned about the impact of this shifting mix of faculty appointments on the quality of the education being delivered by these institutions? There have been worries about the erosion of academic freedom as institutions rely more heavily on faculty with fixed term contracts. Questions have also been asked about the impact on the quality of teaching.

Concerns about the status, vitality, and academic freedom of the professoriate have a notable history in American higher education. Efforts to protect the professoriate led to several versions and interpretations of the American Association of University Professors (AAUP) and the American Council on Education's *1940 Statement of Principles on Academic Tenure*. That statement, which has been endorsed by over 180 professional and scholarly groups over the past seven decades, reflects the high value that academe has traditionally placed on a secure and stable environment in which faculty can work. The AAUP has historically called for all full-time faculty appointments to be tenure track, except for special appointments clearly designed as short-term arrangements. In general, substantial reliance on large numbers of non-tenure track faculty is perceived as a threat to norms such as academic freedom (Day, 2004).

It would be simplistic to assert that X percentage of teaching by non-tenure track faculty is acceptable, while X+1 percentage is harmful. However, there is a sense that there is some line, even if ill-defined, about which institutions should be cautious. In 1993, the AAUP recommended limiting the use of special appointments for part-time and non-tenure track faculty to no more than 15% of the faculty, with responsibility for not more than 35% of instruction within any given department. Similarly, the Carnegie

Foundation for the Advancement of Teaching has suggested that part-time faculty be limited to only 20 percent of undergraduate instruction (Balch, 1999).

There is evidence that when part-time faculty replace full-time faculty there are detrimental effects on students and the institution (Benjamin, 1998; Gappa, 2000). However, there is also evidence showing that when properly utilized and supported, part-time and full-time non-tenure track faculty members can be extremely effective teachers and valuable resources. Indeed, students can benefit substantially from interactions with part-time faculty who bring practical, workplace skills to a college or university. Gappa and Leslie (1997) have argued that part-time faculty members are "professionally qualified for the work they do" (p. 12) and that in general, there are more similarities than differences between part-time and full-time faculty.

Of course, there are concerns besides possible positive or negative repercussions on the quality of teaching and learning. For example, on the positive side, compelling reasons can be offered for relying on clinical faculty and professors of practice (who are usually not on tenure track appointments), who can share valuable field experience that is especially needed in applied fields. On the negative side, non-tenure track appointments are often perceived as being a threat to academic freedom; as an attenuation of faculty participation in institutional governance; and as a mistreatment of the individuals in terms of job security, satisfaction, salary, benefits, and working conditions. From a programmatic perspective, there are both advantages and disadvantages to the use of contingent faculty.

We noted earlier that groups such as the AAUP and the Carnegie Foundation have attempted to promulgate guidelines for the utilization of part-time and contingent faculty. However, these statements have really not been embraced by research universities. In 2007, we conducted a survey of Association of American Universities member institutions and examined whether and how ideas about the desirable proportion of teaching by non-tenure track faculty are translated into practice. We found that only 1 of 24 responding universities have a formal policy at the university level on instructional delivery by faculty appointment type (although 10 of 24 reported policies at the college or department level).

Looming Challenges

Recent turmoil in U.S. and international economies will undoubtedly affect the fiscal stresses on public universities described above. We suspect that, if anything, those economic pressures will intensify. We highlight two more factors that may create additional challenges for public research universities in the management of their faculty resources in the next few years: the graying faculty and a growing public-private salary disparity in the race for top scholars.

The Graying Faculty

TIAA-CREF data (Conley, 2008) show that the average age of full-time faculty members has increased from 47 to 50 in the last twenty years and that the bulk of older faculty are still in the pipeline. TIAA-CREF research (Yakoboski, 2007) also finds that although faculty members tend to retire at ages slightly older than the general population (about age 66 compared to 62) and that some professors would like to stay as long as possible (37% plan to work to age 70 or beyond), an unprecedented wave of retirements is coming to higher education in the near future.

Just as the graying of tenure track faculty is a national phenomenon, it is readily observable at Penn State as well. Since at least the early 1980s, the percentage of full-time faculty age 60 or older at Penn State was very steady at 8% to 10% until it inched above 10% in 2000 and has increased steadily upward to approximately 15% in 2007.

The rising percentages of older faculty are significant because they make it clear that major changes will be occurring over the next 5-10 years in the composition of the faculty in U.S. higher education. In addition, at Penn State we have also observed differences in the turnover rates by type of faculty appointment. The normal turnover of tenure track faculty at Penn State is about 4% per year for tenured associate professors, 5% for tenured professors, and about 9% for untenured assistant professors on the tenure track. For faculty on fixed term contracts, the turnover rate is 15% per year. Thus, the shift toward relying more heavily on fixed term faculty accelerates the rate at which further change can occur.

Growing Public-Private Salary Disparities

We highlight one more complicating factor that perhaps is not as well recognized as it should be: namely, the diminishing capacity of many public colleges and universities, including prominent research universities such as Penn State, to successfully compete in the evolving labor market for top scholars.

Tracking faculty salaries for 214 doctoral and research universities from the 1970s through the 1990s, Alexander noted that, "…data show that from 1970 to 1980, faculty salary disparities between public and private universities only slightly advantaged private university faculty," but followed distinctly different trajectories in the 1980s and 1990s (Alexander, 2000, p. 3). His analysis showed that the public-private gaps at each rank for various institutional categories went from practically negligible in 1979-1980 to what he termed as an emerging "silent crisis" by 1997-98. For example, for the universities in Alexander's dataset, in 1979-80 average salaries for full professors were only 2% higher ($69,000 versus $67,700) at private research universities; by 1997-98, average salaries for full professors at those private universities were 30% higher ($96,000 versus $74,000) than for their counterparts in public universities.

Recently published AAUP data show average salaries for professors at private doctoral universities at $144,256 in 2007-08; that figure compares to $109,569 for

professors at public doctoral universities, for a private university advantage of 32%. The private doctoral universities' 2007-08 advantage was 20% for associate professors and 21% for assistant professors (American Association of University Professors, 2008). This is important because, in fact, public research universities such as Penn State do compete for nationally and internationally recognized scholars in many fields. In 2007, Penn State's provost's office compiled a listing of the university's academic programs or major subfields – undergraduate, graduate, and professional – that are considered to be among the top 20 in the nation by at least one generally recognized or reasonably reputable source. Some of these are programs ranked by *U.S. News & World Report*, others by the National Research Council, others by National Institutes of Health research funding, and others by scholarly or professional societies. A few more – lacking a formal ranking mechanism in the discipline – would undoubtedly be included on any such list by knowledgeable academic or professional leaders of the field. That exercise showed that there are currently more than 90 disciplinary programs or major subfields at Penn State that would rank among the top 20 programs nationally, and more than 50 of those that would fall into the top 10. The point is that Penn State and other public research universities generally stack up well with the best private research universities; they are nationally and internationally competitive in terms of program quality and prestige.

Programs earn a reputation for high quality through a combination of excellence in teaching, research, and visibility within the profession, but the single key ingredient is the strength, scholarly productivity, and recognized accomplishment of faculty. Thus, as public universities such as Penn State strive to succeed in the arena of first-class research institutions, they have no choice but to compete in the national and international market for first-class scholars.

This is not empty rhetoric. Because of the importance of the ongoing effort to recruit and retain top academics, in 2001 Penn State's provost and institutional research office began collecting information from the deans of cases in which they worked to keep faculty members in the face of offers from other universities. We know, therefore, that from 2001 through 2008, Penn State either lost faculty members to, or successfully negotiated against, every other Big Ten university (Wisconsin, Michigan, Ohio State, Northwestern, and so on); Ivy League universities including Brown, Columbia, Cornell, Harvard, Penn, and Yale; and many other premier U.S. and international universities, such as the University of Chicago, the University of Auckland, the Stowers Institute for Medical Research, McMaster University, University of California, Carnegie Mellon, Stanford, Tulane, Vanderbilt, and the University of Virginia. In short, the competition for top scholars is real. It is serious, ongoing, and expensive – and likely to become stiffer for ambitious public research universities, in comparison to their private university peers, in the near future.

Conclusions and Implications for Practice

It is clear from both national and individual university data that research universities have experienced a significant weakening of state support for their core academic enterprises over the past several decades. The erosion of public financial

support has pushed public universities to turn increasingly to student tuition and fees to offset these declines. For many of these universities, growth in tuition and fees has also been limited by their commitments to serve students from a wide range of socio-economic backgrounds (and ability to pay) as well as by legislative and other constraints on their ability to increase tuition. Many public research universities are also pressured to open their doors to additional students in states where populations are growing rapidly.

In addition, endowment incomes are comparatively modest in most research universities and have not kept pace with the growth realized by universities with the largest endowments. Moreover, most public research universities have only recently become engaged in raising significant amounts of philanthropic support relative to their private university peers. The result is a growing gap in institutional wealth (endowment) among research universities in an increasingly competitive environment for talented students and faculty, extramural research funding, and national and international prestige.

Research universities caught in an ever-tightening vise of rising costs and increasingly scarce resources have by necessity turned to a variety of strategies to enhance revenues and reduce expenses. One of the most significant responses has been the steady movement toward greater utilization of contingent faculty at the relative expense of tenure track appointments. This shift appears to have been evolutionary in most cases and carried out within colleges and departments, where most academic staffing decisions are made, rather than being the result of a deliberate, centrally orchestrated university-level strategy. It is probably better characterized as an incremental, "muddling-through" approach as academic units adjust to fiscal constraints while optimistically hoping or planning that the resource situation will improve in the future.

What we may be seeing then is movement away from the conventional idea of a tenure track faculty member who excels as a "triple threat" in teaching, research, and service and toward a more specialized approach or division of faculty labor. Our data indicate that tenure track faculty are teaching a declining share of student credit hours, which is entirely logical as tenure track faculty represent a declining proportion of all faculty and the pressures to produce scholarship, increase extramural funding, and participate in outreach activities are heightened. The increase in research activity among research universities in recent decades has been remarkable, and while these resources have released mainly tenure track faculty from some teaching responsibilities and freed up resources to use for alternative instructional personnel, support for the research enterprise in terms of facilities, equipment, and unrecovered overhead have added further stress to many department, college, and university budgets.

The use of contingent faculty has therefore become one of the dominating national trends of recent decades, having shifted from a situation where nearly all full-time faculty appointments were tenure-eligible to the current pattern where a majority of the new appointments are contingent. However, there is a range of contingent appointments that has potentially important implications for higher education and the professoriate. Some contingent appointments may be part-time and involve teaching

regular or occasionally offered courses. Others may be full-time, extended one year at the time, while still others may involve longer-term commitments up to five years. Full-time fixed term faculty at research universities, particularly those on multi-year appointments, may be required (or at least encouraged) to engage in some level of scholarly research, although not at the same level as tenure track faculty given the differences in the teaching expectations.

Multi-year fixed-term faculty appointments are a kind of hybrid that we predict will become increasingly important in the future research university as fiscal stresses become no less severe in coming years. Growing specialization of faculty roles and associated workloads may result in those faculty members on the tenure track becoming more research oriented while those on fixed-term contracts emerge as a new class of teaching faculty. Those on multi-year appointments have considerable job security, and they may well become the work horse of the university in terms of instruction, at least in lower division teaching. In this light, we repeat our finding that the fastest growing contingent faculty appointment type at Penn State between 1998 and 2007 was the multi-year fixed term variety. Stepping away from the more complementarily view of faculty roles (i.e., research informs teaching and teaching informs research) has many implications for research universities in terms of the educational process and what have traditionally been a major differentiating element of comprehensive research universities.

We are not yet in a position to develop tight arguments about what combination and sequence of coping strategies is most likely to occur under what set of circumstance, but we hope to learn more as we gather and analyze additional data. It is likely to be the case that there are few, if any, coping strategies that come without costs or associated consequences. However, we offer the following four recommendations for how a university may strategically support excellence through the hiring, development, and utilization of outstanding faculty.

The first is to use cluster hiring to attract outstanding faculty and build excellent programs. There is ample evidence that cluster hiring in specific focused areas works well in establishing discipline leadership and critical mass. The same approach can be effective in creating or expanding existing interdisciplinary thrusts, particularly when institutes help by supporting co-hires between colleges.

The second is to provide more effective review of and support for fixed-term faculty. Because building excellent programs and departments requires major contributions from non-tenure track faculty, it is important to ensure that fixed-term faculty can find job satisfaction, and be able to see a career path that encourages them to stay and develop excellence. Units should encourage and (to the extent feasible) support professional development for fixed-term faculty through such means as attendance at regional or national professional conferences.

The third idea is to strengthen faculty mentoring, support, and development. Every hiring decision represents a major commitment of resources and potentially the high costs of a poor initial choice, or of not giving a new faculty member the best chance

to succeed. Appropriate mentoring by senior faculty and flexibility along the career path to accommodate major life course developments such as childbirth, adoption and family illness is part of the way to support faculty and staff. College and departmental support should include (again, to the extent feasible) encouragement and funding for professional travel and development as well as consideration of the need for work-family balance. An ongoing challenge is to recruit and retain women and minority faculty members in greater numbers, especially in the STEM (science, technology, engineering, and mathematics) disciplines, and to ensure the development of the capabilities of these faculty members. All faculty need to be supported and integrated into the lives of their colleges and departments. Given the large and growing role of non-tenured faculty, universities probably should be paying more attention and asking whether they are truly employing the best practices available to support all faculty members.

Fourth, planning and institutional research practitioners can and should contribute as well. They can develop relevant data and analyses, and share that information as widely as possible among academic leaders: provosts, chancellors, vice provosts, deans, department heads, faculty senates, and others involved in academic governance and management. The issues are serious and timely and surely the problems will not be solved by data alone, but good institutional research can raise awareness, clarify the understanding of challenges, and help to inform smart planning and decision making.

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Coffee & Conversation: Gathering Information from our Graduates
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This Coffee & Conversation session focused on the current and potential uses of Graduate Placement surveys. The audience was invited to discuss the proposal that Graduate Placement surveys are the ideal venue for collecting valuable outcome measures of an institution's effectiveness in fulfilling its mission.

Graduate Placement surveys:

I. What we do now.
The Graduate Placement surveys that I examined from a selected group of institutions tend to be very similar in content. For example, the surveys from UPenn, Notre Dame, and Boston College ask about similar content areas: job placement, graduate school attendance, and "other" activities (e.g., community service, military service, and travel). More variable are the *form* of the surveys (e.g., paper-and-pencil vs. online) and the conditions and *timing* of the administration of the surveys (e.g., before graduation, 3 months out, six months out, etc.).

The main focus of Graduate Placement surveys is on *jobs* and *salaries*—as the name suggests. The job questions tend to be fairly standard, and include length of employment, employer, and the relation of job to college major. The salary questions are a bit more varied, owing to the sensitivity and confidentiality of the information requested. Some institutions ask for exact figures, while others only ask graduates to identify a salary range. Some surveys also ask about start-up and annual bonuses.

II. Why we do it.
The pressure to demonstrate the employability of our graduates is coming from many sources, particularly market forces. College guides, administrators, parents, and the students themselves are all concerned with employment outcomes, and some of our IR colleagues have reported that IPEDS may soon require institutions to provide this information. It is widely acknowledged, however, that these data are very difficult to obtain, as evidenced by the generally low survey response rates from students once they have graduated and left their respective institutions.

III. What we *could* do.
Despite the logistical problems, there is much to be gained from surveying our graduates 3, 4, 5 years out and more. We could be assessing our *institutional effectiveness* and our *mission*. Graduate Placement surveys are the ideal venue for collecting valuable outcome measures of an institution's effectiveness in fulfilling its mission. Among the goals of such an outcome assessment would be an answer to the question: Have we produced the kind of graduates that we promised to produce in our mission statement?
In the case of Jesuit institutions, such as Fordham University, we would do well to ask: Are we producing graduates who value learning and wisdom, who are committed to serving others, and who are dedicated to lifting the poor out of poverty?

How can we know these outcomes? I suggest that the answer is *by surveying our graduates two-, three-, five-years out, and longer!* By asking them more nuanced questions than we do in the typical Graduate Placement survey. For example, of the pre-med students who graduate from Fordham, we might ask whether they volunteer their services to charitable organizations (such as Doctors Without Borders) in addition to their regular clinical activity. Similarly, of the pre-law students who have graduated and begun their law careers, we might ask whether they also volunteer their services *pro bono* to work as Legal Aid attorneys. And of the Accounting majors who have graduated, we might ask if they also volunteer their services at tax clinics for poor people.

IV. Why we should do it.

The main reason for suggesting that Graduate Placement surveys might be extended and developed into "Mission Critical" surveys is that they would enable us to obtain *direct* measures of the quality of education that we provide. Rankings in popular magazines tend to use indirect measures of educational quality in assessing the "business" side of academic institutions. But Institutional Researchers—as we learned from this morning's Plenary session—have need to be proactive in defining the measures that define our institutions. If we wish to demonstrate that we produce graduates who reflect the values of our mission—such as people with ethical standards—then developing our Graduate Placement surveys into surveys of institutional effectiveness in the broadest sense is an ideal place to start.

V. Limitations to this approach.

I would be remiss if I did not mention some of the limitations of the concept I am proposing. Among the *technical* limitations are the problems with data collection—particularly the problem of low survey response rates, especially as the time frame is extended outward to five years and beyond. As we all know, it is difficult to obtain high rates of response over time. One possible antidote to this problem is to develop stronger bonds with our students while they are still undergraduates. The more we instill in them a sense of community and belonging through academic advising, social activities, and campus involvement, the more likely they are to stay in contact with us years later.

Another limitation that we would want to remove is the administrative conflict among offices that keep contact with our graduates. It is fairly typical for IR offices and Alumni Affairs offices, for example, to be in conflict over surveying our graduates, with Alumni Affairs adopting a proprietary attitude about current addresses of graduates in order to protect their function of soliciting much-needed donations from alumni. There is also the problem of over-surveying and maintaining the good will of our graduates. These problems are not insurmountable, I would argue, and do not prevent us from obtaining information that is vital to the assessment and continued success of our institutions and to the execution of our mission.

DOES FINANCIAL AID STATUS AFFECT STUDENT PERFORMANCE, RETENTION, PERSISTENCE, AND ACADEMIC SUCCESS?

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Abstract

Does student participation in financial aid programs affect academic performance? The sample for this study includes all (5,144) fall 2000 first-time degree or certificate seeking students within the twelve Connecticut Community Colleges. Students were tracked for six academic years. Although some differences in performance exist among the various financial aid participants and non-participants, these differences cannot be attributed to the financial aid groups alone. Variables, both demographic and college specific, are interacting with each other to form significant combinations that allow for estimates of the likelihood of attaining known academic markers such as successful completion of college-level math, attaining a first semester GPA >= 2.0, being retained fall to spring and persisting fall to fall.

The question now becomes why (or why not) students in various categories identified by logistic regression, are succeeding in the first semester, being retained and persisting, regardless of financial aid participation? For example, why are students in the highest reading group less likely to persist? Are they transferring early? In general, why are Hispanic males less likely to achieve a first semester GPA of >= 2.0 than other students? Why are Black and Hispanic students especially at three of the urban colleges performing so differently than other students? What other factors in addition to those revealed in this study, are impacting students and how? What strategies can be taken to further enhance the success of students?

During the 2005-2006 award year the twelve Connecticut Community Colleges enrolled 64,183 credit students (annualized unduplicated headcount). There were 33,972 financial aid applicants, 19,184 financial aid recipients, and 12,744 Pell Grant Recipients; approximately a 63% increase in all three categories since FY 2001. The total Pell Grant money awarded was $23,584,175, a 99% increase in dollars awarded since FY 2001.

The Connecticut Community College System's financial aid packaging policy is primarily need based and designed to first meet the direct costs (tuition, books and fees) of eligible students. There is a considerable amount of unmet need in the system, and our policy is to discourage the use of loans that will subject an already financially disadvantaged student population to increased debt. Our typical financial aid recipient in

FY 06 was female, 32 years old, single, head of household, with an average household size of 2.5 members, and a 2004 annual income of less than $24,000.

The objective of the Pell Grant program, like that of other need-based grants, is to provide opportunity so that socio-economic status is not a barrier to access, retention, persistence, performance and overall academic success (workforce preparation, degree completion and/or transfer). Is the objective of the Pell Grant program being realized, or is there so much unmet need in the form of food, rent and utilities, for example, that among the poorest students socio-economic status is still a barrier to a successful higher education experience despite the best of financial aid programs?

A longitudinal study of a 1996 cohort of students demonstrates that, on a national level, students from first generation and low-income backgrounds are less likely to enroll in postsecondary education and less likely to persist through graduation (P. Thayer, 2000). Thayer found that students in the top family income quartile completed a baccalaureate degree at a 74% rate, as compared to 5% for those in the bottom income quartile. Do these same results hold at the individual colleges?

Results from a similar study of fall 1999 first time undergraduate students at a four-year selective institution indicate that students receiving the largest amounts of Pell money outperformed their peers in terms of persistence and graduation (Z. Yang, 2006). Yang suggests that the contrary results found in his study may be attributable to "restricted range" issues. A national sample should have much more variance in academic preparedness than that taken from a selective university, where the level of academic preparedness among the student body should be higher based upon admissions requirements.

If Yang is correct, then two-year colleges with open admissions should be more likely to mirror Thayer's national sample, for which academic preparedness is a more important predictor of academic success than socio-economic status. Support for this premise is provided by other research, with findings suggesting that on a national level at two-year colleges, Pell recipients often have many of the recognized risk factors for leaving college early, such as not graduating from high school or finishing with a GED or equivalency certificate; delaying enrollment in postsecondary education; being financially independent; having dependents other than one's spouse; and being a single parent. At first pass in the analysis, it does appear that Pell recipients are less likely to persist than their non-Pell recipient counterparts. However, once variables such as high school curriculum rigor and achievement test scores are controlled for, no differences in persistence are found (Wie & Horn, 2002). In fact, although financial difficulties are often cited as one of the top three reasons why students leave college, some would argue that students tend to overstate their financial difficulties. Financial difficulties are seen as a more acceptable reason for leaving than alternative explanations such as motivation, academic difficulty, etc (D. Masursky, 1977). In sharp contrast are research findings that suggest college costs, especially unmet need for living costs and loans, have a substantial and direct influence on persistence (St. John & Starkey, 1996; M. Wang, 2006).

Other variables often thought to combine with socioeconomic status to affect student persistence are mother's education, "first generation" status and ethnicity. Ishitani & DesJardinsm, (2002) provide evidence that students whose mothers graduated from college are less likely to leave than other students; this effect is especially strong in the second year of college.

The impact of "first generation" status may be more myth than reality. Research has shown that "first generation" students are more likely to enroll in developmental education courses; but upon further analysis, income, high school GPA and age, not "first-generation" status, are more important predictors of academic success. Further, "first generation" status has little or no impact upon GPA (Brown & Burkhardt, 1999).

A recent report compared the outcomes for two cohorts of students, those who began college at two-year institutions with the goal of attaining a degree in 1989, and those who began in 1995. African-American students in the 1995 cohort were less likely to earn a degree (26.5%) than those in the 1989 cohort (31.5%). The gap was even larger for Hispanic students: 54.9% for the 1989 cohort compared with 39.6% for the 1990 cohort (Cook & Cordova, 2006). There was no accounting for socio-economic status in this report. Although the gaps are a reality, and in the opposite direction of what one might expect given all the efforts in recent years to bridge these gaps, the question of why remains largely unanswered.

Overall the results of research investigating the impact of financial aid on educational outcomes are mixed and therefore inconclusive. Some of the research provides for the positive impact of receiving financial aid, and other research shows a minimal effect that is mitigated by a host of other variables. Results of research on a national level are not always congruent with results revealed at individual college campuses. There is also evidence that the impact of financial aid is greater for students at two-year colleges than for those attending four-year institutions (Pascarella & Terenzini, 1991). Pascarella and Terenzini (1991) report that the preponderance of the evidence indicates that after controlling for academic ability, students who receive financial aid are as likely to persist in college as those who do not receive such aid, and further suggest that receiving financial aid may be compensating well for the negative impact of a low socio-economic background.

The purpose of this study is to clear up some of the ambiguity by quantifying the impact of financial aid on student retention, persistence, performance, and academic success. The study attempts to address eight research areas.
(1) Over a six year period, how many students in the various financial aid categories attain positive outcomes, and do differences exist among the groups? Positive outcomes include:

- award of a certificate without transfer
- award of an associate degree without transfer
- award of a certificate and transfer

- award of an associate degree and transfer;
- transfer with no award; and
- still enrolled without an award, having earned 30 or more credits.

(2) Over a six year period, how many students in the various financial aid categories attain the positive marker of academic progress: successful completion of College-Level Mathematics? To what extent and in what manner do students differ within and among the various financial aid groups with respect to attainment of this marker?
(3) How many students in the various financial aid categories attain a positive marker of academic progress: a first semester GPA of 2.0 or higher? To what extent and in what manner do students differ within and among the various financial aid groups with respect to attainment of this marker?

(4) What are the strongest predictors of first semester GPA among the demographic variables: age, gender and ethnic group; and institutional variables: reading group, financial aid group, full-time part-time status, retention (fall to spring), and persistence (fall to fall)?

(5) How many students in the various financial aid categories attain a positive marker of academic progress: retention (fall to spring)? To what extent and in what manner do students differ within and among the various financial aid groups with respect to this marker?

(6) What are the strongest predictors of retention (fall to spring) among demographic variables: age, gender and ethnic group; and institutional variables: reading group, financial aid group, full-time part-time status, and first semester GPA?

(7) How many students in the various financial aid categories attain a positive marker of academic progress: persistence (fall to fall)? To what extent and in what manner do students differ within and among the various financial aid groups with respect to attainment of this marker?

(8) What are the strongest predictors of persistence (fall to fall) among demographic variables: age, gender and ethnic group; and institutional variables: reading group, financial aid group, full-time part-time status, first semester GPA, and retention (fall to spring)?

Method

Participants

The sample for this study includes all fall 2000 first-time degree or certificate seeking students. In Banner terms this means students for whom “student type = N”; “degree <> 000000”; “first credit semester = summer 2000 or fall 2000”, “cumulative

hours earned = 0 at the start of the first credit semester", and "cumulative transfer hours earned = 0 at the start of the first credit semester." Banner provides student demographic variables that include ethnicity, gender, and age. Age is recoded into three groups >= 46, 22 - 45, and <22. Banner also provides college related variables including first semester GPA, reading scores, financial aid information, first semester FT/PT attendance, program of study, and first semester college of record. GPA is recoded into two groups: GPA of < 2.0 and GPA >= 2.0.

A student's reading score serves as a proxy variable for academic ability. There are not enough Sentence Skills and Mathematics test scores available for these to be useful in this analysis. For those students with valid reading scores (4,204), the scores are segmented into four quartiles or ability groups. Reading scores can range from zero to 120. For this particular group of students, the minimum reading score is one, the maximum is 120, the mean is 73.3042, and the standard deviation is 21.67531. For this sample, the upper limit of each quartile is 58.76, 73.3, 87.8 and 120 respectively. There are 940 students for whom no reading score is available.

Students are assigned to four financial aid groups: (1) Pell Grant Only, (2) Non-Pell Aid, (3) Pell Grant and Other Aid, plus (4) No financial aid. Program of study is recoded into two groups: occupational or liberal arts/general studies.

The sample includes 5,144 students: 3,010 Caucasian, non-Hispanic students; 853 Black, non-Hispanic students; 769 Hispanic students; 128 Asian or Pacific Islander students; 37 non-Resident Alien students; 21 American Indian or Alaskan Native students; and 326 students whose category is not known. There are 2,831 females and 2,313 males in the sample. The age of students in the sample ranges from 13 to 74, for an average age of 22; there are five students in the sample whose age is not known. There are 1,185 students with a GPA of < 2.0; 3,093 with a GPA >= 2.0; and 236 students with no GPA recorded. Of these students 2,692 attended full-time, 2,433 became Liberal Arts and General Studies majors, and 2,711 students enrolled in occupational programs.

Design and Procedure

Chi Square

To address the first research question, students are followed over a six year period (fall 2000 through spring 2006) and the number of positive academic outcomes for students in the various financial aid groups were counted. Chi Squares were computed to determine any significant differences among the various financial aid groups.

Analysis of Variance

The second research question is addressed by again following students over a six year period (fall 2000 through spring 2006) to determine the manner and extent of their progression through College-level Mathematics. The analysis begins with where students start in mathematics (Pre-Algebra, Elementary Algebra or College-Level Math) rather than the perhaps more important variable of where students place; placement data for this

group of students are incomplete and unreliable. Analysis of variance is used to identify statistically significant differences in student progression through college-level math based on where students start and their financial aid grouping.

The third research question is addressed using analysis of variance to identify statistically significant differences among the various financial aid groups with respect to first semester GPA, after controlling for academic ability (reading score).

The fifth research question is addressed using analysis of variance to identify statistically significant differences among the various financial aid groups with respect to retention (fall to spring), after controlling for academic ability (reading score).

The seventh research question is addressed using analysis of variance to identify statistically significant differences among the various financial aid groups with respect to persistence (fall to spring), after controlling for academic ability (reading score).

Binary Logistic Regression

The fourth, sixth and eighth research questions are addressed by means of multi-step binary logistical regressions. The regressions identify the best predictors of first semester GPA, retention (fall to spring) and persistence (fall to fall) respectively, from among the independent variables included in this study.

Utilizing SPSS binary logistic regression the dependent variable is specified and then student demographic variables (gender, ethnicity and age group) and college variables (College, FTPT, Reading Score and Financial Aid Group) are entered into block one and the regression is run. Interactions among those variables reaching statistical significance and all other variables are computed.

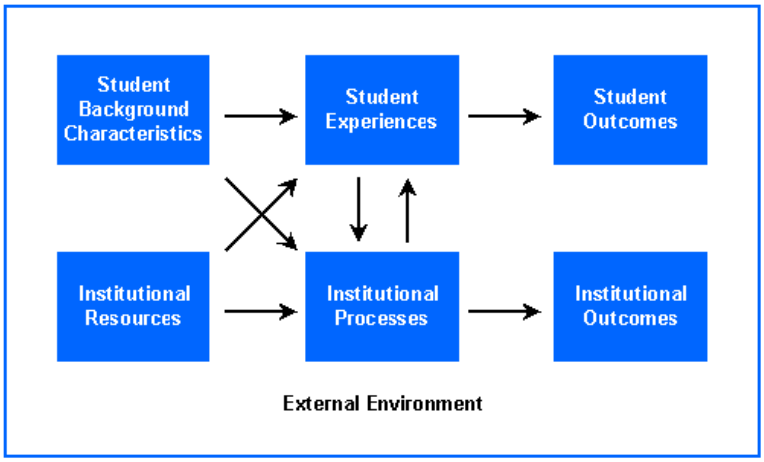
Then just the demographic variables are loaded into block one and the regression is run again after which only demographic variables of significance retained in block one. Next all interaction variables specific to the demographic variables are loaded in block two and the regression run. Following this, only variables in blocks one and two that reach statistical significance are retained.

Following this, college variables are loaded in block three and the regression run. Only variables in blocks one, two and three that reach statistical significance are retained. Then all interaction variables specific to the college variables are loaded in block four and the regression run. Only variables in blocks one, two, three and four that reach statistical significance are retained.

The regression is run one last time utilizing only the remaining significant variables and then collinearity diagnostics are run on the remaining variables with the expectation that all remaining variables achieve a tolerance of <.01 and a Variance Inflation Factor (VIF) of <10.

The fourth research questions concerns Fall Semester GPA, thus the dependent variable for the first regression analysis. For this dependent variable the exact process described above is followed. The sixth research question concerns retention, thus the dependent variable for a second regression analysis and a similar process is followed, only now GPA becomes an independent variable along with the other college variables. The eighth research question concerns persistence, thus the dependent variable in this last regression analysis. The same procedure is followed as for retention only now retention also becomes an independent variable along with GPA and the other college variables.

The design of these regression analysis are modeled after the Input (I) – Environment (E) – Output (O) model of assessment first developed my Alexander W. Astin (1991) and later modified by Dr, Michael E. Moore, Dr. William E. Knight and myself while we were at Georgia Southern University (1994).



Results

Positive Outcomes

Among the 5,144 new students in the fall of 2006, 222 (4.3%) were awarded financial aid in the form of a Pell Grant only; 599 (11.6%) had aid other than a Pell Grant; 1,316 had a Pell Grant plus other aid; and 3,007 (58.5%) received no financial aid. As shown in Table 1, students who received financial aid in the form of a Pell Grant and no other aid have a significantly lower number of positive outcomes than any of the other groups ($X^2 = 29.851$, df=15, $p<.05$). Positive outcomes occurred for 53 students or 23.9% of the of the Pell Grant only recipients while the success rates for other financial aid groups range from 32.1% to 36.7%. The overall success rate for the total cohort is 32.6%.

Table 1 Positive Outcomes

	Pell Grant only		Aid other than Pell Grant		Pell Grant and other aid		No financial aid		Total Cohort	
	N	%	N	%	N	%	N	%	N	%
Initial Cohort	222	4.3%	599	11.6%	1316	25.6%	3007	58.5%	5144	
Certificate w/o Transfer	0	0.00%	10	1.67%	13	0.99%	26	0.86%	49	0.95%
Associates Degree w/o Transfer	5	2.25%	39	6.51%	71	5.40%	141	4.69%	256	4.98%
Certificate and Transferred	0	0.00%	0	0.00%	2	0.15%	5	0.17%	7	0.14%
Associates Degree and Transferred	4	1.80%	25	4.17%	41	3.12%	124	4.12%	194	3.77%
Transferred w/o Award	24	10.81%	88	14.69%	148	11.25%	437	14.53%	697	13.55%
Still Enrolled w/o Award >= 30 hours	20	9.01%	58	9.68%	147	11.17%	247	8.21%	472	9.18%
Total Success	53	23.87%	220	36.73%	422	32.07%	980	32.59%	1675	32.56%

Markers of Academic Progress

Progression through College-level Mathematics

Among students for whom their first math course was Pre-Algebra, successful completion rates for College-level Mathematics are low irrespective of financial aid group, ranging from 20.4% to 27.0%. There are no significant differences among the various groups ($F = .860$, $df = 3$, $p>.05$). Table 2 provides the frequencies and percentages for students in each financial aid category.

Table 2 Started with Pre-Algebra

Started Pre-Algebra	Pell Grant only		Aid other than Pell Grant		Pell Grant and other aid		No financial aid		Total Cohort	
	N	%	N	%	N	%	N	%	N	%
Initial Cohort	222	4.3%	599	11.6%	1316	25.6%	3007	58.5%	5144	
Started Pre-Algebra	108	48.6%	244	40.7%	631	47.9%	891	29.6%	1874	36.4%
Success Pre-Algebra	57	25.7%	178	29.7%	415	31.5%	606	20.2%	1256	24.4%
Enrolled Elementary Algebra	54	24.3%	154	25.7%	347	26.4%	475	15.8%	1030	20.0%
Success Elementary Algebra	35	15.8%	101	16.9%	221	16.8%	316	10.5%	673	13.1%
Enrolled College-Level Math	35	15.8%	92	15.4%	214	16.3%	282	9.4%	623	12.1%
Success College-Level Math	22	9.9%	66	11.0%	156	11.9%	206	6.9%	450	8.7%
College-Level Math Success		20.4%		27.0%		24.7%		23.1%		24.0%

Among students for whom their first math course was Elementary Algebra, the successful completion rates for College-level Mathematics are better for all financial aid groups, ranging from 37.7% to 43.1% and there are no significant differences among the financial aid groups ($F = 1.128$, $df = 3$, $p>.05$). Table 3 provides the frequencies and percentages for students in this category.

Table 3 Started with Elementary Algebra

Started Elementary Algebra	Pell Grant only		Aid other than Pell Grant		Pell Grant and other aid		No financial aid		Total Cohort	
	N	%	N	%	N	%	N	%	N	%
Initial Cohort	222	4.3%	599	11.6%	1316	25.6%	3007	58.5%	5144	
Started Elementary Algebra	33	14.9%	159	26.5%	297	22.6%	847	28.2%	1336	26.0%
Success Elementary Algebra	20	9.0%	106	17.7%	199	15.1%	584	19.4%	909	17.7%
Enrolled College-Level Math	21	9.5%	90	15.0%	158	12.0%	458	15.2%	727	14.1%
Success College-Level Math	14	6.3%	67	11.2%	128	9.7%	319	10.6%	528	10.3%
College-Level Math Success		42.42%		42.14%		43.10%		37.66%		39.52%

Among students for whom their first math course was College-Level Math, the successful completion rate for College-Level Mathematics is even greater for all financial aid groups ranging from 62.5% to 66.1%, and there are no significant differences among the financial aid groups ($F = .133$ $df = 3$, $p>.05$). Table 4 provides the frequencies and percentages for students in this category.

Table 4 Started with College-level Math

Started College Level Math	Pell Grant only		Aid other than Pell Grant		Pell Grant and other aid		No financial aid		Total Cohort	
	N	%	N	%	N	%	N	%	N	%
Initial Cohort	222	4.3%	599	11.6%	1316	25.6%	3007	58.5%	5144	
Started College Level Math	32	14.4%	116	19.4%	184	14.0%	543	18.1%	875	17.0%
Success College Level Math	20	62.5%	75	64.7%	118	64.1%	359	66.1%	572	65.4%
College Level Math Success		9.01%		12.52%		8.97%		11.94%		11.12%

Among all students who successfully completed College-level Math, irrespective of what their first math course was, there are significant differences among the various financial aid groups (F=3.142, df = 3, p<.05).

Table 5 Success in College-Level Math

Financial Aid Group	Mean	Std. Deviation	N
Pell Grant Only	0.25	0.44	222
Other than Pell Grant	0.35	0.48	599
Pell Grant and Other	0.31	0.46	1316
No Financial Aid	0.29	0.46	3007
Total	0.30	0.46	5144

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.983a	3.0	0.661	3.142	0.024
Intercept	197.8	1.0	197.826	940.661	0
FinancialAidGroup	2.0	3.0	0.661	3.142	0.024
Error	1081.0	5140.0	0.21		
Total	1550.0	5144.0			
Corrected Total	1083.0	5143.0			

a. R Squared = .002 (Adjusted R Squared = .001)

					95% Confidence Interval	
(I) Financial Aid Group	(J) Financial Aid Group	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Pell Grant Only	Other than Pell Grant	-.09*	0.036	0.008	-0.17	-0.02
	Pell Grant and Other	-0.1	0.033	0.11	-0.12	0.01
	No Financial Aid	0.0	0.032	0.191	-0.1	0.02
Other than Pell Grant	Pell Grant Only	.09*	0.036	0.008	0.02	0.17
	Pell Grant and Other	0.0	0.023	0.065	0	0.09
	No Financial Aid	.05*	0.021	0.009	0.01	0.09
Pell Grant and Other	Pell Grant Only	0.1	0.033	0.11	-0.01	0.12
	Other than Pell Grant	0.0	0.023	0.065	-0.09	0
	No Financial Aid	0.0	0.015	0.448	-0.02	0.04
No Financial Aid	Pell Grant Only	0.0	0.032	0.191	-0.02	0.1
	Other than Pell Grant	-.05*	0.021	0.009	-0.09	-0.01
	Pell Grant and Other	0.0	0.015	0.448	-0.04	0.02

Based on observed means.

The error term is Mean Square(Error) = .210.

*. The mean difference is significant at the .05 level.

The mean success rate for recipients of Pell Grants (25%) is significantly lower than that of students receiving aid other than Pell Grants (35%). The mean success rate for recipients of aid other than Pell Grants (35%) is significantly higher than the mean for students receiving only Pell Grants (25%) and students receiving no financial aid (29%). The mean success rate for recipients of Pell Grants and other aid is 31% and not statistically different from the other three groups. The mean success rate for students receiving no financial aid is 29% and is significantly lower than recipients of aid other than Pell Grants (35%)

There is a statistically significant, correlation among the number of terms a student waits before taking his/her first math course and eventually attempting (r=.057, p<.05) and successfully completing (r=.065, p<.05) College-Level Math. The earlier the first math course is taken the better the chance of a student has of attempting and successfully completing College-Level Math irrespective of financial aid group.

Table 6 Success in College-Level Math and First Dev Math Course

	Mean	Std. Deviation	N
FirstDevMathTerm	1.52	1.31	3956
Attempt College Level Math	0.41	0.491	5144
Success College Level Math	0.3	0.459	5144

		FirstDevMathTerm	**Attempt College Level Math**	**Success College Level Math**
FirstDevMathTerm	Pearson Correlation	1	.057**	.065**
	Sig. (2-tailed)		0	0
	N	3956	3956	3956
Attempt College Level Math	Pearson Correlation	.057**	1	.791**
	Sig. (2-tailed)	0		0
	N	3956	5144	5144
Success College Level Math	Pearson Correlation	.065**	.791**	1
	Sig. (2-tailed)	0	0	
	N	3956	5144	5144

**. Correlation is significant at the 0.01 level (2-tailed).

Among all students new in the fall of 2000 and followed over time for six years, 1,059 students, or 20.6% of the population, did not attempt any mathematics course while enrolled in the Community College System. There were significant differences among the financial aid participants (X^2 = 1.82E2, df=9, p<.05). The group most likely to attempt mathematics is students receiving no financial aid. From this group, 726 students (24.1% of students with no aid and 14.1% of the total cohort) attempted no math course. Table 5 provides the frequencies and percentages for students in each financial aid category.

Table 7 Attempted No Mathematics Course

	Pell Grant only		**Aid other than Pell Grant**		**Pell Grant and other aid**		**No financial aid**		**Total Cohort**	
	N	%	N	%	N	%	N	%	N	%
Initial Cohort	222	4.3%	599	11.6%	1316	25.6%	3007	58.5%	5144	4.3%
Took No Math (within financial aid group)	49	22.1%	80	13.4%	204	15.5%	726	24.1%	1059	20.6%
Took No Math (within cohort)	49	1.0%	80	1.6%	204	4.0%	726	14.1%	1059	20.6%

First Semester GPA

Overall 63.0% of all new students had a GPA of >=2.0 at the conclusion of the first semester. Overall recipients of Pell Grants are more likely to have a GPA <2.0 at the end of the first semester. Even after controlling for reading scores, the same dynamic holds ($F=3.273$, $df = 3$, $p<.05$).

Table 8 First Semester GPA

		Pell Grant Only		Other than Pell Grant		Pell Grant and Other		No Financial Aid		Total	
		N	%	N	%	N	%	N	%	N	%
GPA	<2.0	93	44.3%	195	34.2%	495	39.2%	1032	36.0%	1815	37.0%
	>=2.0	117	55.7%	376	65.8%	769	60.8%	1831	64.0%	3093	63.0%
	Total	210		571		1264		2863		4908	

Table 8 First Semester GPA (Continued)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	18.814a	4	4.704	20.499	0
Intercept	176.327	1	176.327	768.479	0
Reading Group	16.385	1	16.385	71.411	0
Financial Aid Group	2.253	3	0.751	3.273	0.02
Error	1124.991	4903	0.229		
Total	3093	4908			
Corrected Total	1143.805	4907			

a. R Squared = .016 (Adjusted R Squared = .016)

Although there is an apparent relationship between financial aid status and First Semester GPA, financial aid status on its own is not a significant predictor once other demographic and college variables are accounted for. Hispanic Males, students at Capital Community College in Financial Aid Group 3 (Pell Grant and Other Aid), Hispanic students at Capital Community College, and Black students at Naugatuck Valley Community College, are less likely than students not in these categories to achieve a GPA of 2.0 or higher.

Students at Housatonic in Reading Group 5 (No Reading Score on File), students at Northwestern Connecticut Community College in Reading Group 2 (2^{nd} Quartile), full-time students at Norwalk Community College, along with female and Asian students at Naugatuck Valley Community College, are more likely than students not in these categories to achieve a GPA of 2.0 or higher.

Table 9 Predictors of First Semester GPA

Predictor	B	SE	Wald	Exp(B)	Sig	Tolerance	VIF
NVBlk	-0.951	0.293	10.539	0.386	**	0.960	1.042
CAFA3	-0.869	0.205	18.067	0.419	**	0.984	1.016
CAHsp	-0.669	0.305	4.825	0.512	**	0.981	1.019
MHsp	-0.455	0.126	13.101	0.635	**	0.970	1.031
HORG5	0.298	0.140	4.555	1.347	**	0.983	1.017
NKFT	0.573	0.158	13.207	1.774	**	0.992	1.008
NVF	0.589	0.136	18.680	1.803	**	0.942	1.061
NWRG2	1.622	0.748	4.697	5.062	**	0.998	1.002
NVAsian	1.635	0.743	4.839	5.132	**	0.990	1.010
Constant	0.518	0.034	236.330	1.679	**		

p<.05; ** p< .01

Retention (Fall to Spring)

Overall 69.0% of all new students were retained from fall to spring of their first academic year. Overall students receiving aid other than Pell Grants (75.3%) and those receiving Pell Grants and other aid (75.9%) are retained at a higher rate than other groups. Students receiving no financial aid are the least likely to be retained. The same dynamic holds even after controlling for reading scores (F=18.918, df = 3, p<.05).

Table 10 Retention

	Pell Grant Only		Other than Pell Grant		Pell Grant and Other		No Financial Aid		Total	
	N	%	N	%	N	%	N	%	N	%
No	69	31.1%	148	24.7%	317	24.1%	1063	35.4%	1597	31.0%
Yes	153	68.9%	451	75.3%	999	75.9%	1944	64.6%	3547	69.0%
Total	222		599		1316		3007		5144	

Source	Type III Sum of Squares	df	Mean	F	Sig.
Corrected Model	24.517	4	6.129	29.255	0.000
Intercept	488.941	1	488.941	2333.719	0.000
ReadingGroup	10.167	1	10.167	48.529	0.000
FinancialAidGroup	11.891	3	3.964	18.918	0.000
Error	1076.680	5139	0.210		
Total	3547.000	5144			
Corrected Total	1101.197	5143			

a. R Squared = .022 (Adjusted R Squared = .022)

Although there is an apparent relationship between financial aid status and retention, financial aid status on its own is not a significant predictor of retention once other demographic and college variables are accounted for. At Gateway Community College students in Financial Aid Group 3 (Pell Grant and Other Aid) along with Black and Hispanic students, are less likely to be retained than students not in these categories.

Students in reading Group 1 (1st and lowest Quartile), part-time students with a first semester GPA of 2.0 or higher, full-time students in Reading Group2 (2nd Quartile), students at Capital Community College in Financial Aid Group 3 (Pell Grant and Other Aid), and students in Financial Aid Group 2 (Aid other than Pell) and Financial Aid Group 3 with a first semester GPA of 2.0 or higher, are more likely to be retained than students not in these categories.

Table 11 Predictors of Retention

Predictor	B	SE	Wald	Exp(B)	Sig	Tolerance	VIF
GWFA3	-0.694	0.208	11.090	0.500	**	0.620	1.612
GWBlk	-0.558	0.201	7.701	0.572	**	0.752	1.330
GWHsp	-0.501	0.248	4.103	0.606		0.837	1.195
ReadGroup1	0.292	0.081	12.936	1.338	**	0.954	1.048
GPAHPT	0.413	0.089	21.676	1.512	**	0.945	1.059
R2FT	0.667	0.117	32.252	1.949	**	0.938	1.066
CAFA3	0.854	0.260	10.790	2.348	**	0.985	1.015
GPAHFA2	1.839	0.186	97.757	6.293	**	0.982	1.018
GPAHFA3	2.269	0.159	204.661	9.666	**	0.894	1.119
Constant	0.338	0.043	62.603	1.402	**		

p<.05; ** p< .01

Persistence (Fall to Fall)

Overall 49.2% of all new students persisted from the fall of their first academic year to the fall of the second academic year. Overall students receiving Pell Grants only persisted at a lower rate (39.2%) than other groups. The same dynamic holds even after controlling for reading scores (F=4.793, df = 3, p<.05).

Table 12 Persistence

		Pell Grant Only		Other than Pell Grant		Pell Grant and Other		No Financial Aid		Total	
		N	%	N	%	N	%	N	%		
Persistence	No	135	60.8%	288	48.1%	627	47.6%	1561	51.9%	2611	50.8%
	Yes	87	39.2%	311	51.9%	689	52.4%	1446	48.1%	2533	49.2%
	Total	222		599		1316		3007		5144	

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	10.368	4	2.592	10.444	0.000
Intercept	228.732	1	228.732	921.682	0.000
ReadingGroup	6.018	1	6.018	24.250	0.000
FinancialAidGroup	3.568	3	1.189	4.793	0.002
Error	1275.337	5139	0.248		
Total	2533.000	5144			
Corrected Total	1285.704	5143			

a. R Squared = .008 (Adjusted R Squared = .007)

Although there is an apparent relationship between financial aid status and persistence (fall to fall), financial aid status on its own is not a significant predictor of retention once other demographic and college variables are accounted for. Students in

Reading Group 4 (4th Quartile or Highest) are less likely to persist than students not in Reading Group 4. Students in Reading Group 2 (2nd Quartile) and students with a GPA of 2.0 or higher are more likely to persist than students not in these categories.

Table 13 Predictors of Persistence

Predictor	B	SE	Wald	Exp(B)	Sig	Tolerance	VIF
ReadGroup4	-0.080	0.085	0.902	0.923		0.904	1.107
ReadGroup2	0.198	0.093	4.521	1.218		0.918	1.089
GPAHigh	2.019	0.069	864.832	7.534	**	0.171	5.842
Constant	-0.259	0.050	26.624	0.772	**	0.174	5.764

p<.05; ** p< .01

Summary

Although some differences in performance exist among the various financial aid participants and non-participants, these differences cannot be attributed to the financial aid groups alone. Variables, both demographic and college specific, are interacting with each other to form significant combinations that allow for estimates of the likelihood of attaining known academic markers such as successful completion of college-level math, attaining a first semester GPA >= 2.0, being retained fall to spring and persisting fall to fall. The question now becomes why (or why not) students in various categories identified by logistic regression, are succeeding in the first semester, being retained and persisting, regardless of financial aid participation? For example, why are students in the highest reading group less likely to persist? Are they transferring early? In general, why are Hispanic Males less likely to achieve a first semester GPA of >= 2.0 than other students? Why are Black and Hispanic students especially at three of the urban colleges performing so differently than other students? What other factors in addition to those revealed in this study, are impacting students and how? What strategies can be taken to further enhance the success of students?

Table 14 Summary of Predictor Variables

GPA >= 2.0	
NVcc Black	less likely
CAcc Pell Grant and Other Aid	less likely
CAcc Hispanic	less likely
Male Hispanic	less likely
HOcc No Reading Score on Record	more likely
NKcc Full-Time	more likely
NVcc Female	more likely
NWcc Reading Score in 2nd Quartile	more likely
NVcc Asian	more likely

Retention	
GWcc Pell Grant and Other Aid	less likely
GWcc Black	less likely
GWcc Hispanic	less likely
Lowest Reading Group	more likely
GPA >=2.0 Part-time	more likely
Reading Score in 2nd Quartile Full--time	more likely
CAcc Pell Grant and Other Aid	more likely
GPA >=2.0 Aid Other than Pell	more likely
GPA >=2.0 Pell Grant and Other Aid	more likely

Persistence	
Highest Reading Group	less likely
Reading Score in 2nd Quartile	more likely
GPA >=2.0	more likely

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ENHANCING PARENTS' ROLE IN HIGHER EDUCATION ASSESSMENT

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Introduction. This paper presents a model designed to enhance parents' role in higher education assessment. The model is based on a study that compared parents' and students' evaluation of undergraduate education. Major research questions include the following:

- To what extent do parents think the undergraduate program enhanced their child's personal, intellectual and career relevant abilities?

- How satisfied are parents with the academic, social, career preparation and campus life aspects of their child's college experience?

- What specific aspects of parents' evaluation predict their overall satisfaction with the undergraduate program?

- How do parents' evaluations compare with their children's in terms of the College's impact on students' abilities and satisfaction with aspects of college life?

Literature Review

Wartman and Savage (2008) offer a compelling rationale for involving parents in the life and work of higher education institutions.

> "By bringing parents into the educational equation on personal, social and economic issues, administrators gain a partner who has the most at stake in their student's well-being. Moreover, parents can add to institutional messages by infusing them with family or personal history. Increasingly, schools consider parents as not only an audience but also a stakeholder in the messages they deliver to students." (p. 90)

Developments in society and in parent-child relationships have enhanced parents' role in higher education. Kirwan (2007) observes that our nation has developed an educational deficit in relation to the rest of the industrialized world and we must recapture the sense of higher education as a common good worthy of greater investment of public funds. Further, since paying for a college education is one of the most expensive purchases parents incur, they have every right to expect access to information about costs and accountability for outcomes, including graduation rates, job-placement and graduate school acceptance statistics. Scott and Daniel (2001) note that parents matter to higher education because of the increasing costs of a college education; parents' expectations that they be involved; and changing family dynamics.

A cultural shift in parent-child relationships has resulted in increasing involvement of parents in the lives of today's college students. Jackson and Murphy (2005) cite the evolution of parent-child relationships into partnerships as a major factor accounting for a

change in the role of parents in higher education. Wartman and Savage (2008) identify five factors that may contribute to the increasing involvement of parents: generational differences; cost of college; use of technology; changes in parenting style and demographics. Results from the 2007 National Survey of Student Engagement offer empirical evidence of parents' greater involvement in students' lives. Seven out of ten students reported they communicated very often with at least one parent or guardian during the academic year. Students talked with their mothers about personal issues, academic performance, and family matters, and they communicated most often with their fathers about academic matters.

Previous research studies have investigated parents' role in various aspects of higher education, including college choice, goals of undergraduate education and, to a limited extent, evaluation of college outcomes. Some studies have compared parents' and students' perspectives.

With regard to college choice. Smith and Bers (l989) found that parents were involved in information gathering but were not necessarily decision-makers. In terms of college choice criteria, Warwich and Mansfield (2003) determined that both parents and students identified academics as the most important criterion and shared four of the same top criteria - academics, tuition, financial aid and friendly atmosphere. In contrast, Brokemier and Seshadri (l999) discovered significant differences between students' and parents' college choice criteria. Students attributed significantly more importance to social life, friends attending an institution, and athletic programs, while parents assigned more importance to cost, program of study, facility quality, academic reputation, and campus safety. Both students and parents most frequently identified parents as the major influence in the college choice decision.

Turrentine at al. (2000) explored parents' goals for their students' overall college experience. Results revealed that parents' top goals were: job preparation, quality education, maturity/independence, graduation, fun/enjoyment, academic success and friendships/networks.

A select number of studies have compared parents' and students' perspectives on quality, goals and outcomes. Litten and Hall (l989) found that parents were more likely to select faculty related indicators, while students were more likely to select program related factors in assessing institutional quality. With regard to goals of undergraduate education, Papish (2000) discovered that parents attributed more importance to a mix of academic and student development goals - including managing psychological stress and developing skills for self-sufficient living, while students placed more value on gaining a sense of interdependence with others and getting involved in community service.

Bisset et al. (l999) compared the views of students, parents and faculty members regarding the importance of educational goals for undergraduate education. Comparative findings for parents and students revealed that parents placed more importance on academic goals related to science and technology, humanities, social and behavioral sciences, intellectual abilities and personal and social development. However, both parents and students highly valued career related goals, including acquiring skills for a special job and

getting a good job after graduation. Parents and students also shared an appreciation for the personal and social development that a college education affords; they ranked gaining a sense of independence and gaining self-confidence among their top five goals for undergraduate education.

Browne, Kaldenberg and Browne (l998) compared parents' and students' evaluation of an undergraduate business education program. Results revealed significant positive correlations between parents' and students' ratings on faculty teaching skills and advising. Parent and student ratings were also positively correlated on overall satisfaction, willingness to recommend the college and satisfaction with the value of the education.

Methodology

Data Source. The population for this study included 281 parents of seniors who graduated in May 2007. A survey was administered primarily on the Internet during the 2008 spring semester. Responses were received from 155 parents, yielding a response rate of 55 percent. The paper presents results for all respondents and for a subset of 122 parents whose responses were matched with their children's responses.

Methods of Analysis. Correlation analyses examined relationships between parents' evaluation of specific aspects of the college experience and their overall satisfaction and willingness to recommend the College. Regression analyses identified specific aspects of parents' evaluation that predicted their overall satisfaction and willingness to recommend the College. Analyses were conducted with individual items and scale scores.

Development of Scales. Common factor analysis or the principal axis factor method was employed to identify the dimensions underlying parent responses to the survey. Items included in the scales had factor loadings of .4 or higher. Three scales were created representing: parents' assessment of the undergraduate program's impact on students' abilities; parents' satisfaction with the academic program and parents' satisfaction with campus social life. Items in the *Assessment of Impact on Abilities* scale include parents' perception of the program's impact on their child's ability to: understand moral and ethical issues; relate well to people of different races; think analytically and logically; write effectively; communicate well orally and exercise leadership. The *Satisfaction with the Academic Program* scale reflects parents' satisfaction with faculty attitude and academic advising. The *Satisfaction with Campus Life* scale represents parents' satisfaction with extra-curricular programs and campus social life on.

Table 1 presents the statistical properties of the scales including the mean and standard deviation for the total group and the alpha reliability coefficients, which range from .73 to .82, indicating moderate to high reliability.

Table 1. Statistical Properties of the Scales

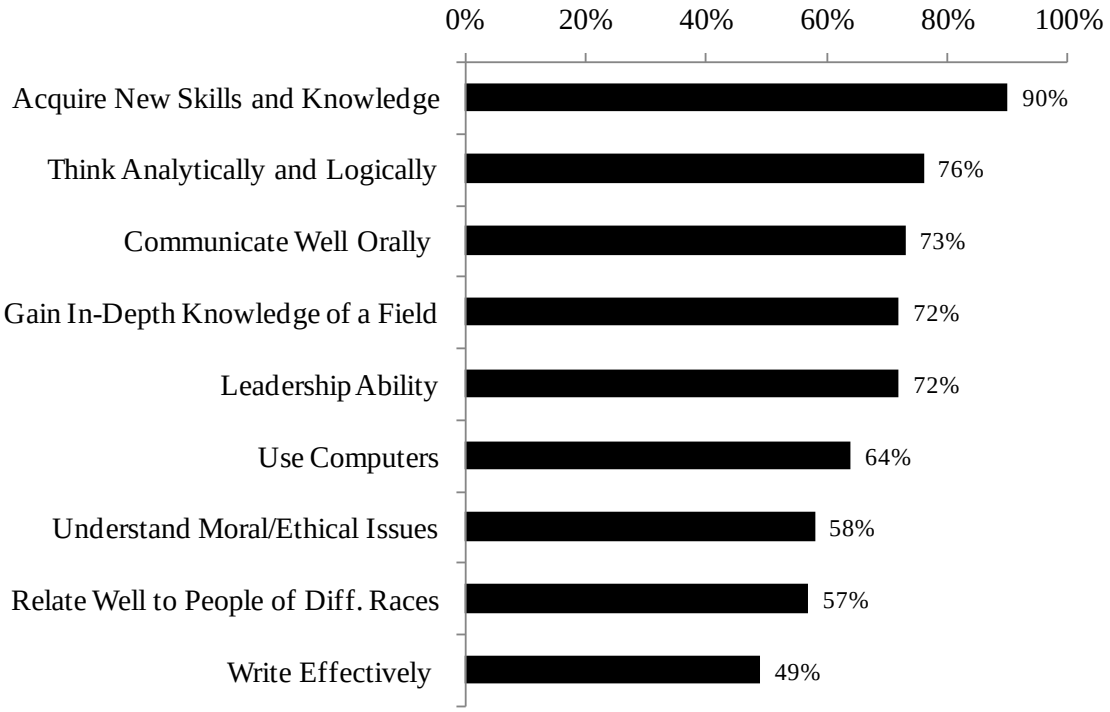
Scale Names	Mean	S.D.	Reliability	No. of Items	Range of Responses Low-High
Assessment of Impact on Abilities	3.57	.44	.82	6	1 - 4
Satisfaction with Academic Program	3.32	.62	.80	2	1 - 4
Satisfaction with Campus Life	3.24	.64	.73	2	1 - 4

Results

Parents' Assessment of the Undergraduate Program

Perceived Impact on Abilities. Figure 1 graphically displays the percent of parents who perceived that the College greatly enhanced their child's abilities in each area.

Figure 1. Percent Rating Students' Abilities 'Greatly' Impacted



As shown, 90 percent of the parents reported that the College greatly impacted the ability to acquire new skills and knowledge and 72 to 76 percent perceived that the College greatly enhanced the ability to think analytically, communicate well orally, gain in-depth knowledge of a field and exercise leadership. In contrast, only 49 percent thought that the College greatly enhanced the ability to write effectively.

Satisfaction with College Experiences. Responses reflect considerable variance in parent satisfaction with three areas of their child's college life: the academic program, student services and campus life. With respect to the academic program, 76 percent were very satisfied with the quality of business courses, while only 32 percent were very satisfied with academic advising. Regarding student services, 44 percent were very satisfied with the financial aid package, while only 26 percent were very satisfied with career services. In the area of campus life, 58 percent were very satisfied with campus safety, but only 26 percent were very satisfied with student housing.

Overall Assessment. Two questions addressed parent's overall assessment of their child's undergraduate education. One question elicited level of satisfaction and another question focused on parents' willingness to recommend the College to a high school senior. Results revealed that 69 percent were very satisfied and 26 percent were satisfied with their child's education. Some 76 percent reported they definitely would and 17 percent probably would recommend the College to a high school senior.

Table 2 identifies significant correlates of parents' overall satisfaction. As shown, parents who perceived a greater impact on their child's ability to acquire new knowledge and skills and leadership expressed higher overall satisfaction. Similarly, those who were

Table 2. Significant Correlates of Parents' Overall Satisfaction

Correlates	Correlation
Impact on Abilities	
Acquire New Skills and Knowledge	.42 ***
Exercise Leadership	.33 ***
Satisfaction with College Experiences	
Student Housing	.35 ***
Faculty Attitude	.34 ***
Satisfaction with College Offices	
Career Services Office	.51 ***
Counseling Services Office	.45 ***
Health Service Office	.41 ***
Housing Office	.39 ***
Class Dean's Office	.33 ***
Satisfaction with the College's Communication with Parents	
Overall Communication	.39 ***
E-mail Communication	.36 ***

*** $p \leq .001$

more satisfied with student housing, faculty attitude, career services, other student services offices and the College's communication with parents also expressed higher satisfaction with their child's education.

Table 3 identifies significant correlates of parents' willingness to recommend the College. As shown, parents who perceived that the College enhanced their child's ability to acquire new skills and knowledge; understand moral and ethical issues; exercise leadership; think analytically and logically; and gain in-depth knowledge of a field were more willing to recommend the College. Also, those who were more satisfied with student housing, extra-curricular programs, faculty attitude and the College's communication were more willing to recommend the College to a high school student.

Table 3. Correlates of Parents' Willingness to Recommend the College

Correlates	Correlation
Impact on Abilities	
Acquire New Skills and Knowledge	.56 ***
Understand Moral and Ethical Issues	.41 ***
Exercise Leadership	.38 ***
Think Analytically and Logically	.37 ***
Gain In-depth Knowledge of a Field	.36 ***
Satisfaction with College Experiences	
Student Housing	.48 ***
Extra-Curricular Programs	.42 ***
Faculty Attitude	.40 ***
Satisfaction with the College's Communication with Parents	
Overall Communication	.39 ***
E-mail Communication	.36 ***

*** $p \leq .001$

Predicting Parents' Overall Satisfaction. Regression analysis addressed the question, "What specific aspects of parents' evaluation predict their overall satisfaction with the undergraduate program?" Results, presented in Table 4, identify parents' perception of the College's impact on their child's ability to acquire new skills and knowledge; satisfaction with academic advising; and satisfaction with career services as significant predictors of overall satisfaction. The R^2 with these variables in the model is .51, indicating that these variables explain 51 percent of the variance in parents' overall satisfaction with their child's undergraduate education.

Table 4. Predicting Parents' Overall Satisfaction

Predictors	Beta Coefficient	t Ratio	R2	F Ratio
Perceived impact on ability to acquire new skills and knowledge	.43	5.33***		
Satisfaction with academic advising	.31	3.39***		
Satisfaction with career services	.24	2.74**		
			.51	28.06***

** p < .01;*** p ≤ .001

Predicting Parents' Willingness to Recommend the College. Regression results, displayed in Table 5, also identified perceived impact on the ability to acquire new skills and knowledge as a significant predictor of willingness to recommend the college. In addition, satisfaction with student housing and extra-curricular programs were identified as significant predictors. The R^2 of .49 indicates that these variables explain 49 percent of the variance in parents' willingness to recommend the College.

Table 5. Predicting Parents' Willingness to Recommend the College

Predictors	Beta Coefficient	t Ratio	R2	F Ratio
Perceived impact on ability to acquire new skills and knowledge	.46	6.85***		
Satisfaction with student housing	.28	3.97**		
Satisfaction with extra curricular programs	.19	2.62**		
			.49	40.18***

** p < .01;*** p ≤ .001

Comparison of Parents' and Students' Assessment

Matched pair t tests were conducted with responses from 122 parents and their children to answer the question, "How do parents' evaluations compare with their children's in terms of the College's impact on students' abilities and satisfaction with aspects of college life?"

Perceived Impact on Abilities. Table 6 presents results regarding perceived impact on abilities. As shown, parents' ratings are consistently higher than those of their children. The largest significant differences involve the ability to relate well to people of different races and to understand moral and ethical issues. Parents' mean ratings indicate they perceive a moderate to great impact, while their children perceive only a little to moderate impact. The smallest differences

involve leadership ability and the ability to acquire new skills and knowledge; both parents and seniors perceive a moderate to great impact on these abilities.

Table 6. Significant Differences between Parents' and Seniors' Assessment of Babson College's Impact on Students' Abilities

	Mean Ratings			
Abilities†	**Parents**	**Seniors**	**Difference**	**T test**
Relate Well to People of Different Races	3.39	2.48	.91	10.01 ***
Understand Moral and Ethical Issues	3.48	2.65	.83	9.20 ***
Think Analytically and Logically	3.77	3.24	.53	6.55 ***
Write Effectively	3.37	2.91	.46	5.39 ***
Use Computers	3.58	3.26	.32	3.65 ***
Gain In-depth Knowledge of a Field	3.69	3.41	.28	3.56 ***
Communicate Well Orally	3.72	3.49	.23	3.45 ***
Acquire New Skills and Knowledge	3.91	3.71	.20	3.55 ***
Leadership Ability	3.67	3.50	.17	2.35 *

† These ratings are based on the scale: 1 'Not at All' 2 'A Little' 3 'Moderately' 4 'Greatly'.
* $p \leq .05$; *** $p \leq .001$

Satisfaction with College Experiences. Table 7 presents parents' and seniors' mean satisfaction ratings regarding various aspects of the college experience. As shown, parents' ratings are generally higher than those of their children. The largest difference involves satisfaction with social life on campus. The parents' mean rating of 3.14 indicates satisfied, while the senior mean rating of 2.28 indicates dissatisfied. Compared with seniors, parents also report substantially higher satisfaction ratings on student financial services and student housing; the parent mean ratings suggest satisfied, while the senior mean ratings range between dissatisfied and satisfied. There are no significant differences between parents' and seniors' mean satisfaction ratings on faculty attitude, quality of business courses and campus safety. Both parents and their children report mean ratings that range between satisfied and very satisfied on these college experiences.

Table 7. Significant Differences between Parents' and Seniors' Satisfaction with Students' College Experiences

	Mean Ratings			
College Experiences†	**Parents**	**Seniors**	**Difference**	**T test**
Social Life on Campus	3.14	2.28	.86	9.06 ***
Student Financial Services	3.13	2.62	.51	4.45 ***
Student Housing	3.13	2.66	.47	5.56 ***
Academic Advising	3.17	2.85	.32	4.22 ***
Financial Aid Package	3.03	2.73	.30	2.56 *
Extra-curricular Programs	3.31	3.11	.30	2.08 *
Career Services	3.09	2.80	.29	2.83 **
Faculty Attitude	3.42	3.43	-.01	n.s.
Quality of Business Courses	3.74	3.78	-.04	n.s.
Campus Safety	3.57	3.42	.15	n.s.

† These ratings are based on the scale: 1 'Very Dissatisfied' 2 'Dissatisfied' 3 'Satisfied' 4 'Very Satisfied'.
* $p < .05$; ** $p \leq .01$; *** $p \leq .001$

Overall Evaluation. Table 8 presents the results of t tests comparing parents' and seniors' overall assessment of the undergraduate program. On overall satisfaction, the parents' mean of 3.64 is significantly higher than the seniors' rating. The second set of mean ratings is based on slightly different, but related questions. Parents were asked, "Would you recommend the College to a high school senior interested in a career in business?" Seniors were asked, "If you had a chance to relive your college experience, would you choose to attend the College again?" The parents' mean rating of 4.62 is also significantly higher than the seniors' mean rating.

Table 8. Significant Differences between Parents' and Seniors' Overall Assessment of the College's Undergraduate Program

	Mean Ratings			
	Parents	**Seniors**	**Difference**	**T test**
Overall Satisfaction with the Education	3.64	3.28	.36	4.83 ***
Would Recommend or Choose the College Again	4.62	3.70	.92	8.89 ***

*** $p \leq .001$

Note: Overall satisfaction mean ratings range from 1 ‘very dissatisfied’ to 4 ‘very satisfied’. Response options for recommending or choosing the same college range from 1 ‘definitely not’ to 5 ‘definitely would’.

The following selected comments offer insight into the reasons for parents' positive evaluation of their child's undergraduate education, including: excellent education, enriching student life experiences, responsive student services and effective communication with parents.

> From day one until the day my daughter graduated from the College, it has been the best investment I have made in my life and in my daughter's life.
>
> My son got an outstanding education and grew more then I could have imagined in four short years. He was thrilled with the academics.
>
> His participation on the swimming and diving team for four years, his athletic records and achievements, coupled with his active involvement in the admissions office for three years helped make him a strong candidate for summer internships which eventually led to his existing job in the consulting arena.
>
> While my son attended the College, we had a serious family medical emergency and found the College's response, locating my son and informing him of the need to call home, to be speedy and very caring. Thereafter, professors and staff expressed concern and care, which helped him weather the crisis.
>
> I'm impressed with the College's efforts at communication and support. Being so far away and my son being determined to be as self-reliant as possible, actual interaction with the faculty and administration has been limited.

Recommendations

Based on the research findings, the following types of policy recommendations were designed to promote the College's strengths and address areas for improvement.

- *In communicating with prospective students' parents, share current parents' confirmation of their choice reflected in their willingness to recommend the College.*
- *Utilize parent testimony to portray the undergraduate program as a wise investment.*
- *Promote parents' positive evaluation of the program's impact on students' abilities.*
- *Publicize parent's high level of satisfaction with the undergraduate program.*
- *Intensify the program's focus on enhancing students' ability to write effectively.*
- *Review and enhance the undergraduate academic advising program.*
- *Closely monitor student housing to ensure high quality maintenance.*
- *Ensure that all College offices are responsive to parents' inquiries and concerns.*

Discussion

This study represents an effort to involve parents in assessing higher education's effectiveness. The research is based on the belief that parents ought to be involved given the investment they make; their expectation to be involved; and the significant role they play in their children's lives (Kirwan, 2007; Scott & Daniel, 2001).

Results revealed that the vast majority of parents rated the program highly for enhancing students' ability to think analytically; gain in-depth knowledge of a field; and lead effectively. In contrast, only a minority considered that the program greatly enhanced students' ability to write effectively. Parents expressed varying levels of satisfaction with aspects of the college experience. While the majority were very satisfied with the quality of business courses and campus safety, only a minority were very satisfied with academic advising and student housing. In terms of overall assessment, close to 70 percent or more were very satisfied with their child's education and would definitely recommend the College to a high school senior.

Comparative analyses revealed that parents and students rated the program highly for enhancing students' ability to acquire new skills and knowledge and develop leadership ability. However, parents reported substantially and significantly higher ratings for the program's impact on students' ability to relate well to people of different races and to understand moral and ethical issues; parents perceived a moderate to great impact, while their children perceived only a little to moderate impact. Parents also reported significantly higher satisfaction with campus social life; the parent mean rating indicated satisfied, while the student mean rating indicated dissatisfied.

There were no significant differences between parents and students in terms of satisfaction with faculty attitude and quality of business courses; both parents and students reported positive mean ratings between satisfied and very satisfied. Browne, Kaldenberg and Browne (l998) also found significant positive correlations between parents' and students' ratings on faculty teaching skills and satisfaction with the overall value of the education in an undergraduate business program.

Parents and students reported positive mean ratings on the two outcome measures reflecting an overall assessment of the undergraduate program. On overall satisfaction, the parent mean rating was close to very satisfied, while the student mean rating was close to satisfied. In terms of recommending or choosing the same college again, parents reported a mean close to definitely would, while students reported a mean close to probably would.

Regression analyses identified significant predictors of parents' overall satisfaction and willingness to recommend the College. Perceived impact on students' ability to acquire new skills and knowledge was a significant predictor of both outcomes. Other predictors of these outcomes varied. Satisfaction with academic advising and career services significantly predicted overall satisfaction, while satisfaction with student housing and extracurricular programs significantly predicted willingness to recommend the College.

Previous research with students also identified a different set of predictors for overall satisfaction and the likelihood of choosing the same college again. Delaney (2005) found that student satisfaction with the quality of business courses; satisfaction with faculty

attitude; and the perception of enhanced ability to think analytically significantly predicted overall satisfaction. In contrast, satisfaction with campus life and satisfaction with campus safety significantly predicted the likelihood of choosing the same college again. Thus, research with parents and students identifies factors related to academic preparation as significant predictors of overall satisfaction with undergraduate education, while factors related to student life are significant predictors of willingness to recommend or choose the same college again.

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NEAIR 2008 CONFERENCE BEST FIRST PAPER

IMPROVING RESPONSE RATES THROUGH BETTER DESIGN: RETHINKING A WEB-BASED SURVEY INSTRUMENT

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Abstract

Institutional researchers often understand "survey design" as a process in which researchers translate broad research questions into specific survey items. Here, we go beyond this conception and search for ways to improve the experience of taking a web-based engagement survey. We present evidence from an experiment that this process can result in increased response rates and better quality data.

Introduction

Cornell University has administered a survey of student engagement four times since 2003. This survey, titled the *Enrolled Student Survey* or the *ESS*, was developed in consortium with 30 other elite institutions and included over 250 individual items. Over the course of the four survey administrations, Cornell's response rate declined substantially, from 47% in 2003 to 29% in 2007.

In an effort to address declining response rates on our campus, we considered the role of survey instrument design and how it can contribute positively or negatively to the experience of completing a web-based survey of student engagement. In this paper, we describe how we: reduced the overall length of the survey; enhanced its visual appeal; and increased students' perceptions that the survey was relevant to their experiences. Evidence from an experiment on our campus indicates that the new survey generates a higher response rate with better quality data.

Conceptual Approach

Existing research on survey design emphasizes that potential respondents evaluate signals from the survey instrument itself in deciding whether to respond. We focused on the following four considerations:

1) **Survey length**. The perceived burden of responding to a survey is tied directly to its overall length (Bogen, 1996; Handwerk, Carson, & Blackwell, 2000) as well as the number of questions that appear per web screen (Schonlau, Fricker, & Elliott, 2002). In the course of this project, we reduced a survey with over 250 items to one with fewer than 100. In addition, we searched for ways to signal that the survey was not burdensome to complete, and that progress through the survey was swift (e.g. Schonlau et al., 2002).

2) **Survey content**. Researchers are advised to use a "top down" approach to survey construction where underlying research questions are identified and relevant survey questions follow. While there is considerable merit in this theory driven approach, we note that surveys enjoy higher response rates when their contents are seen as relevant to the respondents' own experiences and values (Dillman, 1991; Groves et al., 2000; Groves, Presser & Dipko, 2004). To enhance the salience of our survey, we asked our interview participants what they thought of the questions we had developed and what *they wanted to tell us* in a survey. Consequently, we added a handful of new questions to the instrument.

3) **Visual appeal**. When survey design is viewed as relating narrowly to the choice and wording of questions, insufficient thought may be given to the process of converting those items into a web-based survey instrument. Yet extant research suggests the visual design of a web-based survey affects response rates (Couper, Traugott & Lamias, 2001; Dillman, 2000; Dillman, Tortora, Conradt & Bowker, 1998). In this project, we paid a great deal of attention to the overall look and feel of the survey, and responded to student feedback regarding the appearance of the pages.

4) **Delivery of survey results**. Providing respondents with survey results can help build rapport with respondents (Cook, Heath & Thompson, 2000; Groves, Singer & Corning, 2000; Ribisl et al., 1996). In this project, we took advantage of what the web makes possible, using Cold Fusion software to incorporate instant results into the survey-taking process. In this way, we immediately rewarded survey respondents with a handful of findings at key points.

Process

In consortium with 30 other elite institutions, Cornell University had administered the ESS four times since 2003. That survey included over 250 individual items, and had gone through one substantial revision (before the 2007 administration). While we had achieved a respectable 47% response rate in 2003, our 29% response rate in 2007 enhanced our desire to lessen the burden the survey placed on students.

We held a day-and-a-half face-to-face meeting with like-minded institutional research colleagues from peer institutions to establish the foundations for moving the project forward. Specifically, we held a sustained dialogue concerning, first, the core objectives of our institutions and their intersections and, second, the criteria we should use in deciding whether or not a specific item should be included in this survey.

As an illustrative example of "core objectives": there was consensus that our institutions conscientiously emphasize vibrant intellectual communities (beyond the classroom), including: residential communities that foster the exchange of ideas, interactions with diverse kinds of students, and meaningful discussions with faculty. Thus, a survey that would enable us to hold ourselves accountable for the things we believe we should be doing would include measures relevant to intellectual communities.

The criteria we adopted to make decisions as to whether or not any specific item would appear on the new survey included:

- The survey item should clearly relate to our shared research agenda.
- The survey item reflects the principles of quality survey design.
- The survey is of interest to several institutions.
- Previous use of the survey item produced results of practical importance on our campuses.
- Prior analyses have demonstrated that the item has a proven track record statistically: it has sufficient variance; it does not suffer from high item-nonresponse; it is not redundant with another indicator; it is an important predictor of key outcomes; and/or outcomes have changed over time such that timely data provide new insights.
- The wording and interpretation of new survey items have been thoroughly explored and pre-tested with students.
- There is utility in time-series data: we should not change ESS question wording or response categories without a compelling reason. That being said, the utility of legacy items needs to be assessed.

With careful attention to both our core objectives and our agreed upon criteria for inclusion, an engaged working group reduced the 250 item survey to a core of approximately 75 measures (including 13 measures—like race and gender—which could be supplied from administrative files when that is a possibility).

With input from a graphic designer, we worked with a Cornell-based survey service to mock-up a version of the survey instrument to use for the purposes of testing and evaluation. We then recruited students—with a $20 payment for a one-hour interview—to come to our office to take the survey and provide their candidate feedback about the *experience* of taking the survey. In total, we interviewed nineteen undergraduate students. After the feedback received in the first ten interviews, we made substantial revisions to both the aesthetics and the substance of the evolving survey instrument. This revised instrument was then pretested with nine more students, with only minor changes resulting.

As a final step in our research, we took the survey instrument that resulted from this process—now dubbed "PULSE"—and tested it head-to-head with the original ESS instrument. In this experiment, we drew a random sample of 300 summer session students and randomly assigned 100 to take the original ESS just as it had been administered in the spring semester of 2007 and 200 students to take the new PULSE. Results from that experiment are described in the section titled, "Did it Work?," below.

Survey Redesign: A Look at Page 1

Figures 1 and 2 are screen captures of the ESS (the original instrument) and PULSE (the revised instrument) respectively. In glancing across the figures, perhaps the first thing to note is that the first page of the ESS is notably longer than the first page of the PULSE. This is partly a reflection of the fact that the entire ESS is longer than the PULSE, but it is also the case that the single longest page of the ESS is the *first page*, with a total of 42 individual items. In contrast, we conscientiously elected to make the first page of the PULSE particularly short in an attempt to signal with the first impression that the PULSE was not a particularly lengthy or burdensome endeavor.

A second difference between the instruments is that we replaced the simple mechanical "progress bar" on the ESS with a more elaborate header on the PULSE. The PULSE header is not navigable; clicking on it will not take you to a different page of the survey. Rather, the goal of the header is to alleviate anxiety about "where the survey is going" by providing a succinct outline of the entire scope of the instrument.

Third, on the basis of student feedback, we replaced the black grid used on the ESS with a white grid and increased the spacing between items.

Fourth, and perhaps most substantively, the two instruments use different lead-off questions. This is not because the surveys differed substantively in content; in fact, the PULSE includes several of the items used to kick-off the ESS. Rather, this was a strategic choice in recognition of work by Dillman and others which indicates that the first question on a survey signals the nature of the survey and its salience to the respondent. With the PULSE, we elected to begin by asking for students' generalized opinions of their experience at the university rather than simply asking for unreflective reporting of behaviors. Further, given substantial evidence that academic engagement is positively correlated with survey response rates, we sought to avoid reinforcing this tendency by introducing the survey with a section on "Academics."

What Student Didn't Want to Tell Us, and What They Did

In our initial extended interviews with students taking the PULSE, the single most common complaint with the survey had to do with the bank of "time budget" questions. On the ESS, this bank is launched with the following stem: "During the current school year, approximately how many hours do you spend during a typical week doing the following activities." As illustrated in Figure 3, this stem is followed by 28 individual items, and students are asked to respond regarding the time spent on each item using one of *ten* response categories.

In the PULSE, we limited ourselves to asking about eight behaviors, but students still told us unequivocally that it was both daunting to be faced with a "sea of bubbles" ten—or even eight—columns wide *and* quite burdensome to try to have any precision in their estimates of how much time they spent "exercising" or "hanging out." Indeed, those of us who have had the experience of having to account for our time use—such as for reporting

purposes at work—may be able to relate to their irritation on this note. Accordingly, on the PULSE we sacrificed some precision and limited ourselves to just five broad response categories (see Figure 4). We were able to get more coverage out of five categories by dividing the time-use questions across two different banks, with behaviors tending to occupy a large amount of time (such as studying) using a different response scale than behaviors typically consuming less time (such as community service).

As a part of the sustained interviews with our nineteen pre-testers, we asked respondents if there were things that they felt we omitted from the survey—things that they would want to tell us about their undergraduate experience that we had not asked about.

More than half of our pre-testers indicated in one way or another that they wanted to tell us more about *what is like to be a Cornell student*. Specifically, they wanted to tell us that they work hard, that they sacrifice sleep, and that they are stressed. Further, they wanted to tell us not just about binge drinking—a single question on the survey—but about the role of alcohol in social life and how they have managed to navigate that. Finally, they wanted to tell us about the importance of Greek life on Cornell's campus. In response to this feedback, we dismissed our own hesitancy to inquire into quite personal issues such as drinking and mental health and added new questions that tapped these aspects of undergraduate life.

Web Surveys: More than a Paper Survey Put on the Web

As we searched for ways to improve the experience of taking the new PULSE survey, we invited ourselves to think about how we could use the fact that is a web-based survey to our advantage. As one of our early collaborators suggested, we should think about a web survey as being "more than just a paper survey put on the web." We seized three opportunities.

First, entirely generic survey instruments that ask about "your institution" or "your college" may reflect the economies of scale inherent in the mass production of paper surveys. With the web, however, the costs of customization are substantially less. In the PULSE, we ask about satisfaction with "Cornell University" rather than with "your institution," and we expect that our peer institutions will do similarly.

Second, we have tended to use random draws for prizes as incentives for our surveys. Our past practice had been to wait until the survey closes to draw winners. The trouble with this practice, however, is that it separates the behavior and its reward (stimulus and response) by days or even weeks. Indeed, we have contacted prize winners in the past who have told us they had completely forgotten they had taken the survey! While this might be the best possible model for drawing winners with a paper survey, the web makes it possible to program lottery selection right into the survey itself. Thus, for the PULSE, we indicated that every tenth respondent would know instantly if they had won $20. By notifying respondents *at the time they complete the survey*, we create the possibility that they will share their delight over winning with other students thereby encouraging others to participate in the survey as well.

Third, there is considerable evidence in the literature that respondents want to hear about the results of the study in which they participated. Indeed, our students told us as much as well. However, the effective *delivery* of study findings has proven to be more problematic than one might immediately assume. Further, as with post-survey lottery drawings, the lag between taking the paper survey and receiving a summary of findings can be substantial. Here again, the power of computing can be used to address the issue. At three points in the PULSE, we offered students "instant results" about a question they had already answered. For example, after responding to a question about their own satisfaction on one page of the survey, respondents are told on the next page, "X% of students who have taken the PULSE so far also rated their entire educational experience at Cornell as 'Excellent." And, upon hitting "submit" on the last page of the survey, respondents are provided a full page of bar charts and pie graphs portraying the responses "thus far" to key items of interest on the PULSE.

We also found that on our campus, students were sensitive to the notion of going to a URL outside of Cornell to take a Cornell survey. By hosting the survey ourselves – rather than using a single survey provider for the whole consortium – we were able to allay concerns that the survey was anything other than a Cornell-based effort to inform Cornell administrators about the Cornell experience.

Did it Work?: Impact on Response Rates and Data Quality

As described above, in order to test whether our efforts would make a difference in the response rate to the survey, we drew a random sample of 300 summer session students and randomly assigned 100 to take the original ESS and 200 students to take the new PULSE. Nearly identical emails were sent from the Dean of Students inviting the students to take the surveys; the only differences in the text were the names of the surveys and the estimated time it would take to complete the survey. Thus, 100 students were asked to complete the ESS with instructions that the "The questionnaire typically takes 20 to 25 minutes to complete," and 200 students were invited to take the PULSE with the comment "The survey typically takes around 10 minutes to complete."

Under any definition of "survey response," the PULSE fared better than the ESS. For example, if we define a student as a respondent if he or she answered just one or more questions, the PULSE attained a response rate of 47%, while the ESS response rate was just 39%.

More remarkable, however, is the data we observed on persistence through the survey, as is illustrated in Figures 5 and 6. Aside from the sentence in the invitation email cluing students to the estimated length of time to take the survey, there is little reason to expect that fewer students would even *open* the ESS as compared to the PULSE. Thus we were somewhat surprised to find any difference at all in the percent of students who even *entered* the survey (48% of those taking the revised PULSE as compared to 42% taking the original ESS).[5] The difference grew from there, however: 45% of the sample asked to take the

[5] The programming for the ESS did not allow us to observe how often a student followed the link to the survey and then left without any further action. However, we did observe that three of the 110 students opened the

PULSE reached the final page of the survey, compared to just 36% of those taking the ESS. Moreover, among those who responded, nearly all (94%) of those answering the PULSE provided answers for 90% or more of the questions asked, compared to just 60% of ESS respondents doing so.

An analysis not shown here suggests that PULSE respondents were also less select vis-à-vis non-respondents than the ESS respondents as compared to non-respondents. That is: the gap between the GPAs and SAT scores of respondents and non-respondents was substantially smaller for the PULSE group than for the ESS sample. This suggests that the PULSE data may be more representative of the population as a whole.

Implications

Inarguably, the content of a survey should be dictated, first and foremost, by the research questions the instrumented is intended to address. Clearly articulating the core research objectives underpinning a survey and establishing criteria to evaluate the utility of specific survey items are two important steps in developing surveys that are both relevant to our purposes and concise. Like other researchers (e.g., Bogen, 1996; Handwerk et al., 2000; Schonlau et al., 2002), we found that students are quite sensitive to the effort required to participate in a survey – whether measured by estimated time for completion, total number of questions, or the complexity of the response categories employed in particular questions. Dropping survey response rates suggest that our students are less and less willing to give up their time to complete a survey. Together, these points argue for being very sure that we are asking the *right* questions on our surveys and *only* those questions that really need to be asked.

But survey design should not be driven by content considerations alone. We may know *what* we want to ask our students, but *how* we present those questions within a web instrument may well affect the likelihood that students will choose to participate in the survey and the quality of the data we ultimately collect. Consistent with past research (e.g., Couper et al., 2001; Dillman, 2000), our study found that visual design elements – such as the borders and spacing used in questions, and the number of questions presented per page – elicited strong reactions from our pretesters. And ultimately, differences in survey length and visual design seem to have accounted for significant differences in the proportion of students responding to the original and revised versions of our survey, as well as differences in the proportion of survey questions completed. Visual design elements are most under our control when we are developing local survey instruments. Even when using externally-authored web-based instruments where the content has been predetermined, there may be opportunities for visually presenting this content in ways that can positively affect survey participation and for hosting the survey on a local domain. If so, the cost of programming such changes would seem to be well worth the potential benefits in survey response and completion rates.

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survey, went to the bottom of page one without answering any questions and clicked the submit button there without going on to answer any later questions or submit any other pages. Only one student acted analogously with the PULSE.

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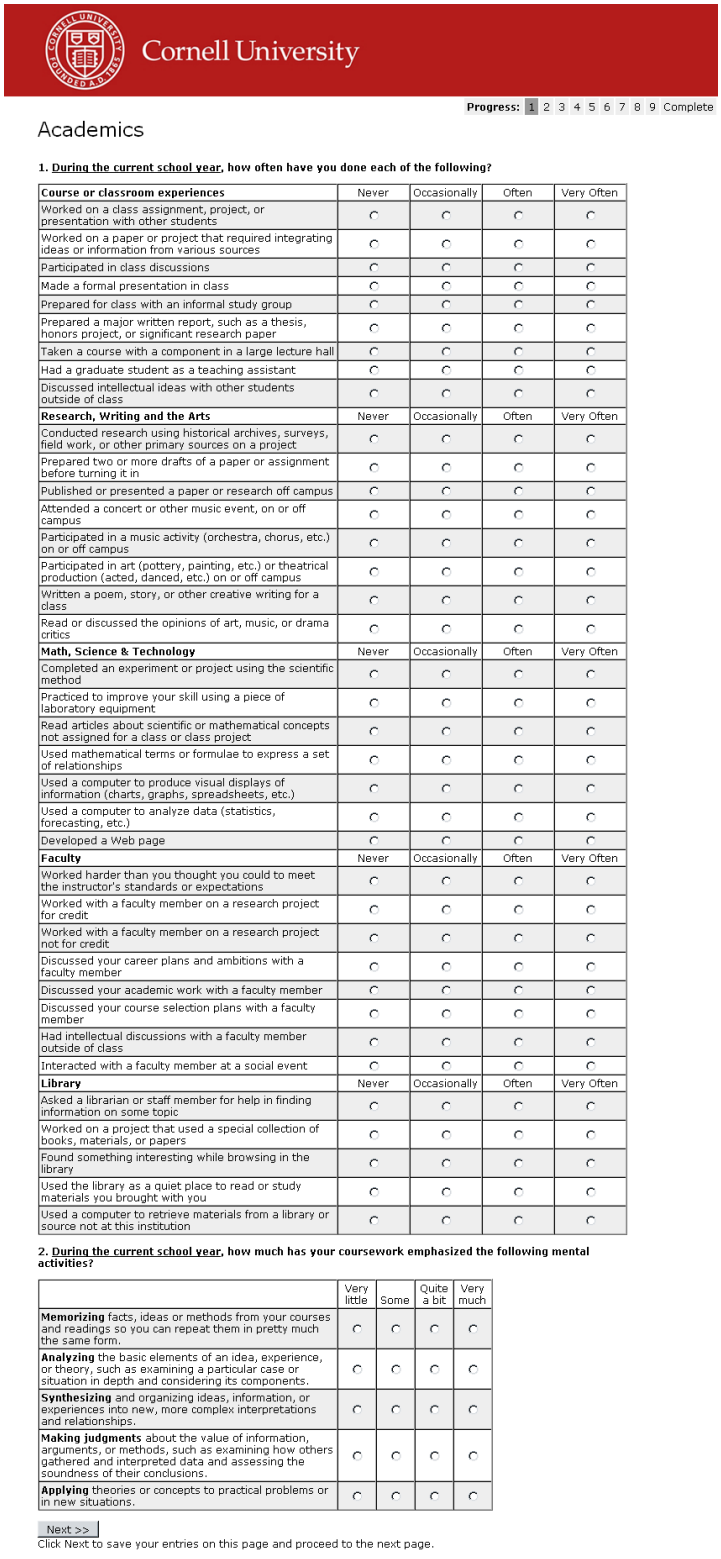
Figure 1. Page 1 of Enrolled Student Survey (ESS)



Cornell University

Progress: 1 2 3 4 5 6 7 8 9 Complete

Academics

1. During the current school year, how often have you done each of the following?

Course or classroom experiences	Never	Occasionally	Often	Very Often
Worked on a class assignment, project, or presentation with other students	○	○	○	○
Worked on a paper or project that required integrating ideas or information from various sources	○	○	○	○
Participated in class discussions	○	○	○	○
Made a formal presentation in class	○	○	○	○
Prepared for class with an informal study group	○	○	○	○
Prepared a major written report, such as a thesis, honors project, or significant research paper	○	○	○	○
Taken a course with a component in a large lecture hall	○	○	○	○
Had a graduate student as a teaching assistant	○	○	○	○
Discussed intellectual ideas with other students outside of class	○	○	○	○
Research, Writing and the Arts	Never	Occasionally	Often	Very Often
Conducted research using historical archives, surveys, field work, or other primary sources on a project	○	○	○	○
Prepared two or more drafts of a paper or assignment before turning it in	○	○	○	○
Published or presented a paper or research off campus	○	○	○	○
Attended a concert or other music event, on or off campus	○	○	○	○
Participated in a music activity (orchestra, chorus, etc.) on or off campus	○	○	○	○
Participated in art (pottery, painting, etc.) or theatrical production (acted, danced, etc.) on or off campus	○	○	○	○
Written a poem, story, or other creative writing for a class	○	○	○	○
Read or discussed the opinions of art, music, or drama critics	○	○	○	○
Math, Science & Technology	Never	Occasionally	Often	Very Often
Completed an experiment or project using the scientific method	○	○	○	○
Practiced to improve your skill using a piece of laboratory equipment	○	○	○	○
Read articles about scientific or mathematical concepts not assigned for a class or class project	○	○	○	○
Used mathematical terms or formulae to express a set of relationships	○	○	○	○
Used a computer to produce visual displays of information (charts, graphs, spreadsheets, etc.)	○	○	○	○
Used a computer to analyze data (statistics, forecasting, etc.)	○	○	○	○
Developed a Web page	○	○	○	○
Faculty	Never	Occasionally	Often	Very Often
Worked harder than you thought you could to meet the instructor's standards or expectations	○	○	○	○
Worked with a faculty member on a research project for credit	○	○	○	○
Worked with a faculty member on a research project not for credit	○	○	○	○
Discussed your career plans and ambitions with a faculty member	○	○	○	○
Discussed your academic work with a faculty member	○	○	○	○
Discussed your course selection plans with a faculty member	○	○	○	○
Had intellectual discussions with a faculty member outside of class	○	○	○	○
Interacted with a faculty member at a social event	○	○	○	○
Library	Never	Occasionally	Often	Very Often
Asked a librarian or staff member for help in finding information on some topic	○	○	○	○
Worked on a project that used a special collection of books, materials, or papers	○	○	○	○
Found something interesting while browsing in the library	○	○	○	○
Used the library as a quiet place to read or study materials you brought with you	○	○	○	○
Used a computer to retrieve materials from a library or source not at this institution	○	○	○	○

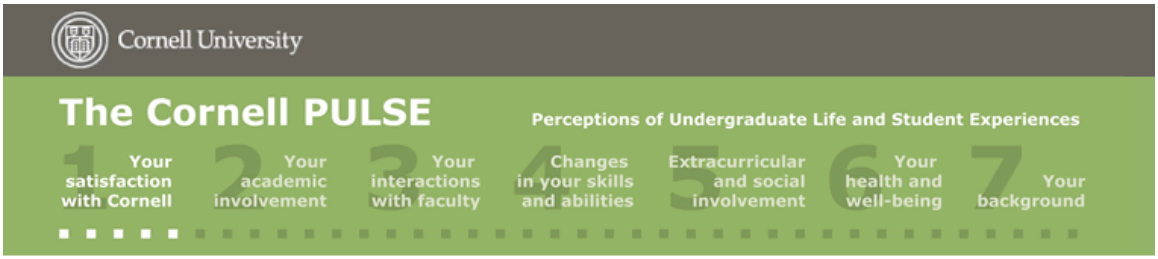
2. During the current school year, how much has your coursework emphasized the following mental activities?

	Very little	Some	Quite a bit	Very much
Memorizing facts, ideas or methods from your courses and readings so you can repeat them in pretty much the same form.	○	○	○	○
Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components.	○	○	○	○
Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships.	○	○	○	○
Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions.	○	○	○	○
Applying theories or concepts to practical problems or in new situations.	○	○	○	○

Next >>

Click Next to save your entries on this page and proceed to the next page.

Figure 2. Page 1 of the PULSE



How would you evaluate your entire educational experience at Cornell University?

Excellent	Good	Fair	Poor
○	○	○	○

How satisfied are you with the following aspects of your Cornell experience so far?

	Very **dis**satisfied	Generally **dis**satisfied	Generally satisfied	Very satisfied
Overall quality of instruction	○	○	○	○
Academic advising	○	○	○	○
Administration's responsiveness to student concerns	○	○	○	○
Social life on campus	○	○	○	○
Sense of community on campus	○	○	○	○
Sense of community where you live during the academic year	○	○	○	○

Submit (page 1 of 7) >>

See how quickly this goes??

Figure 3. The Time-Budget Bank on the ESS

7. <u>During the current school year</u>, approximately how many hours do you spend during a typical week doing the following activities?

Academic	None	Less than 2 hours	2-4 hours	5-10 hours	11-15 hours	16-20 hours	21-25 hours	26-30 hours	31-40 hours	More than 40 hours
Attending scheduled classes or labs	○	○	○	○	○	○	○	○	○	○
Working on scheduled courses outside of class or lab (i.e., homework)	○	○	○	○	○	○	○	○	○	○
Doing other academic work (e.g. thesis, internship, research)	○	○	○	○	○	○	○	○	○	○
Health and Athletics	None	Less than 2 hours	2-4 hours	5-10 hours	11-15 hours	16-20 hours	21-25 hours	26-30 hours	31-40 hours	More than 40 hours
Participating in Intercollegiate Athletics (during practice and playing season)	○	○	○	○	○	○	○	○	○	○
Participating as a cheerleader, mascot, or member of the marching band	○	○	○	○	○	○	○	○	○	○
Playing on intramural athletic or club sport team(s)	○	○	○	○	○	○	○	○	○	○
Exercising or using a fitness or weight room	○	○	○	○	○	○	○	○	○	○
Competing informally on a team or sport (e.g., "pick-up" game)	○	○	○	○	○	○	○	○	○	○
Eating meals	○	○	○	○	○	○	○	○	○	○
Extracurricular Activities	None	Less than 2 hours	2-4 hours	5-10 hours	11-15 hours	16-20 hours	21-25 hours	26-30 hours	31-40 hours	More than 40 hours
Participating in student government	○	○	○	○	○	○	○	○	○	○
Working on a campus newspaper	○	○	○	○	○	○	○	○	○	○
Working on a literary magazine	○	○	○	○	○	○	○	○	○	○
Participating in a Fraternity or Sorority ("Eating Club" or "Secret Society")	○	○	○	○	○	○	○	○	○	○
Playing or singing in an orchestra, band, choral or other musical group	○	○	○	○	○	○	○	○	○	○
Working on a theatrical production	○	○	○	○	○	○	○	○	○	○
Participating in a religious organization or religious service	○	○	○	○	○	○	○	○	○	○
Volunteering in the community	○	○	○	○	○	○	○	○	○	○
Participating in a political organization	○	○	○	○	○	○	○	○	○	○
Participating in a minority or ethnic organization	○	○	○	○	○	○	○	○	○	○
Participating in another organized student activity or club	○	○	○	○	○	○	○	○	○	○
Job	None	Less than 2 hours	2-4 hours	5-10 hours	11-15 hours	16-20 hours	21-25 hours	26-30 hours	31-40 hours	More than 40 hours
Working at a job that was part of a financial aid package (e.g., work-study program)	○	○	○	○	○	○	○	○	○	○
Working at a job that was not part of a financial aid package	○	○	○	○	○	○	○	○	○	○
Recreation	None	Less than 2 hours	2-4 hours	5-10 hours	11-15 hours	16-20 hours	21-25 hours	26-30 hours	31-40 hours	More than 40 hours
Socializing and talking with friends	○	○	○	○	○	○	○	○	○	○
Watching TV	○	○	○	○	○	○	○	○	○	○
Using a computer for non-academic activity (e.g., video games, Facebook, IM)	○	○	○	○	○	○	○	○	○	○
Reading for pleasure	○	○	○	○	○	○	○	○	○	○
Visiting with a family or friend off campus	○	○	○	○	○	○	○	○	○	○
Relaxing by yourself	○	○	○	○	○	○	○	○	○	○

Figure 4. The Time-Budget Banks on the PULSE

Page 2:

During the typical week this academic year, approximately how many hours do you spend on your academic work?

	Hours per week:				
	0-10	11-15	16-20	21-30	30+
[s2q1a] Attending scheduled classes or labs	○	○	○	○	○
[s2q1b] Working on academic work outside of class or lab (e.g., homework, research project, etc.)	○	○	○	○	○

Page 5:

During the typical week this academic year, approximately how many hours do you spend doing the following activities?

	Hours per week				
	None	1-5	6-10	11-20	21+
[s5q1a] Working for pay	○	○	○	○	○
[s5q1b] Physical fitness (exercise, sports, etc.)	○	○	○	○	○
[s5q1c] Community service	○	○	○	○	○
[s5q1d] Participating in other extracurricular activities (student organizations, fraternity or sorority, etc.)	○	○	○	○	○
[s5q1e] Partying	○	○	○	○	○
[s5q1f] Other relaxing or socializing (e.g., watching TV, playing video games, hanging out)	○	○	○	○	○

Figure 5. Percent of Sample Entering, Submitting Page 2 and Submitting Final Page, by Survey

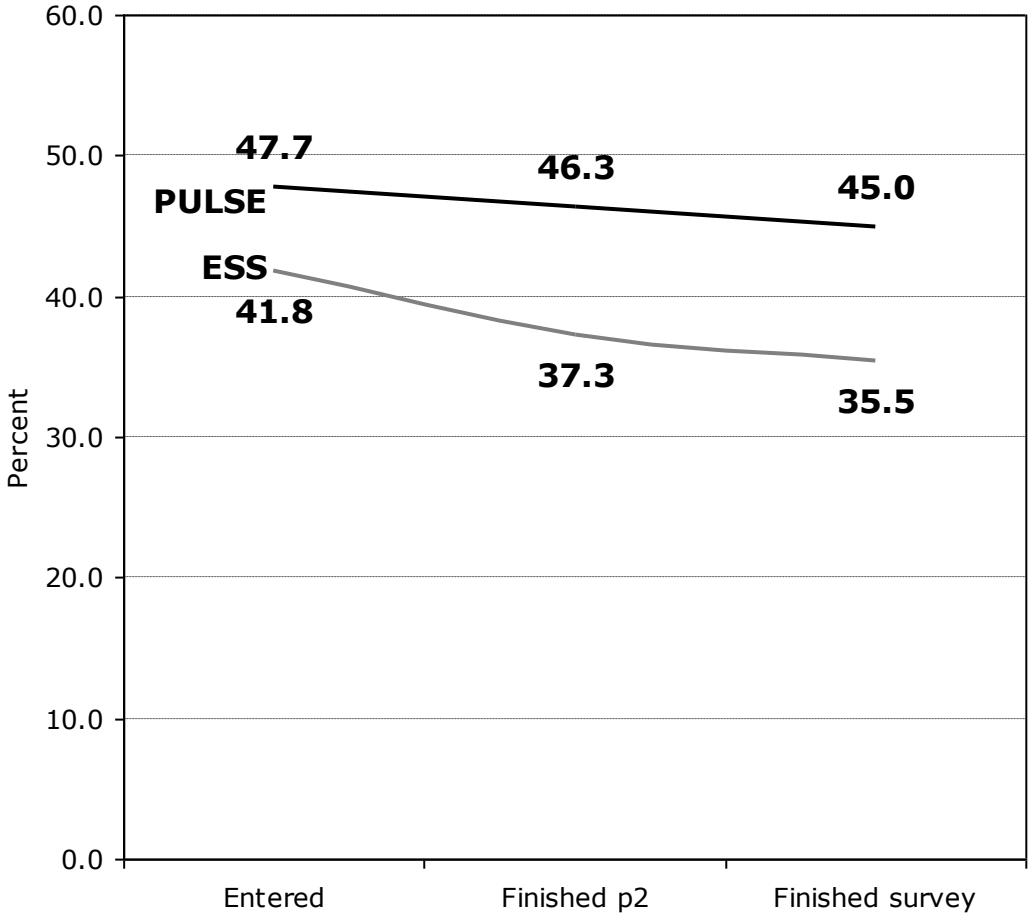
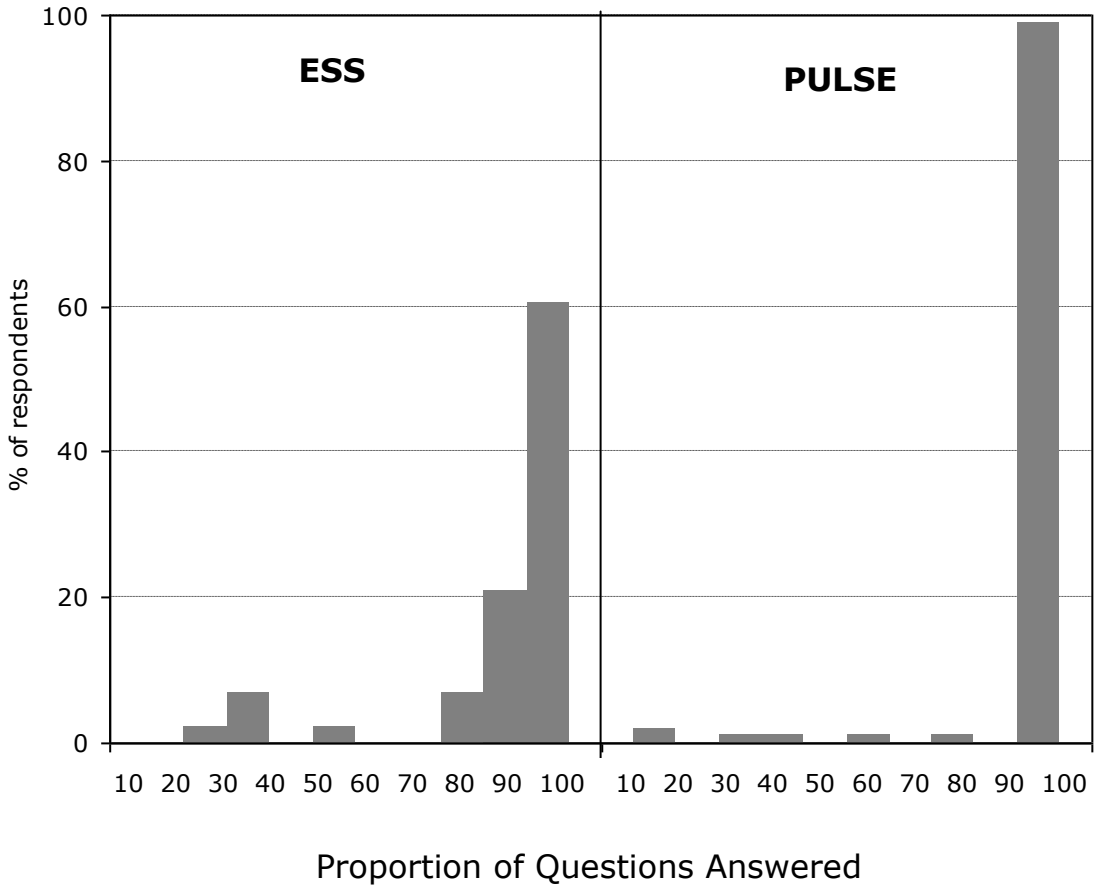


Figure 6. Histogram of Proportion of Questions Answered, by Survey



MOVING DATA INTO ACTION: THE APPLICATION OF INSTITUTIONAL RESEARCH TO ENHANCE STUDENT SUCCESS

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Introduction

The purpose of this research project was to examine factors related to student retention for students who entered the University of Massachusetts Boston (UMB) through the Directions for Student Potential (DSP) program. The DSP program is a six-week pre-matriculation summer program that provides intensive college preparation in reading, writing, mathematics, ESL, and study skills to students who don't meet the admission requirements of the University, but show other academic potential. At the end of the successful completion of the DSP summer program, students are guaranteed admission to the University. The majority of DSP participants are low-income, first generation, minority students, who, according to the literature, tend to have lower retention and graduation rates than their peers. Researchers in UMB's Office of Institutional Research and Policy Studies (OIRP) collected both qualitative and quantitative data on issues related to student retention, analyzed this data, and participated in the development of evidence-based plans for the implementation of an intervention designed to increase student success for this population. This paper will focus on the leadership role of the OIRP by delineating the research planning and the iterative data-based process that was utilized to develop the intervention. Implications for other IR professionals will also be discussed.

Background

College retention, persistence and degree attainment have been studied exhaustively over the past three or four decades. No single answer to questions of poor retention, persistence, and graduation rates has arisen. Perhaps the best-known retention theory is Tinto's student integration model (1975, 1982, 1988, 1993, 2005) that suggests that retention, persistence, and graduation rates will improve if the student withdraws from the old life of family and neighborhood and becomes fully integrated into the society of the higher education institution. Indeed, much of the work in the area of postsecondary education retention either builds on or is set in contrast to Tinto's theory.

Most models attempt to examine traits that are intrinsic to the student, such as race/ethnicity, gender, and age. Most also include traits that may have been developed in earlier education such as standardized test scores and high school grade point average. A number of studies simply report differing success rates by race/ethnicity rather than using multivariate analyses to examine differences in success rates by race/ethnicity while holding

other factors equal. Tinto (1993) reported six-year completion/persistence rates (based on the 1980 High School and Beyond study) for members of these groups who had entered four-year institutions immediately after high school as 60.7% for White non-Hispanics, 39.6% for Black non-Hispanics and 46.6% for Hispanics. Among the completers and persisters, White non-Hispanics were almost twice as likely to have graduated as were members of the other two groups. More recently, a report based on data from the Cooperative Institutional Research Program (CIRP) reported national six-year completion rates of 69.4% for Asian Americans, 52.2% for African Americans, 53.2% for Mexican-Americans, 44.3% for Puerto Ricans, and 61.6% for White non-Hispanics (Astin and Oseguera, 2002).

The main college entrance standardized test scores used for college admissions are the ACT and SAT exams. While many studies use them as independent variables in their models of retention and persistence, the scores are interpreted to mean different things in different studies. Tinto (1993) and Astin & Oseguera (2002, 2005) use combined SAT scores as an indicator of institutional selectivity. Other studies use SAT or ACT scores as an indicator of student ability (Aitken, 1982; Astin & Oseguera, 2005; DesJardins et al, 2002; Pascarella, Terenzini, & Wolfle, 1986). Other studies have used the scores as an indicator of acquired skills (Aitken, 1982; Elkins et al, 2000). Still others use them as an indicator of general academic preparation (Murtaugh et al, 1999; Nettles et al., 1986). The target population of this study, students who entered the Directions for Student Potential (DSP) Program, partially qualified for the program on the basis of SAT scores that were below the range normally accepted at the university but were combined with other qualities that led the university to believe that the students could be successful.

DSP students showed results that were not consistent with the results found in the literature for students with similar characteristics. For DSP students, the relationship of race/ethnicity and standardized test scores to retention was the opposite of what is usually found in the literature. These students were retained at higher rates than the non-DSP students who generally had significantly higher SAT scores. The DSP students are disproportionately minority, but over a number of cohorts often had higher retention rates than white non-Hispanic students who did not attend DSP. The contrast between outcomes predicted by the literature and the actual outcomes for the DSP students seemed important enough to explore further to ascertain whether something in the DSP program that was important to success could be expanded to a larger population. The planning year grant provided support for a year while a Community of Practice (COP) researched the program, tried to identify what made it successful, and developed a comprehensive plan to provide similar services to a larger population.

Charting the Course: The Roadmap

Representatives from the Office of Institutional Research and Policy Studies (OIRP) at UMB played a critical leadership role in the COP in a number of ways. From the very beginning of the process, OIRP had a place at the table. The Associate Director of OIRP analyzed initial data that revealed that the DSP program participants have better retention rates than their non-DSP counterparts. In addition, the COP hired a part-time, grant-funded, project-specific research fellow, with a direct reporting line to OIRP rather than to the principal investigators. This allowed OIRP to lead the data collection and analysis process, such that the research was conducted within an IR context, rather than having IR answer data requests from the COP in a unidirectional process. This organizational structure also allowed for a seamless incorporation of additional IR data as the iterative process within the COP generated new questions. In addition, because the research fellow was 100% project-funded, there were no conflicting responsibilities, and the study was able to progress very quickly. Within a 6 month timeline, IRB approval was obtained, surveys were developed and administered, 6 focus groups were conducted, all quantitative and qualitative data were analyzed, and three study reports were generated.

OIRP began playing a leadership role during the research planning stage. Survey instruments were developed and administered to first and third year DSP students. Rather than developing new survey instruments from scratch, OIRP developed surveys that were compatible with data fields that are already collected with routine student surveys, such as NSSE and CIRP. The outcome of this process was to create a longitudinal dataset with baseline information for the 2007 cohort of students, which will be usable after this specific project ends, through data merges with subsequent routine surveys that are conducted by OIRP. In addition, this strategy allowed for comparisons to be made between this specific cohort and other university cohorts who had completed the existing surveys. Also, existing data were merged with the new data that was collected. Data sources included pre-existing official University records of admissions and semester-by-semester enrollment data. In addition, a number of focus groups were planned that explored the experiences of the 2007 cohort of DSP students with attention to students who were identified as particularly successful and others who were viewed as at-risk. Overall, the OIRP planning created a context of data triangulation that allowed for a comprehensive and holistic approach to understanding students' experience as it relates to retention, and which allowed for merging with data from past and future planned student surveys.

Re-routing with New Information

The COP met monthly to discuss progress and to review the study findings. Through discussions at the COP meetings, we learned that there is a Student Support Services (SSS) program that is offered to many DSP students. The SSS program offers academic advising, loaner books and laptops, some financial support, a Foundations course which teaches time management and study skills, and unlimited tutoring to program participants. The SSS program is offered to first-generation, low income students, and there is space for 500 students per year to qualify for the program, of which 100 are new students each year. The benefits of the SSS program are provided until students have accumulated 60 credits, at

which point they are no longer eligible for SSS services. Since the DSP population overlaps with the eligibility requirements for the SSS program, OIRP representatives questioned the amount of overlap between the DSP program and the SSS program. OIRP found that almost all of the SSS students enter through the DSP program, but only about half of the DSP students are offered SSS services. OIRP, concerned that the high overlap of these two programs may be impacting study results, gathered more information about the program by meeting with the SSS Program Director, and subsequently added SSS coding to the datasets. As a result, it was discovered that most of the effect that we were seeing in retention in DSP students was from the SSS component, not DSP alone. An example using the 2006 cohort (n=92 DSP Only and n=91 DSP & SSS) is shown in Figures 1. and 2. below.

When the DSP group was not coded for SSS, retention rates were better for the DSP group than the Non-DSP group (82.0% vs. 70.7%, $p<.01$), indicating that the DSP program enhances retention. However, once the SSS coding was incorporated, there were no differences between the DSP Only group and the Non-DSP group in retention rates (69.6% vs. 70.7%, $p=.809$), but there was a significant difference between the DSP & SSS group and the Non-DSP group (94.5% vs. 70.7%, $p<.01$). These results were presented to the COP, and a decision was made that the evidence pointed to focusing on the SSS component.

Figure 1. One-Year Retention Rates: DSP Students vs. Non-DSP Students

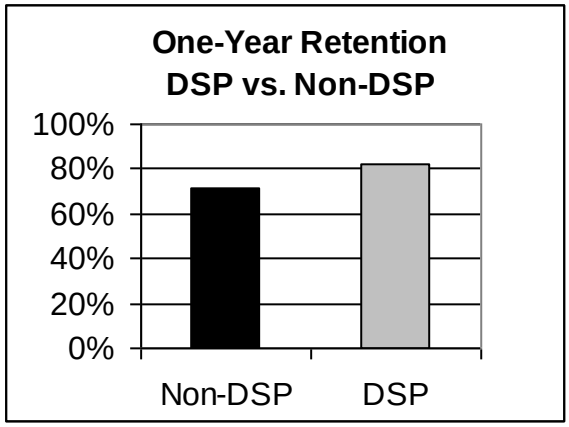
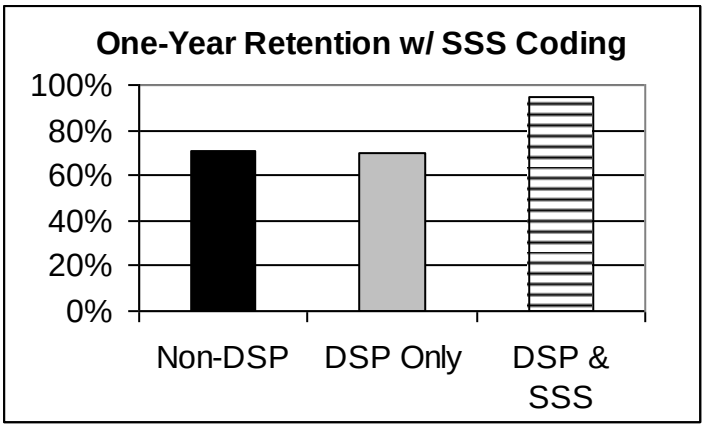


Figure 2. One-Year Retention Rates with Coding for Student Support Services (SSS)



Survey results also indicated that there was a need to further explore the impact of the SSS program. Approximately 60% of those DSP students who returned surveys were also in the SSS program, and of those in the SSS program, 66.1% rated the program as very important to their success and ability to continue in school. In addition, the Student Support Services program tied for first place with Computer Labs in rankings of student satisfaction with the services. Results are presented in Table 1. below.

Table 1. Utilization of All Student Services Ranked by Importance for Success and Ability to Continue in School (n=110)

Program/Service	% Used	n Used	% Very Important	% Very Satisfied
Financial Support	87.3%	96	72.9%	38.6%
Computer Labs	91.8%	101	67.3%	52.5%
Student Support Services	58.2%	64	66.1%	52.5%
Library Resources	89.1%	98	61.2%	41.8%
Academic Support (tutors, workshops)	79.1%	87	52.9%	26.4%
Advising/Counseling	88.2%	97	51.5%	37.1%
Being a part of DSP	96.4%	106	43.4%	47.2%
Student Life Services	68.2%	75	36.0%	18.7%
Club Affiliations or Student Organizations	59.1%	65	30.8%	18.5%
Athletics/Recreational facilities	67.3%	74	25.7%	16.2%

OIRP staff then incorporated the SSS coding into all analyses of the DSP program data. Existing information on seven cohorts of students (those entering UMB from Fall, 2000 to Fall, 2006), including admissions data, student GPAs by semester, credits accumulated by semester, and retention and graduation data were analyzed and compared between three

groups of UMB students (DSP Only, DSP & SSS, and non-DSP). A total of 1,138 DSP students and 3,011 non-DSP students were included in the analysis. The effect of SSS on retention held true in the larger analysis.

Other factors that were analyzed showed similar results, with DSP & SSS students performing better than DSP Only students for the majority of cohorts. An analysis of end of semester cumulative GPAs showed that, overall, DSP students had lower GPAs than non-DSP students. However, after being coded for SSS, it was revealed that DSP & SSS students had average GPAs that were close to non-DSP students, while DSP Only students had the lowest GPAs. These results are displayed in Figures 3. and 4. below.

Figure 3. Average GPA by Semester: DSP Students vs. Non-DSP Students

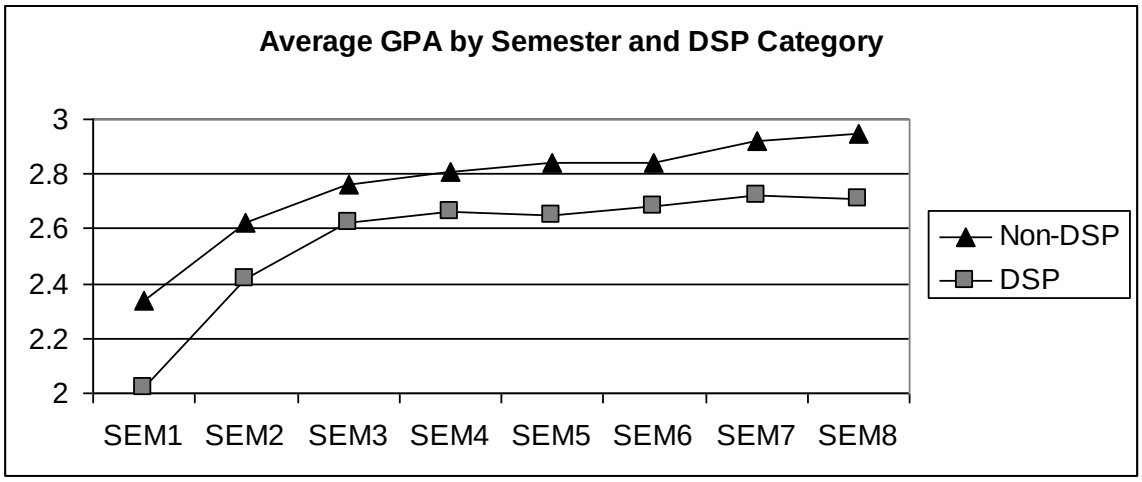
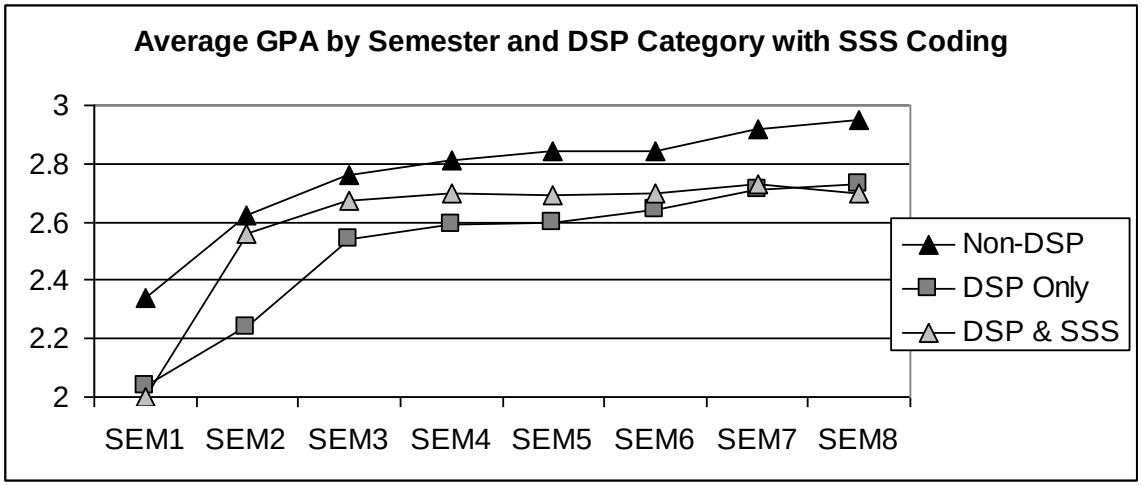


Figure 4. Average GPA by Semester and DSP Category with SSS Coding



More questions were then generated about what aspects of the SSS program might be impacting these findings. The OIRP staff was able to incorporate these questions into the ongoing data collection. For example, additional focus group questions were added to

explore areas within SSS that seem to have the biggest impact from the students' perspectives. A total of 21 of the 22 students (95%) who attended a focus group and were in the SSS program made comments about the program, and the majority of the comments were positive. The SSS program seems to be effective because of its multidimensional approach to students. Students' feedback centered on three main themes: 1) High quality advisors who both provide useful information and also personally care about the students and connect with them (57%); 2) Services and/or the Foundations class that are useful to students (57%); and 3) A space and environment that is inviting to students and creates a place to gather or hang out (29%). Several made comments which showed the interactive nature of the SSS advisors.

> "I used to have a regular advisor because I wasn't signed up with SSS. You're only a number [with university advisors], but with SSS they know me by my name, and you have that relationship with them. They know what classes you take and what you need to take. They know if I am missing something, and they call me....In other departments, they look at it as it's your problem. My problems become our problem at SSS. They helped me fill out my FAFSA – the school kept telling me I made a mistake, but didn't tell me what the mistake was. She [SSS advisor] actually sat down with me and filled it out."

Another student revealed about her advisor,

> "I'm really close to her. I had a problem last semester, and I talked to her. She understands you, she is supportive, very helpful."

Another student stated that even though her advisor was not always available for a meeting, she emails him frequently, and he responds to her emails. She also stated, "When I get anxious and stuff, he helps calm me down." This feedback from focus groups led us to the conclusion that advising was an important factor.

A further breakdown of the SSS services that students felt were useful revealed that of the 17 comments that were made about the services (excluding advising), 35% were about the usefulness of the tutors, 29% were about the usefulness of the Foundations class, 24% were about the book loan program, and 12% were about the laptop loan program. One student also mentioned that she got a free USB port and a planner. Only three students stated that they did not use their advisors on a regular basis or that SSS was not helpful to them. In addition, students mentioned that the unlimited amount of tutoring they could get from the SSS tutors (versus the limits placed on University tutoring) was very helpful.

When survey results were analyzed, the analysis focused on study time, tutoring, and advising. A total of 64 students (58.2%) who returned the survey were also classified as Student Support Service students. These students reported the importance of and their satisfaction levels with subdivisions of Student Support Services programs. The highest percentage of students reported using their SSS advisor (92.2%), followed by the priority registration (89.1%) and then the cash aid/money other than financial aid loans (76.6%). The book loan program and the laptop loan program had the fewest percentage of students participating (67.2% and 68.8%, respectively), but still had the majority of students reporting that they used these programs. Interestingly, the two programs most used by students (SSS advisor and priority registration) also had the two highest percentage of students rating the program as very important (65.7% and 59.4%, respectively) and having been very satisfied with the services they received (47.5% and 43.9%, respectively), and had the lowest percentage of students rating that they were very unsatisfied with the service (1.7% and 1.8%, respectively).

Table 2. Utilization of Student Support Services Program Ranked by Importance for Success and Ability to Continue in School (n=64)

Student Support Services Program	**% Used**	**n Used**	**% Very Important**	**% Very Satisfied**
Advisor	92.2%	59	71.2%	47.5%
Cash aid/money other than Financial Aid loans	76.6%	49	67.3%	30.6%
Priority registration	89.1%	57	66.7%	43.9%
Book loan program	67.2%	43	65.1%	34.9%
Tutor	73.4%	47	61.7%	34.0%
Laptop loan program	68.8%	44	61.4%	31.8%
Foundations class	82.8%	53	54.7%	35.8%
Referrals to other sources	76.6%	49	49.0%	32.7%

There were no significant differences between DSP Only and DSP & SSS students on the amount of time spent on schoolwork each week, but higher percentages of DSP & SSS students reported that they completed all of their assignments (77.0% vs. 47.7%, $p=.001$). Those students who were in DSP & SSS were more likely to use the Reading, Writing, and Study Strategies Center (25.9% vs. 9.5%, $p<.05$), the subject tutoring (individual tutorials, including ENG 101/101E and 102/102 E) (51.7% vs. 24.4%, $p<.01$), and the ESL Center tutoring (40.7% vs. 7.3%, $p<.001$) than those in DSP only.

These results led to more questions about the different types of academic advising available to students, and a short survey was conducted by OIRP staff with academic advisors from three departments (SSS, University Advising Center (UAC), and athletics) in order to further examine the components of the SSS advising program. Advisors were asked about a variety of activities that occur during advising sessions, and were asked to rate how frequently each activity occurs during a 'typical' advising session. Activities that advisors

say they do only sometimes or rarely include working with advisors in the students' major department, performing placement tests or other assessments, meeting with or communicating with students' parents, and making referrals to sources outside of the University. SSS advisors assist students with financial aid documents, while UAC advisors don't typically do so. Among the three SSS advisors across the 26 activities (excluding referrals to SSS tutors), more activities were selected as being performed 'Usually' (n=40) than among UAC advisors (n=23). In addition, SSS advisors had fewer activities selected as 'Rarely/Never' (n=8) than those in UAC (n=11).

Several advisors in the UAC stated that students get referred to them by faculty. In addition, the UAC advisors stated that students who are experiencing problems schedule appointments with them. In the UAC, a student can see any advisor, while in SSS, advisors are assigned a specific caseload. SSS advisors and the Athletics Department advisor have smaller caseloads (approximately 200 to 1) compared to the UAC advisors (approximately 400 to 1). The SSS advisors are mandated to meet with students several times a year, as is the advisor in the Athletics Department. In addition, one SSS advisor and the advisor in the Athletics Department revealed that they teach skills courses (Foundations) or study hall to students, and therefore have frequent interactions with them and get to know their strengths and weaknesses. Several advisors also stated that they do "intrusive counseling" and frequently communicate through informal networks with other faculty or professional staff. One advisor in SSS stated that they know the students' course schedules, and can meet up with students after class if they need to reach them and they are unresponsive to phone calls or email messages. All of the SSS advisors and the Athletics advisor said students are 'usually' comfortable talking about personal, social, and academic problems, while the UAC advisors all stated that students were 'often' comfortable doing so. Perhaps the smaller caseloads and the relationships that the SSS advisors forge over time allow students to get more comfortable talking about problems with them. The SSS advisors seem to act more as a one-stop resource, and their lower caseloads may allow them to engage in a broader range of advising activities at more frequent intervals than the UAC advisors.

All the advisors across all the departments said that students return to them even after they have declared a major and have a faculty or departmental advisor, because students still need help with general education requirements. The advisors that were interviewed saw the role of the faculty advisor as one of knowing specific departmental requirements and linking students in their majors to career opportunities. Interestingly, the SSS advisors mentioned the relationship that they had built with their advisees, and encouraged students to utilize both types of advisors. On the other hand, the UAC advisors and the advisor for student athletes emphasized more the distinct roles of the faculty advisor.

One area in which DSP & SSS students did not perform as well as DSP Only students or non-DSP students was in graduation rates. While there were no statistically significant differences between the non-DSP, DSP Only, and DSP & SSS groups in the percent of students graduating (28.8% vs. 28.0% vs. 25.2%, respectively, p=.416) across those cohorts who have at least four years of data (2000-2003), there was a question as to why the higher retention rates of the DSP & SSS students did not translate into higher graduation rates for these students. The COP discussed this issue, and generated some ideas as to why this may

UTILIZING STUDENT CLASS SCHEDULES TO PREDICT PERSISTENCE DURING THE FIRST SEMESTER OF COLLEGE

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The first year college signifies a time of great transition for many students, involving separation from parents, immersion into a new environment, additional freedoms and greater responsibilities (Chickering & Reisser, 1993; Gardner, Upcraft, & Barefoot, 2005). The challenge posed by the college transition seems to explain why the first-year is the most likely time for a student to drop out of college (Gardner et al. 2005; Tinto, 1993). Research on student departure suggests that the first 2 to 6 weeks of the first semester represents a critical period for students' decision to persist or withdraw from an institution of higher education (Levitz & Noel, 1989). During these few weeks, the first-year students who are most likely to persist to their sophomore year integrate into the academic and social culture of the institution (Tinto, 1993). The students who successfully achieve a fit with their college or university also tend to solidify their financial commitment to completing an education at the institution (Paulsen & St. John, 1997).

Academic performance and progress represent important measures of academic integration (and social integration to some extent), but for first-year students the critical period in their transition to college occurs before the end of the first semester or even before the mid-term warning grades get posted. Therefore, effective retention efforts must identify the most at-risk first-year students prior to their first day of class in order to provide the necessary support for the student's successful transition into the institution. Tinto (1993) argues that successful first-year programs do not focus on retention as a primary goal, but on ensuring that students acquire the necessary skills and habits to meet the developmental challenges that result from university life. The current investigation seeks to provide an effective method to identify the students who have the slimmest chance of returning to an institution for their sophomore year.

Institutional researchers often utilize logistic regression to develop models that identify individual students with the highest probability of dropping out in an effort to provide individualized support for at-risk students (Dey & Astin, 1993; Hadijcostas, 2006). Retention prediction models for first-year persistence tend to focus on students' preexisting characteristics (e.g., demographic variables, financial aid, and pre-college academic records), but do not include

measures that approximate student-faculty interaction. A vast body of literature stresses the importance of student-faculty interaction on student persistence beyond their first-year of college (Astin, 1993; Tinto, 2000). The current investigation utilizes students' first semester course schedules in order to construct variables that coupled with students' preexisting characteristics present a valid logistic regression model. A key finding suggests that small class size during the first semester (i.e., fewer than 20 students) promotes student retention from freshmen to sophomore year. In the discussion section, We highlight the implications of the findings for institutional research, academic advising, student retention, and academic affairs.

Problem Statement

Retention prediction models for the entering freshmen class tend to focus on students' preexisting characteristics (e.g. demographic variables, financial aid, and pre-college academic records), but do not include measures that approximate student-faculty interaction during their first semester. The current study also seeks to utilize students' first semester course schedules in order to construct variables that coupled with students' preexisting characteristics suggest a logistic regression model that predicts student persistence beyond the first-year. The model utilizes variables that predict the likelihood of student persistence prior to the first day of classes for an entering class of first-time degree-seeking students. In addition, to predicted measures of faculty interaction; the current work aims replicate the findings from previous studies (e.g., that high school GPA and receiving financial aid predict first-year student persistence to the sophomore year).

Method

We utilized logistic regression to develop a predictive model that identified a set of significant predictors of persistence for the three most recent entering first-year classes. The model we present predicts the future likelihood (i.e. probability) that each student in the current first-year class would return for their sophomore year.

Participants

The students in the study enrolled at a moderately selective private university in the Northeastern United States with an enrollment around 5,000. Participants included all first-time full-time undergraduate degree seeking entering the university in Fall 2005, Fall 2006, Fall 2007 and Fall 2008 enrolled at the October census date (N = 4,173). Non-U.S. citizens were excluded from the study. Female students made up 52% of the sample and ethnic minorities comprised 6% of the sample.

Participants satisfied the federal cohort group definition (i.e., first-time first-year students enrolled in a degree program full-time). The prediction sample (n=3,182) consisted of the federal cohort groups for fall 2005, 2006, and 2007. The dependent variable (persistence to the sophomore year) was known for students in the prediction sample. The verification sample consisted of students from the fall 2008 federal cohort group (N=991), for which persistence to the sophomore year was not known at the time of the study and would be predicted by the model. The logistic regression procedure develops predictive probabilities for participants in the verification sample based on the significant relationships in the prediction sample.

Data

Student records from the registrar, financial aid, and admissions provided the data to measure students' class size, instruction from full-time faculty, financial aid (e.g., grants, student loans, work study), demographic characteristics (e.g., sex, race, state of residence), prior academic performance (e.g., high school GPA, SAT/ACT score) and whether or not students persisted to their sophomore year.

Course schedules provided data on class size and instructional contact with full-time faculty. We examined each course schedule to calculate the percentage of a student's courses delivered by full-time faculty and the percentage of the student's course sections with enrollments below 20. Percentage of classes below 20 served as the measure of small class size. Percentage of classes taught by full-time instructional faculty served as the measure of contact with full-time faculty.

Financial aid variables included whether or not a student received any form of financial aid (e.g., loans, grants, work study) and whether they received a Pell grant (i.e., an indicator of low economic status). A variable also tracked if the student had a work study position.

Student background indicators consisted of whether a student was female or not and if the student was a member of a racial minority group or not. Geographic background was measured by whether or not the student was from one of the six New England states or not (the research was conducted at an institution located in New England). Prior academic performance variables included SAT (or ACT score converted to SAT) and high school GPA.

The dependent variable (persistence to the second year) was measured by whether or not the student returned for their sophomore year. For the prediction sample enrollment data verified if each student returned or not for their sophomore year. For the verification sample, the model attempted to predict the probability of persistence for the fall 2008 federal cohort group.

Procedures

We used binary logistic regression as the data analysis procedure. The binary logistic regression procedure allows for multiple dichotomous and continuous predictor variables to predict a dichotomous outcome or dependent variable. In the current investigation the outcome variable is dichotomous (i.e., students either return for their sophomore year or they do not return for their sophomore year) and the predictor variables are dichotomous (e.g., sex) or continuous (e.g., high school cumulative grade point average). The following equation represents the logit equation for the persistence model in the current investigation:

$$z = b_0 + b_1X_1 + b_2X_2 + ... + b_kX_k$$

In this equation z equals the natural log of the odds ratio.

$$z = \ln(\text{odds ratio})$$

The odds ratio is the probability of persistence divided by the probability of dropping out.

$$\text{Odds Ratio for Persistence} = \frac{\hat{P}(\text{Persist})}{\hat{P}(\text{Dropout})}$$

For each significant variable the logit coefficient suggests a significant increase or decrease in the odds ratio. For example, if the results suggest female students are significantly less likely to persist to the sophomore year, the logit coefficient for female students determines how much the overall odds of persistence decrease if the student is female. Notice that sex is

only one variable in this hypothetical model, sex would actually be coupled with other significant variables in the model to identify students with the lowest probability of returning for their sophomore year. The probability that a student persists or returns for their sophomore year equals the following equation:

$$\hat{P}\,(\text{Persistence}) = \frac{\text{Odds Ratio}}{(1 + \text{Odds Ratio})}$$

To better control for error and identify the best fitting model with the fewest number of predictors, we utilized the hold-out cross-validation method (Oxford & Daniel, 2001). We split the participants into two randomly selected subsets prior to analysis. For the first subset of the sample, we entered all variables simultaneously in order to determine which variables would significantly predict persistence. The resultant model was tested on the second subset of the data. Significant predictor variables from the second subset established the final model, which was rerun against the entire study population to obtain the predicted probability of persistence for each student in the study.

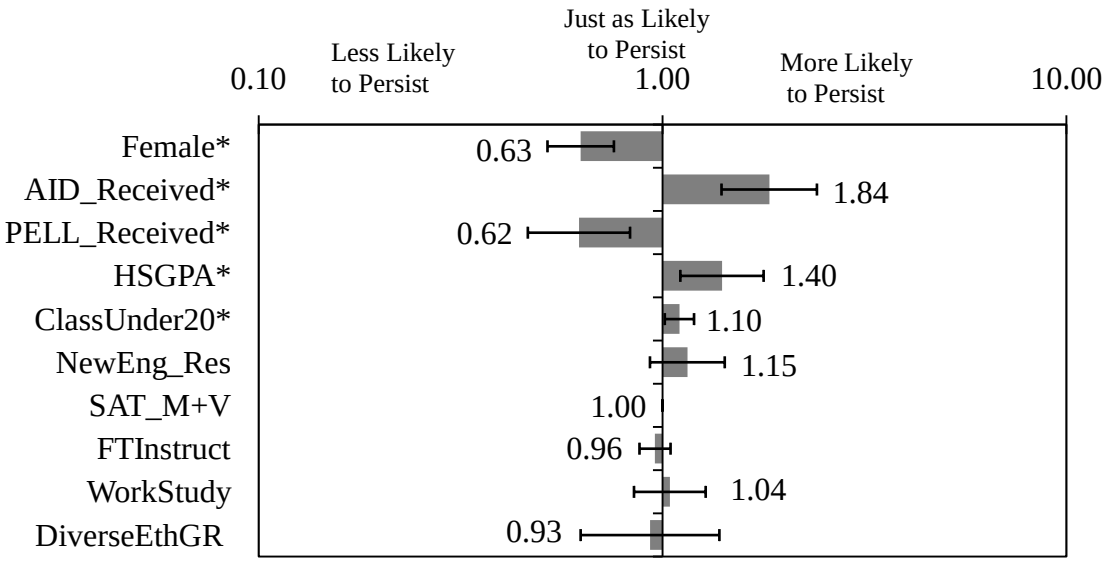
In order to classify the students as most likely to persist or most likely to drop-out we established the model's cut-off for predicted probabilities. Traditionally, the cut-off for determining group membership in the dependent variable is an odds ratio of 1 to 1 or a probability of .50. In the case of the current study a probability of .50 indicates that students with a persistence probability of less than .50 are predicted to not return for their sophomore year while students with a probability greater .50 are likely to return for their sophomore year. For the purpose of identifying students who are at risk, some researchers suggests that it may be more appropriate to increase the sensitivity of the model to attrition by changing the cut off probability for persistence to .75 or an odds ratio of 3:1 (Hadijcostas, 2006). Students who have less than a .75 chance of returning for their sophomore year would then be predicted to depart. In the current work, we were more interested in identifying at risk students and decided to set the cut off probability for student persistence at .75 rather than .50. Thus, the institution intends to develop interventions for fall 2008 entering students with predictive probabilities below .75

Results

We initially used binary logistic regression to regress all 10 predictor variables on persistence in the first subset of the sample. The variables were entered simultaneously to determine which indicators significantly predicted persistence to the sophomore year. The odds ratios for each variable ranged from .62 to 1.84 (see Figure 1), but only five variables (i.e., female, aid received, Pell grant received, high school cumulative grade point average and percentage of classes under 20) significantly predicted persistence beyond the first-year $p < .05$. Being from the study institution's geographic region (i.e., New England), SAT score (math and verbal total), percentage of courses taught by full-time faculty, having a work study award, and being a racial minority did not significantly predict persistence $p > .05$.

Figure 1. First-year retention odds ratios for first-time degree-seeking undergraduate students on all variables.

Note. Variables with a * significantly predict persistence at $p < 0.05$



Although the initial model with all 10 predictor variables (including 5 non-significant predictor variables) was not the most parsimonious model, there were no significant differences between observed and model-predicted values as indicated by Hosmer and Lemeshow goodness of fit X^2 (8, N = 1,586) = 5.49, $p > .05$. The initial model accounted for 6% of the variance in the dependent variable student persistence, Nagelkerke $R^2 = .06$.

We found the five significant predictor variables from the first subset to be statistically significant when tested on the second subset of the sample. The five significant predictors supported a parsimonious model that was run against the entire sample of participants. The results of the final model are summarized in Table 1.

Table 1. Variables in the final model.

							95.0% C.I. for EXP(B)	
	B	S.E.	Wald	df	Sig P-Value	EXP(B) Odds Ratio	Lower	Upper
AID_Received(1)	0.632	0.131	23.25	1	0.000	1.882	1.455	2.434
Female(1)	-0.433	0.095	20.94	1	0.000	0.648	0.539	0.781
HSGPA	0.276	0.114	5.85	1	0.016	1.318	1.054	1.649
PELL_Received(1)	-0.446	0.144	9.56	1	0.002	0.640	0.483	0.849
ClassUnder20	0.092	0.042	4.75	1	0.029	1.096	1.009	1.191
Constant	0.200	0.334	0.36	1	0.549	1.221		

Note. Variables with a * significantly predict persistence at $p < 0.05$

Two significant predictors in the final model relate to financial factors. In particular, the odds of persistence to the sophomore year increased when students receive some kind of financial aid (i.e., loans, grants, or/and work study), but the odds of persistence decreased if students have a low enough household income to receive a Federal Pell Grant. Although not as strong a predictor as financial factors, being female significantly decreased the odds of persistence to the sophomore year. After financial factors and sex of student, high school cumulative grade point average was the next strongest predictor of first-year persistence. The last

variable in the final model to predict persistence was the percentage of small classes (i.e., enrollment under 20 students) a student had during their first semester of college. Findings suggest the our proposed final model fit the data as there were no significant differences between observed and model-predicted values based on the Hosmer and Lemeshow goodness of fit X^2 (8, N = 3,182) = 8.00, $p > .05$. The final model accounted for 4% of the variance in the dependent variable student persistence, Nagelkerke $R^2 = .04$ and correctly classified 75% of the students in the prediction sample as persisting or dropping out after the first year (see Table 2).

Table 2. Classification accuracy of final model for individual cases in prediction sample.

	Predict Depart	Predict Stay	% Correct
Actual Depart	125	473	21%
Actual Stay	313	2,271	88%
		Overall	75%

Note. The cut value is .750

Discussion

In the current work we replicated previous findings (e.g., Paulsen & St. John, 1997) that financial factors have important effects on the ability of students to persist in college. Also in support of previous research (e.g., Kahn & Nauta, 2001), we found that high school cumulative grade point average positively predicts persistence beyond the first-year of college. Contrary to previous research we found that females were less likely than males to persist to the sophomore year. This finding may be institution specific and reflect the characteristics of the study population. The study institution has a higher first-year retention rate for males, but females have a higher graduation rate.

Although the number of classes taught by full-time instructional faculty did not significantly predict first-year persistence, a wide body of past research suggests that student-faculty interaction with full-time faculty highly correlates with student persistence (Astin, 1993). Perhaps the percentage of classes taught by a full-time faculty does not necessary provided a strong enough measure of student-faculty interaction but class size does. Class size seemed to offer a better indicator of faculty-student interaction, given that first semester students with a greater percentage of small classes (i.e., fewer than 20 students) were significantly more likely to return for their sophomore year. The findings of the current study suggest that interaction with instructors fostered persistence to the sophomore year regardless of whether those instructors taught at the institution on a full-time or part-time basis.

Implications and Future Research

The current work implies that institutions with limited resources should consider utilizing more part-time faculty to reduce first semester class sizes. Importantly reducing class size in the first semester of college may better support student persistence and interaction with faculty. Future research should focus on the effectiveness of predictive models that incorporate variables from class schedules in predicting the probability that individual students will persist. This research suggests that early interventions can be designed for academic advisors to better assist

at-risk students in course selection. For enrollment managers the current investigation offers a method to better identify first semester students with a higher probability of leaving the institution. Academic Affairs should also consider student success when structuring the first-year curriculum. More effort to identify high risk courses for predicting student success would also be beneficial to institutions in developing predictive models of student persistence.

Limitations

A major limitation was that the study was only conducted at a single institution. Future studies will need to determine if the results apply to other institutions. In addition to threats to external validity the binary logistic regression procedure excludes participants with missing data limiting the variables that the current study could consider. All cases must have data for each variable or the case is excluded from the analysis. In the current work, all participants had data for each of the variables used. If participants had missing data the variable was not used. As a result, we did not look at a number of financial variables, such as parental income or unmet financial need given that a large proportion of the participants did not have data on these variables. However, we did consider if the student received any form of financial aid and found it to be a significant predictor of persistence, but the inclusion of more financial variables might better predict retention and further enhance the ability of the model to predict persistence. Institutions may need to gather information on students who do not apply for financial aid to better predict persistence of all students.

Connecting Research to Practice

The current work provided additional information into the reasons why students do or do not persist. The fact that a smaller class size may further increase student persistence rates extends an opportunity to shape a student's class schedule during the summer orientation program taking into account the significant background, academic, and financial variables. We have coupled the findings of current work with other resources, such as the results of Noel Levitz's Student College Inventory, (specifically the dropout proneness factor) in order to triangulate multiple sources that identify at-risk students. The information from the current work and other sources has been incorporated in the retention and student success efforts of the university. For example the university's peer mentor program, administered through the Student Advocacy Office, has used this information to reach out to at-risk students in the fall 2008 cohort, in addition to monitoring whether or not these students have received warning grades. The list of at-risk students has also been shared with the University's "At-Risk" Committee, which works to identify students with academic and behavioral issues early in the freshmen year.

The benefits of this research spread across the Academic and Student Affairs divisions, as well as the Enrollment Management & Retention division. The findings of current investigation have prompted us to review and refine the academic advising process in order to provide additional information to both the individual academic advisor and the University Advising Center. The at-risk student information also benefited our Student Affairs Division by helping them identify potential behavior and attitude issues early on. In the area of Enrollment Management & Retention, the early identification of at-risk students allowed us to target interventions for at-risk students at the outset of the student's academic career. The Student Advocacy Office, which fosters monitors and collaborates on student persistence, has been able

to focus more closely on those students with an at-risk profile. In conclusion, the current research allows us to examine an additional set of variables for identifying at-risk students and work more efficiently to improve the overall academic success and persistence of the freshmen class.

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be so. One of the ideas generated was that perhaps DSP & SSS students, who tend to be ESL students, are leaving UMB prior to having to take the Writing Proficiency Exam, which students are required to pass as a requirement for graduation. This area requires further examination.

The Home Stretch: Creating the Action Plan

During the course of formulating the action plan, OIRP played a critical role in presenting the data and leading the discussions. For example, as more and more questions arose, OIRP would re-direct the group to focus on the questions that could be answered with the data that had been obtained. When additional data was required, OIRP directed the group to focus on collecting data that was able to answer the questions that were generated. While many interesting lines of inquiry were explored, OIRP played a leadership role in clarifying the relationship of the data to the overall project goal. In addition, without the initiative of the OIRP questioning and analyzing the role of the SSS program, knowledge of the role that this program plays in student retention would not have become a part of the institutional knowledge base regarding university retention efforts.

This iterative process produced an evidence-based intervention strategy. The plan of action that was created was drawn directly from the data analyses that had taken place over the course of the planning year. The key component of the action plan was to replicate the intensive advising services that are offered to SSS students, and to provide them first to DSP students who are not eligible for SSS. The action plan included funding a DSP Success Coordinator who would be responsible for implementing this strategy. Components of the advising were based on the research findings about SSS advising, and included maintaining a small caseload, mandatory advising sessions at the beginning and end of the semester, monitoring of student grades, teaching a college survival course, and assisting with the student's financial aid requirements. In addition, at the end of the DSP Program, a new survey was incorporated in which students conducted a self-assessment of their skills and indicated the areas in which they would want additional help. The DSP Success Coordinator would review the student's self-assessment of services required. In addition, the DSP Success Coordinator would work with representatives from Career Services and individual Colleges and Departments to host a series of career development workshops, and would work more closely with departmental advisors, two components that the data revealed could be more pronounced in the current SSS advising model. The plan also included a research fellow position that would be responsible for assessing the strengths and weaknesses of the new model, so that subsequent adjustments could be made. In addition, the research fellow would examine in more depth the question of why higher retention rates for DSP & SSS students were not translating into higher graduation rates. Overall, the intervention was designed to capitalize on the parts of the SSS advising model that the data pointed to as being helpful from the students' perspectives, and to introduce some new elements that were needed in some important areas.

Decisions were also made to exclude some components from the action plan. One example was the priority registration element. Priority registration was used by most of the students (89.1%), and ranked third in importance, perhaps because it allowed students to get

into their top choice of classes. However, the long term goal of the intervention was to eventually incorporate the successful components university-wide, and priority registration was incompatible with that goal, as it cannot be applied universally or it defeats the purpose. In addition, financial assistance was ranked second in importance, but was not implemented as part of the intervention. The reason for this decision was because the focus group data revealed that students had a lot of confusion regarding the financial aid component of their education, and the COP felt that this area needed to be explored further. Provisions were made instead for the DSP Success Coordinator to review student financial aid packages and for the Research Fellow to examine the financial aid piece in more detail.

Implications for IR Professionals

In conclusion, there are many ways that the findings of this research project can be helpful for other IR professionals. First, the project documents a process whereby IR leadership in the research planning and implementation stages created value-added data and analyses to program leaders. Data were collected and utilized in a way that would allow it to directly support a plan of action with a specific goal, and the iterative process utilized to move data into action is outlined for others. Historical IR data had to be combined with current data collection and information from program leaders in order to make sense. Otherwise, the role of the SSS program on retention would have remained submerged within the existing datasets. In addition, qualitative data from the focus groups added a layer and texture to the analysis that helped tease out some important issues and add perspective to other issues. Focus group results revealed that the tutoring and advising component of the SSS program were significant aspects of assistance to students, and interviews with advisors shed more light on the differences between general university advisors and advisors in the SSS program. Last, this collaborative IR model, including a funded research fellow position, is now being extended to other departments on campus. Plans are in place for a second year of funding for a research fellow to examine assessment issues in the Student Affairs division. This structure will be explored further as a novel way to include short-term yet extensive data projects from various departments under the IR umbrella.

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