CONFERENCE PROCEEDINGS

TIME FOR DECISIONS

Visualizing the Future

NEAIR 39th ANNUAL CONFERENCE

November 3–6, 2012

Hyatt Regency, Bethesda, Maryland

CONFERENCE TEAM

President
STEPHEN THORPE

Program Chair
MARK PALLADINO

Associate Program Chair
JESSICA SHEDD

Pre-Conf Workshop Coordinator
ALAN STURTZ

Best Paper Chair
MATTHEW HENDRICKSON

Evaluation Coordinator
LAURA UERLING

Newcomer/Mentor Coordinator
MARY GOODHUE LYNCH

Poster Session Coordinator
PAULA MAAS

Proposal Peer Review Coordinator
MARK ECKSTEIN

Publications Coordinator
CRISTI CARSON

Local Arrangements Chair
SHANNON TINNEY LICHTINGER

Conference Website Coordinator
CHRISTOPHER CHONCEK

Exhibitor Coordinator
GURVINDER KHANEJA

Local Arrangements Coordinators
ARLENE BLAYLOCK
JOHN BURCZEK DREIER
ELIZABETH CLUNE-KNEUER
CONNIE PIERSON

Technology Chair
CHAD MAY

Administrative Coordinator
BETH SIMPSON

Dear NEAIR Colleagues,

The 39th Annual NEAIR Conference held in Bethesda, Maryland, November 3-6, 2012 encouraged attendees to contribute to our conference theme of *Time for Decisions: Visualizing the Future*. Three hundred and nine conference attendees had the opportunity to share and gain invaluable information from institutional research and higher education colleagues. The 2012 Conference Proceedings is a result of the conference theme in action.

The Conference Program team led by Program Chair **Mark Palladino** and Associate Program Chair **Jessica Shedd** developed a program filled with plenty of variety that included four plenary/keynote sessions, 11 contributed papers, 32 workshares, five techshares, 13 special interest groups, and four table topics. Poster Session Coordinator **Paula Maas** organized 16 posters to be on display. These offerings went through a blind peer review process facilitated by 74 proposal reviewers and coordinated by **Mark Eckstein**. Pre-Conference Workshop Coordinator **Alan Sturtz** organized 15 workshops with 166 participants. Exhibitor Coordinator **Gurvinder Khaneja** and **Beth Simpson** partnered with 18 exhibitors who offered 8 exhibitor showcases and Lightning Talks.

A big thanks goes to Publications Coordinator **Cristi Carson** for all her hard work and keen eye editing the conference program, as well as compiling and organizing the 2012 Conference Proceedings. The 2012 Conference Proceedings contains papers submitted by authors as well as the 2012 Best Paper Award recipients. The award recipients were determined by Best Paper Chair **Matthew Hendrickson** and his committee. The 2012 Best Paper this year was awarded to **Debra Allen** and **Theodore Coladarci** of the University of Maine for their paper, *Examining the Threat of Nonresponse Bias as a Follow-up to the National Survey of Student Engagement.* The 2012 Best First Paper was awarded to **Chunmei Yao** of SUNY College at Oneonta for the paper, *Using Internal Market Ratios to Detect Gender Differences in Faculty Salaries.* The 2012 Best IR/Practitioner Award was awarded to **Laura Ariovich** and **William Richman** of Prince George's Community College for their workshare session, *Non-returner Survey: Why Students Leave.*

Local Arrangements Chair **Shannon Tinney Lichtinger** and Local Arrangements Coordinators **Arlene Blaylock, John Burczek Dreier, Elizabeth Clune-Kneuer, and Connie Pierson** worked hard coordinating hotel, travel logistics and made sure we all enjoyed the *NEAIR Third Place* and all that Bethesda had to offer. Conference Website Coordinator **Chris Choncek** and Administrative Coordinator **Beth Simpson** developed and maintained the conference website as well as conference registration. Next year's conference planning will be facilitated by online evaluations analyzed by Evaluation Coordinator **Laura Uerling**.

It was a pleasure to work with such an extraordinary Conference Planning Team and the many talented volunteers. A premiere professional development opportunity was the result of the efforts of these individuals. We hope you take advantage of all the great information the 2012 Conference Proceedings have to offer!

Best wishes,

Stephen W. Thorpe, Ed.D
NEAIR President 2011-2012

Leadership & Committees 2011-2012

Officers:	President	Stephen Thorpe
	President-Elect	Catherine Alvord
	Secretary ('11-'14)	Allison Walters
	Treasurer ('10-'14)	George Rezendes
Steering Committee Members:		
	Past President	Gayle Fink
	Program Chair	Mark Palladino
	Local Arrangements Chair	Shannon Lichtinger
	Technology Chair	Chad May
	Member-At-Large ('09-'12)	Emily Dibble
	Member-At-Large ('09-'12)	Paula Maas
	Member-At-Large ('10-'13)	Ann Marie Senior
	Member-At-Large ('10-'13)	Mary Goodhue Lynch
	Member-At-Large ('11-'14)	Maren Hess
	Member-At-Large ('11-'14)	Laura Uerling
Administrative Coordinator (ex-officio)		Beth Simpson

Standing Committees

Local Arrangements (Standing Committee)

Chair	**Shannon Lichtinger**
Exhibitor Coordinator	Gurvinder Khaneja
AV Coordinator	Jessica Shedd
LAC Coordinators:	Arlene Baylock
	John Burczek Dreier
	Elizabeth Clune-Kneuer
	Connie Pierson

Membership (Standing Committee)

Chair	**Mary Goodhue Lynch**
Chair-elect	Maren Hess
Member	Laura Uerling
Member	Betsy Carroll
Member	Jane Kimble
Member	Ingrid Skadberg
Past Chair	Paula Maas

Nominations (Standing Committee)

Chair	**Gayle Fink**
Member – 2 YR Public Sector	Gurvinder Khaneja
Member	Michelle Appel
Member	Becky Brodigan
Member	Elizabeth Clune-Kneuer
Member	Cherry Danielson
Member	Alexander Yin

Prof Development Services (Standing Committee)

Chair	**Cathy Alvord**
Member - Program Chair-Elect	Alan Sturtz
Member	Emily Dibble
Member	Nancy Ludwig
Member	Laura Uerling

Program (Standing Committee)

Chair	**Mark Palladino**
Associate Program Chair	Jessica Shedd
PCW Coordinator	Alan Sturtz
Evaluation Coordinator	Laura Uerling
Newcomer/Mentor Coord	Mary Goodhue Lynch
Peer Review Coordinator	Mark Eckstein
Poster Session Coord.	Paula Maas
Publications Coordinator	Cristi Carson

Site Selection (Standing Committee)

Chair	**Cathy Alvord**
Treasurer	George Rezendes
Past LAC/Program	Nicole Marano
Admin Coord (ex officio)	Beth Simpson

Technology (Standing Committee)

Chair	**Chad May**
Conf Web Coordinator	Chris Choncek
LAC (ex officio)	Shannon Lichtinger
Program Chair (ex officio)	Mark Palladino
Admin Coord. (ex officio)	Beth Simpson

NEAIR
North East Association for Institutional Research

Leadership & Committees 2011-2012

ad hoc Committees

Finance Committee

Chair	**Emily Dibble**
Treasurer	George Rezendes
Member	Julie Alig
Member	Rebecca Brodigan
Member	Gayle Fink
Member	Roland Pearsall
Member	Alan Sturtz

Grants Committee

Chair	**Ann Marie Senior**
Chair-Elect	Laura Uerling
Member	Lisa Daniels
Member	Peter Feigenbaum
Member	Jane Zeff
Past Chair (ex officio)	Michael Dooris

Conference Proposal Peer Reviewers

Mark Eckstein, Peer Review Coordinator

Jacqueline	Andrews	Kristy	Huntley	Melissa	Thorpe
Louis	Attinasi	Elizabeth	Johnston-O'Connor	Steve	Thorpe
Rosanne	Bangura	Lisa	Keating	Rachel	Tsang
Melissa	Barnett	Ezekiel	Kimball	Laura	Uerling
R.	Benson	Daniel	Larson	Courtney	Wade
Gary	Boden	Melanie	Larson	Alex	Wagner
Ellen	Boylan	Ann	Lehman	Michael	Whitcomb
Christina	Butler	Carol	Lerch	William	Wilson
Jason	Canales	Paula	Maas	Charlotte	Woodward
Betsy	Carroll	Rajiv	Malhotra	Jasmine	Yang
Elizabeth	Clune-Kneuer	Tom	McGuinness	Alexander	Yin
Margaret	Cohen	Peggy	McKernan	Lillian	Zhu
Theodore	Coladarci	Pat	Mizak		
Lauren	Conoscenti	Louise	Murray		
Lisa	Daniels	Denise	Nadasen		
Cherry	Danielson	Mitchell	Nesler		
Mary Ann	DeMario	Doug	Nutter		
Veena	Dhankher	Tiffany	Parker		
Chrisanthy	Diamantopoulos	Kim	Pavlick		
Kate	Doria	Ellen	Peters		
Michael	Duggan	Maria	Piteros		
Judy	Dunham	Paul	Prewitt-Freilino		
Jennifer	Dunseath	Heather	Roscoe		
Nora	Galambos	Elizabeth	Shaffer		
Hong	Gao	Judith	Shaw		
Susan	Gracia	Layla	Shumnok		
Jessica	Greene	Sri	Sitharaman		
Phil	Handwerk	Jacquelyn	Stirn		
Laura	Harrington	Susan	Tammaro		
Braden	Hosch	Joy	Tatusko		
Christopher	Hourigan	Danielle	Taylor		

ACKNOWLEDGMENT

Contained within these pagers of the NEAIR 39th Annual Conference Proceedings are eight contributed conference papers authored by twelve NEAIR colleagues.

Additionally, you will find the contributed conference session and keynote presentations just a few clicks away on the NEAIR website under the Proceedings tab. These pages are only accessible to signed in NEAIR members.

Special thanks go out to Stephen Thorpe, Mark Palladino and Beth Simpson for their contributions, oversight and support with all aspects of publication responsibilities during the course of this past year.

Cristi Carson
2012-2013 NEAIR Publications Chair
University of Southern Maine

Table of Contents

Can a Marketing Campaign Increase Response Rates to Online Course Evaluations?
Kimberly Puhala

Developing Community College Peer Institutions: Methods, Measures, & Issues.
Joanna Musial-Demurat and Bruce Szelest

Best Paper
Examining the Threat of Nonresponse Bias as a Follow-up to the National Survey of Student Engagement.
Debra Allen and Theodore Coladarci

Maximizing the Utility of Alumni Feedback.
Susan Tammaro

NCES Projection Methodology: Institutional Research Applications.
J. R. Robles

Best IR/Practitioner Paper
Non-returner Survey: Why Students Leave.
Laura Ariovich and Allen Richman

Testing Differences: Contrasts in Group Perceptions of Mission and Identity.
Ellen Boylan and Kim Pavlick

Best First Paper
Using Internal Market Ratios to Detect Gender Differences in Faculty Salaries.
Chunmei Yao

Can a Marketing Campaign Increase Response Rates to Online Course Evaluations?

Kimberly Puhala

Quincy College

Abstract

Switching from paper-and-pencil administration of surveys to online surveys has been shown to result in a dramatic decrease in response rates. Fewer studies have examined response rates when switching from paper-and-pencil course evaluations to online course evaluations. This study examined the impact of a social marketing campaign on participation rates for online course evaluations. In addition, the impact of having computer access and the use of pre-notification postcards were also examined. The marketing campaign consisted of advertising the course evaluation web link on large screen TVs, posters, through online messaging, and via instructor announcements in class. Analysis of variance indicated that there were no differences in response rates between marketing and non-marketing groups. Access to computers and using a paper-and-pencil evaluation form did increase response rates when compared to online course evaluations administered in classrooms that were not equipped with computers. Discussion focused on the impact of online course evaluations on process and suggestions for creating strong incentives for students to complete online course evaluations.

Introduction

Implementing process efficiencies is paramount to institutional researchers, whose offices are often under resourced. One area that is frequently under the jurisdiction of the Institutional Research Office and is highly administrative in nature, as well as time-consuming, is the administration of course evaluations. Efficiencies can be gained by switching to electronic course evaluations that are administered online, yet there is often the very real fear that survey response rates will drop significantly (Anderson, Cain, & Bird, 2005; Dommeyer, Baum, Hanna, & Chapman, 2004; Norris & Conn, 2005; Nulty, 2008). Prior research has investigated ways to increase response rates for surveys, in general, but few studies specifically address the conversion of course evaluations from in-class paper-and-pencil administration to online formats.

At Quincy College, course evaluations are administered via paper-and-pencil scannable forms to every student in every class, for a total of approximately 14,000 course evaluation forms per semester. Problems with this approach include the use of already limited instruction time to complete course evaluations, the administrative burden of distributing course evaluation forms, and the staff time consumed by scanning forms and hand entering student comments. During the past summer, we implemented a pilot study of the use of online course evaluations. A link to an online survey was posted on the Quincy College portal, a password-protected course management system. Instructors were provided with memos asking them to announce the course evaluations in class, and containing screenshots of how to access the survey. The pilot study indicated that response rates dropped from 58.2% of students completing evaluations in Spring (administered in-class, paper-and-pencil) to 32.2% in Summer (announced in class, administered online). On the other hand, the percentage of classes with non-zero completion rates increased

from 83.2% to 88.1%, which led us to conclude that the issue is motivating students to complete the online course evaluations, rather than a breakdown in the communication of the new course evaluation process.

A review of the literature indicates that response rates can be recovered for online course evaluations through the use of several methods. The literature indicates that offering extra credit or early access to course grades can return response rates to those found with paper-and-pencil in-class administration of course evaluations (Anderson, et al., 2005; Dommeyer, et al., 2004). However, there may be objections by faculty or administrators to use grade incentives on the grounds that this method is coercive or may bias study results (Dommeyer, et al., 2004). Additional studies have examined the use of incentives other than grades to boost response rates. Strategies such as having faculty stress the importance of course evaluations, sending reminder emails to students, posting the survey link on the course calendar, ensuring that responses are anonymous, providing lottery incentives, and showing the students how to access the online survey have all shown to improve response rates to online course evaluations (Anderson, et al., 2005; Dommeyer, et al., 2004; Norris & Conn, 2005; Nulty, 2008). In addition, Nulty (2008) indicates that using multiple methods further increases response rates. Kaplowitz, Hadlock, & Levine found that the use of pre-notification postcards is effective at boosting response rates to online surveys (as cited in Wren & Showers, p.4). In addition, variations in response rates may be a function of logistics. Institutions with a higher number of computers per student have higher response rates to online surveys (Porter & Umbach, 2006). These last two areas have not been assessed specifically in regard to online course evaluations, which my research study proposes to do.

My research study will also introduce a novel approach to increasing response rates that draws on techniques used in other fields. One approach that has been utilized by the field of Public Health for decades is the use of media campaigns to initiate behavior change. This study will examine the use of a media campaign designed specifically around course evaluations.

The main research question is whether or not a social marketing campaign can increase response rates to online course evaluations. This study will also examine the additive effect of two other techniques: the use of a pre-notification postcard and the accessibility of classroom computers. Pre-notification postcards will consist of small cards with the marketing tagline and the web link that will be distributed to students during class. All classes that teach in a computer lab will complete the online evaluations during class time. An analysis of variance will be used to examine the difference in response rates between the groups. The research hypotheses are as follows:

1. The marketing campaign will increase course evaluation response rates compared to the overall online evaluation response rates (32.2%) observed in a prior semester.
2. There will be higher response rates for those courses that are held in computer-equipped classrooms and exposed to the marketing campaign than those exposed to the marketing campaign alone.
3. Response rates for courses held in computer-equipped classrooms should be equal to response rates (58.2%) seen in classrooms that complete paper-and-pencil course evaluations.
4. There will be a higher response rate for those courses that receive pre-notification postcards than those exposed to the marketing campaign alone.

Methods

All courses that ran at Quincy College in Fall, 2011 except independent studies or internships were included in the analysis, for a total of 718 courses. Courses were assigned to one of eight possible study groups, which differed based on type of course evaluation (paper-and-pencil versus online), whether the course finished before or after the start of a marketing campaign, whether or not the course was held in a computer-equipped classroom, and whether or not the course instructor handed out pre-notification postcards. Response rates were examined across the eight study conditions, and group differences in response rates were analyzed using an analysis of variance methodology.

Course Evaluations

The course evaluation form consisted of 46 questions. The first 26 questions asked the student to rate various statements about the course on a 5-point Likert scale, from Strongly Disagree to Strongly Agree. There was also a choice to indicate that the statement did not apply to the course. Questions were organized in six categories, including Course Organization and Planning, Communication, Faculty/Student Interaction, Assignments/Exams/Grading, Instructional Methods, and Student Engagement. Additional questions asked students to rate their satisfaction with different elements of the classroom. Student demographic information was also collected, and there were three open-ended questions. Questions on the online course evaluations were identical to the paper-and-pencil version, with the exception that students answered one additional question about whether they preferred to do course evaluations online or via the paper-and-pencil version. Online course evaluations were administered through surveymonkey.com, and students could access the link from any internet-enabled computer and were not required to complete the evaluations in class, except for the courses held in computer

classrooms. No password or identification code was required to complete the online course evaluations so that there were no barriers to accessing the course evaluations. Course evaluation questions are included in Appendix A.

Course Assignment to Groups

Courses were assigned to study groups using both convenience and random assignment. Full-time faculty are required by contract to have the students in their courses complete course evaluations via paper-and-pencil, scannable forms. Therefore, all courses taught by full-time contract faculty were assigned to the paper-and-pencil group. Courses that that ended after the start of the marketing campaign were examined (Paper/Marketing) and compared to courses that ended prior to the start of the marketing campaign (Paper/No Marketing). All courses taught by adjunct faculty were assigned to complete online course evaluations, since there is no requirement in their contract to complete paper-and-pencil evaluations. Courses held in computer-equipped classrooms that ended after the start of the marketing campaign were assigned to the Online/Computer/Marketing group, while those that ended before the start of the marketing campaign were assigned to the Online/Computer/ No Marketing group. Courses that were not taught in a computer-equipped classroom and were taught by adjunct faculty were also assigned to online course evaluations. Those that ended prior to the start of the marketing campaign were assigned to the Online/No Marketing group, and the remaining courses were randomly assigned to either receive pre-notification postcards (Online/Postcard/Marketing) or to not receive pre-notification postcards (Online/Marketing). Courses that were held exclusively online were also included as a control group. The number of courses assigned to each study group and the number of students in each study group are presented in Table 1.

Table 1. Number of Courses and Students in Each Study Group

Study Group	# Courses	# Students Enrolled
Paper/Marketing	170	4,280
Paper/No Marketing	9	224
Online/Computer/Marketing	41	674
Online/Computer/No Marketing	23	362
Online/Postcard/Marketing	188	3,585
Online/Marketing Only	213	3,975
Online/No Marketing	37	610
Online Course	37	589
Total	718	14,525

Marketing Campaign

The Department of Institutional Research and Assessment collaborated with the Marketing Department to create a marketing campaign that lasted for a three-week period. The marketing campaign included the following components:

- The creation of a catchy tagline encouraging completion of the course evaluations
- Posting the course evaluation tagline and link on the College's large screen TVs
- Placement of laminated signs at all college student use computers with the tagline and the survey link
- Placement of large, cardboard posters announcing the campaign in each of three academic buildings
- Placement of a reminder "button" on the college website
- Distribution of the survey link via student email
- Two email reminders to complete the course evaluation

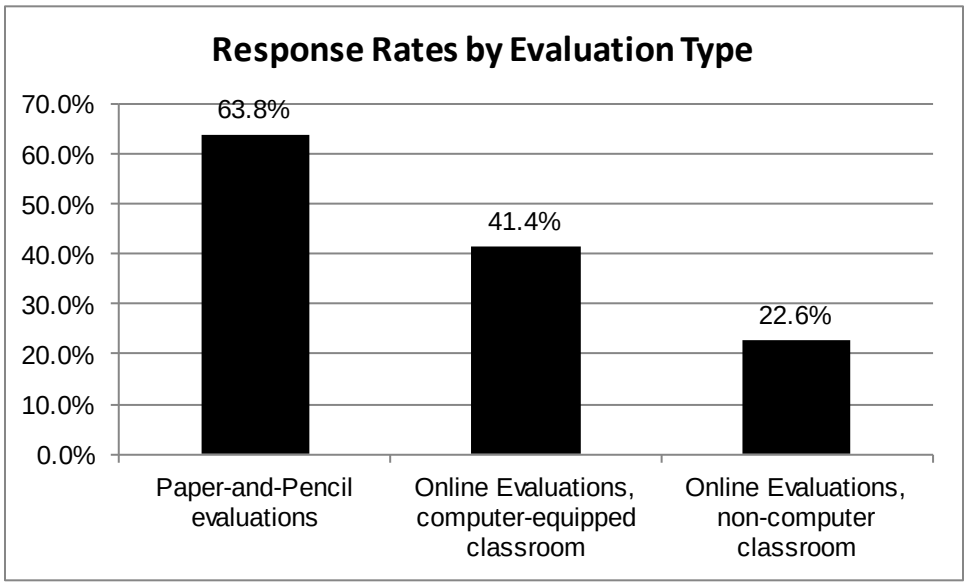
- Facebook and Twitter reminders to complete the course evaluations
- Faculty encouragement of students to complete online course evaluations with an emphasis on their importance

Pre-notification Postcards

Pre-notification postcards were 2 ½ inches wide by 1 inch high. They contained a partial Quincy College seal and the word “Evaluate” on the front. The back of the cards had the complete web link for the survey, and a scannable QR code to allow students to access the survey from their cell phones. In addition, the tagline, “Make your voice count at QC” was written on the back of the card. Postcards had a black background with white writing.

Results

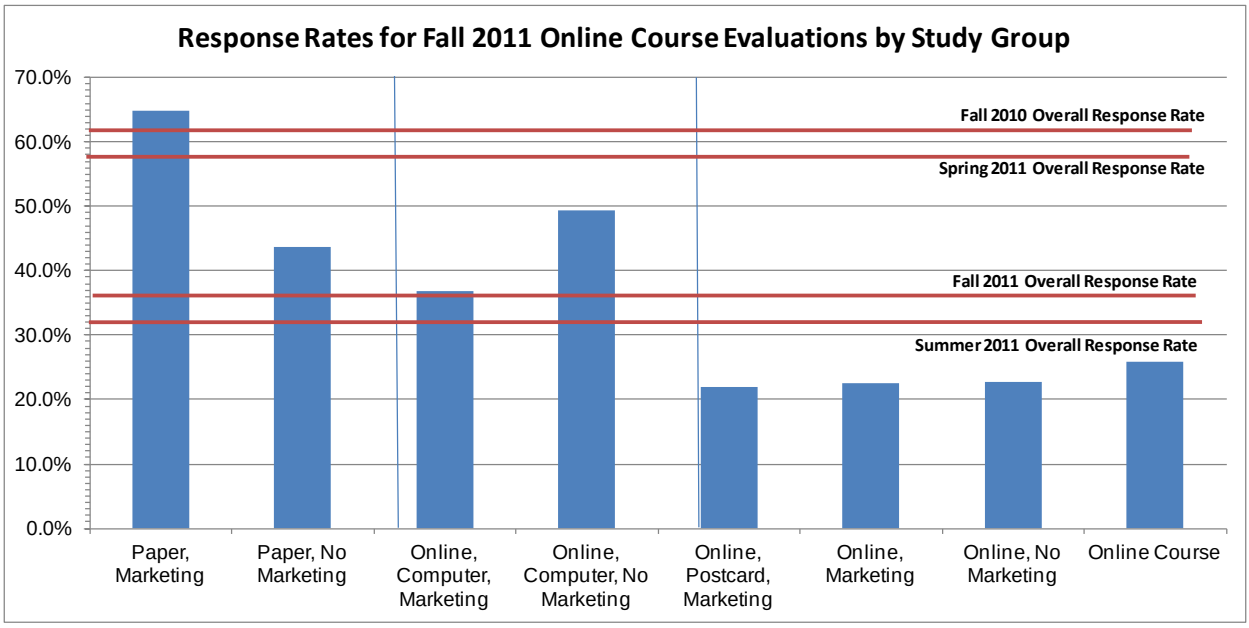
The response rates to the paper-and-pencil administration in the semesters prior to switching to online course evaluations were 60.6% in Fall 2010 and 58.2% in Spring 2011. A pilot test of the switch to online course evaluations was conducted in Summer 2011, and overall response rates fell to 32.2%. The overall response rate to the Fall 2011 online course evaluations was 36.2%. Analysis of Variance was conducted and indicated that courses where students completed paper-and-pencil evaluations had higher overall response rates than those who completed online evaluations in a computer-equipped classroom, which had higher response rates than courses whose students completed online evaluations (63.8% vs. 41.4% versus 22.6%, $F=238$, $p<.001$).



Analysis of Variance was used to further investigate the differences in response rates between the eight study groups, and specifically, whether there were any differences in response rates based upon the marketing campaign and the pre-notification postcards. The analysis of variance indicated that there were significant differences in response rates among the eight groups ($F=71$, $p<.001$). However, post-hoc tests revealed that there were no significant differences in response rates between the paper-and-pencil administration of course evaluations whether or not they were

exposed to the marketing campaign (p=.078). In addition, there were no significant differences between response rates for online evaluations that were completed in computer-equipped classrooms, whether or not they were exposed to the marketing campaign (p=.345). Last, an analysis of variance conducted on the four online evaluation groups that were completed outside the classroom indicated that there were no significant differences, even if they received a pre-notification postcard (p=.671). Results are presented in Figure 2.

Figure 2. Response Rates for Fall 2011 Online Course Evaluations by Study Group



Discussion

Overall, study results indicated that there were no increases in response rates as a function of either the marketing campaign or the pre-notification postcards. The conclusion drawn is that students need a stronger incentive in order to motivate them to complete course evaluations. In some ways, this is not surprising as we are seeing lower and lower response rates to surveys across the college. This could be a result of students getting bombarded with surveys and other electronic announcements. The results of this study were used to support the purchase of a new online evaluation system that is integrated with our college portal. Students will have their access restricted from the portal's other functions if they do not complete the course evaluations. We are hypothesizing that this will be a strong enough incentive for students to complete the course evaluations each semester. This new system will be implemented in time for the Spring, 2013 course evaluation cycle.

There was some evidence that response rates were trending higher for the paper-and-pencil administration of course evaluations in courses that had been exposed to the marketing campaign. One problem may have been that there were only 9 courses in the paper-and-pencil/no marketing group, versus 170 in the paper-and-pencil/marketing group. The reason for this discrepancy was because of the small number of courses that ended prior to the start of the marketing campaign, which was out of the experimenter's control and based on the limited number of 10-week courses offered during the semester. Perhaps replicating the study with a higher number of courses in the paper-and-pencil/no marketing group would yield significant differences in response rates.

A surprising finding was that response rates for online evaluations completed in computer-equipped classrooms were lower than response rates for paper-and-pencil administration. This

was surprising because the evaluations should have been administered in class in the exact same manner that the paper-and-pencil evaluations were conducted, and therefore, all students should have completed the course evaluation if they were in class that day. It is possible that since all full-time faculty had to complete paper-and-pencil evaluations, while adjunct faculty completed online course evaluations. It is possible that the higher response rates were a function of faculty status, with full-time faculty being more committed to completing evaluations since the evaluation process is clearly delineated in their union contract. Also, another possibility is that instructors encountered technological difficulties with the online evaluations that contributed to lower response rates. In fact, several instructors had reported that they had trouble accessing the online course evaluation system.

One element of this study that is applicable to institutional researchers is the efficiency improvements in workload required of online course evaluations versus paper-and-pencil administration. In this particular Institutional Research office, which consists of one FTE worker and one part-time work study student for a school with a headcount of 4,674, processing time from when all evaluations were received in the office to when the final report was available to the college administrators was reduced from six months to three months. The major time saving occurred as a result of not having to scan paper-and-pencil evaluation forms or enter student comments. The process to clean the data, analyze the data, and write up the results was equivalent to the process for the paper-and-pencil evaluations. Additional time savings resulted from not having to compile packets of evaluation forms for each instructor; when switching to the online course evaluation system, one memo was distributed to all instructors that were completing online course evaluations that contained instructions and the web link where the survey could be found. In addition, monetary savings were achieved. The cost of a yearly

subscription to surveymonkey.com is approximately $300, compared to approximately $1,500 spent in purchasing scannable evaluation forms. Plus, administering online course evaluations is a much “greener” solution than utilizing paper-and-pencil evaluation forms. In conclusion, although the study hypotheses were not supported, there were process improvements that resulted from this study which led to the decision to purchase a new system that should result in a greater incentive for students to complete course evaluations.

REFERENCES

Anderson, H. M., Cain, J., & Bird, E. (2005). Online student course evaluations: Review of literature and a pilot study. *American Journal of Pharmaceutical Education, 69(1),* 34-43.

Dommeyer, C. J., Baum, P., Hanna, R. W., & Chapman, K. S. (2004). Gathering faculty teaching evaluations by in-class and online surveys: their effects on response rates and evaluations. *Assessment & Evaluation in Higher Education, 29(5),* 611-623.

Norris, J. & Conn, C. (2005). Investigating strategies for increasing student response rates to online-delivered course evaluations. *The Quarterly Review of Distance Education, 6(1),* 13-29.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: what can be done? *Assessment & Evaluation in Higher Education, 33(3),* 301-314.

Porter, S. R. & Umbach, P. D. (2006). Student survey response rates across institutions: why do they vary? *Research in Higher Education, 47(2),* 229-247.

Wren, S. & Showers, N. (2010). The big payoff: Use of incentives to enhance participation in web surveys. *Association for Institutional Research IR Applications, 25*, 1-11.

APPENDIX A: Course Evaluation Questions

Questions 1-26 were rated on a 5-point Likert scale (Strongly Agree, Agree, Neither Agree nor Disagree, Strongly Disagree) and students were also offered the choice Doesn't Apply.

A. Organization and Planning
   1. The instructor's expectations were clear.
   2. The classes for this course were held for the allotted hours.
   3. The content covered was consistent with the course objectives as stated in the syllabus.
   4. The instructor displayed knowledge of the subject.
   5. The instructor summarized or emphasized important points in class.

B. Communication
   6. The instructor's presentations were clear and well organized.
   7. The instructor communicated clearly in English (or the language used in the course).
   8. The instructor used challenging questions or problems.
   9. The instructor inspired me to learn.

C. Faculty/Student Interaction
   10. The instructor was accessible outside of class.
   11. The instructor was helpful and responsive to students.
   12. The instructor created a learning environment that encouraged open discussion

D. Assignments, Exams, and Grading
   13. The information given to students about how they would be graded was clear.
   14. Assignments were returned in a timely manner.
   15. The instructor's feedback on assignments and exams in this course was effective in helping me learn.
   16. The work load for this course was appropriate.

E. Instructional Methods
   17. The articles, videos, internet, etc. were effective in helping me learn.
   18. The out of class assignments were effective in helping me learn.
   19. The in-class assignments were effective in helping me learn.
   20. The text(s) used in this course were effective in helping me learn.
   21. The instructor used a variety of teaching methods.

F. Student Engagement
   22. This course contributed to my knowledge, skills or personal development.
   23. This course helped me to think independently about the subject matter.
   24. I studied and put effort into the course.
   25. I was challenged by this course.
   26. I would recommend this course to another student.

G. Overall
   27. The pace of this course was: (Very Fast) (Somewhat Fast) (About right) (Somewhat Slow) (Very Slow)
   28. The overall quality of this course was: (Excellent) (Very Good) (Good) (Fair) (Poor)

Questions 29-35 were rated on a 5-point Likert scale (Very Satisfied, Satisfied, Somewhat Satisfied, Not Very Satisfied, Not At All Satisfied) and students were also offered the choice Doesn't Apply.

H. Please rate your satisfaction with the classroom in each of the following:
    29. Size of the classroom
    30. Outside classroom noise/distractions
    31. Classroom temperature
    32. Classroom lighting
    33. Cleanliness of classroom
    34. Working order of Equipment and Technology
    35. Ease of use of the Quincy College Portal

I. Student Information
    36. Are you currently in a Certificate or Associate Degree program at Quincy College?
    37. If in a certificate or degree program at Quincy College, what is your program of study/major?
    38. How many credits are you taking this semester?
    39. How many credits have you completed at Quincy College prior to this semester?
    40. What was the most important reason for your taking this class? (choose one): College Requirement, Elective, Because of the Instructor, Related to my work, Personal Interest
    41. Did you take the pre-requisite for this course?
    42. Do you communicate better in English or in another language?
    43. What is your gender?

J. Comments
    44. What did you like about this course?
    45. What didn't you like about this course?
    46. What aspects of the course would you change?

Developing Community College Peer Institutions: Methods, Measures, & Issues

Joanna Musial-Demurat
Columbia-Greene Community College
State University of New York

Bruce Szelest
University at Albany
State University of New York

Abstract: Dimensions of finance, size, complexity, quality and service area characteristics are captured in the peer group development process used by a public two-year community college. A cluster analysis approach, data integrity/limitations and campus political considerations shape the development of institutional peers.

Paper presented at the 2012 North East Association for Institutional Research, Bethesda, Maryland

Introduction

Community colleges serve almost half of the undergraduate students in the United States, providing open access to postsecondary education, preparing students for transfer to four-year institutions, and offering workforce development and skills training. Given the scope and importance of the community college role, it is difficult to overstate the importance of assessing and strengthening the quality of its education, performance and outcomes. Proper selection of peer groups is a key starting point in effective use of benchmarking for improvements and changes which can help to transform institutions to enhance their standing.

Both external and internal forces create a need for development of accurate peer groups for community colleges (Bers, 2006). The external factors include pressure for accountability and efficiency and thus proof that colleges provide quality education, allocate appropriately their funds, and are effective in fulfilling their missions. Community colleges must show student attainment and institutional effectiveness through analyzing intra-institutional trends and inter-institutional benchmarking (Juhnke, 2006). The internal motivations of selecting peer groups include self-evaluations that may help to identify areas in which a college needs improvements and in which it is strong and needs to sustain its position. In other words, benchmarking can be used to focus college attention on practices, programs, and policies that may be in need of improvement – and on those worthy of celebration (McClenney, 2006). Both external and internal motivations support benchmarks and benchmarking (Bers, 2006).

The Columbia-Greene Community College (CGCC) is one of 64 campuses in the State University of New York system. The system includes four university centers, nine other doctoral-granting institutions, thirteen university colleges, nine technology colleges, and twenty nine community colleges. The 29 community colleges are very diverse and so it is not obvious how any one of them can know which other community colleges would be appropriate peers for benchmarking. Our research aims at helping individual community colleges decide how to narrow their choices of peers in order to create comprehensive benchmarking groups.

Columbia-Greene Community College, like other community colleges, has a need to develop a list of peer institutions to support its institutional planning and effectiveness, decision making processes, and planned initiatives. Its original peer list was successfully developed about fifteen years ago and has been updated a few times since then. The college primarily used informal panel reviews and a threshold method to create its original list of peers, and later during the updating process. The latest version of Columbia-Greene's peers is now some 8 years old. Although the list is still basically appropriate, it needs re-evaluation due to the fact that the last ten years have brought many changes in higher education, particularly within the SUNY system. Within New York State, and nationally, many colleges continually

adjust and transform themselves to meet new challenges and enhance their standing. These processes are visible across all institutions starting from research universities through university colleges and technical colleges, and community colleges. Some changes are commonly visible across groups of institutions; for example, residential student housing projects brought changes and new challenges to many community colleges in the last decade. To facilitate changes which occurred at Columbia-Greene Community College as well as those at our historical peers, we have decided to re-evaluate and revisit our peer group selection though applying an advanced method of peer selection used successfully for the same purposes by the University at Albany in 1996 and 2011 (Szelest 1996; Musial-Demurat & Szelest, 2011).

Literature Review

Types of comparison groups

Previous research has identified several peer types that have been successfully used during peer selections for four-year colleges and major research universities. Brinkman and Teeter (1992) listed the best known types of comparison groups; 1) competitors, which regard to applicants, faculty, or financial resources, 2) aspirational, those institutions we strive to be like in some respects, 3) predetermined, those institutions that are natural, traditional, or which share a common jurisdictional area, and 4) peers, which can be used in benchmarking. This classification of comparison groups, for the most part, remained constant across time. It helps with identification of a pool of institutions that should be selected based on the given situation and purpose of the comparison.

Three distinctive comparison groups were identified for community colleges in the five benchmarking projects discussed by Hurley (2002a): peer institutions and peer groups, comparator institutions, and benchmarking institutions. Very similar peer types are used in newer publications on comparison groups for community colleges. Horn (2008) refers to “peer grouping” while describing the use of benchmarking in term of its development, mechanics, and implications for California’s system of 109 community colleges. Juhnke (2006) uses the “peer institutions” term while discussing the National Community College Benchmark Project (NCCBP), which provides community colleges within a system to report data on key learning outcomes and indicators of institutional effectiveness and to compare their results with data from selected peer insinuations. Similarly, Manning and Bostian (2006) refer to “peer institutions” while discussing how Central Piedmont Community College (CPCC) has used data from the NCCBP to initiate and implement strategies that were demonstrated to be effective in reducing course-withdrawal rates. Another term --“community colleges clusters”-- is used by Hurley (2009) in his study of the Community College Survey of Student Engagement (CCSSE) benchmarks for extra-large community colleges.

Methods

There is no one generally accepted standard technique with which to identify peer institutions. Brinkman and Teeter (1987) define cluster analysis, hybrid, threshold, and panel reviews as useful methods for peer institution selection. These methods range from a purely statistical technique like cluster analysis to mainly subjective methods like a panel review. All of them have been used for development of peer institutions for four –year colleges and research universities. These institutions have much longer histories and stronger foundations in peer selections than community colleges do (Hurley, 2002b), so that community colleges have a significant need for benchmarks of education quality (McClenney, 2006).

In recent years, several scholars and practitioners have focused on using cluster analysis for selecting peer groups or clusters for community colleges. For example, Hurley (2002) discusses how cluster analysis has been employed in various community college peer grouping efforts. This statistical analysis is also applied by Hurley (2009) in research on the formation of community college clusters using the CCSSE benchmarks for extra-large community colleges. Similarly, cluster analysis was used for peer grouping for California's system of 109 community colleges (Hom, 2008). One of the reasons that this statistical tool has been used for peer grouping on system-level benchmarking is that it prevents politically biased peer selections that would favor certain colleges.

Hybrid approach

Although, there are advantages of using cluster analysis for peer selections, especially for system-level analysis, in recent years several scholars have strongly recommended a hybrid approach as a useful tool in forming peer groups because it incorporates the advantages of both the data-driven analysis and expert judgment (Ingram 1995; Zhao 1997; Lang 2000; Xu 2008; Archer, Reiss, Armacost, Sun, Fu 2009; Musial-Demurat, Szelest 2011). The approach is used for analyzing peer groups mostly for four-year colleges and its applicability to community college settings was not explored in detail. Thus our research aims to evaluate how the hybrid approach can be used for selection of institutional peers by community colleges. The research uses a combination of statistically driven techniques and subjective judgment methods in regard to selecting possible sets of peers, variable selection and weighting schemes. Overall, the structure of the research is based on methods and findings presented in the paper "In Search of Peer Institutions: Two Methods of Exploring and Determining Peer Institutions" (Szelest, 1996) and further developed peer selection ideas presented in Musial-Demurat & Szelest 2011. These two publications are thus the core starting points for the present research in terms of methodological approach. Additionally, however, we now focus on a different set of institutions. Whereas the prior methodological work was developed and tested for selection of peer four–year public research universities, this new research focuses on community colleges.

Dimensions

Two-year colleges differ significantly from one another, and there is a dramatic variation in terms of institutional characteristics like size, geographic location, available resources, programs, and in terms of student characteristics like enrollment patterns. These differences must be taken into consideration in the benchmarking process, both when interpreting an individual institution's benchmark scores and when making institutional comparisons (McClenney, 2006). Dimensions like size, finance, quality, and complexity have been commonly used for peer analysis for four-year colleges and research universities (Szelest, 1996; Zhao 1997; Weeks, Puckett, Daron 2000; Xu 2008; Gaylor 2009; Nzeukou and Muntal 2010). Hurley (2002) recommends using these dimensions for identification of peer institutions for community colleges based on his evaluation of peer analyses conducted on the state and institutional levels. However, the validity and reliability associated with these institutional variables in the four-year college and universities levels have been established over last two decades. But this is new research focusing on community colleges (Hurley, 2002b). Thus there is a need for reevaluation of institutional dimensions/variables to determine which can best be used for peer selections for the two-year college setting, taking into consideration the unique symbiosis of community colleges and their communities. Factors like the social-economic profile of the surrounding community or wealth of the community are examples of factors that may be more critical for establishing benchmark groups for community colleges within the same state, as well as in other states.

Variables

Once important dimensions have been chosen, variables can be identified for determining peer institution selection. According to Aldenderfer and Blashfield (1984), the selection of variables in peer analyses is one of the most critical steps in the research process. That is because the choices of variables for peer comparisons strongly influence the characteristics of institutions and thereby the selection of peer groups.

In many peer selection studies variables are placed into major categories, which frequently are similar or the same as dimensions. Interestingly, comparison of dimensions used by researchers for analysis peers for four-year instructions including research universities (Szelest, 1996) and two-year institutions (Hurley, 2002) shows that the same taxonomy--including institutional level, size, complexity, quality and finance--can be used for selecting peers for those institutions. However, there are some differences in terms of variables used for peer selections for four-year colleges and research universities and two-year community colleges. For example, variables used for measuring quality differ based on type of institution; SAT scores are frequently used in four-year colleges whereas most community colleges have an open enrollment policy and accept students without requiring these scores. Similarly, funding sources differ between different types of higher education institutions, with research

universities on one end of the spectrum paying a lot of attention to research expenditures and on the other end community colleges, which usually do not generate research funds.

There is no consensus among scholars on the correct number of variables to use for peer comparison analyzes. Some researchers like Nzeukou and Muntal (2010) use a large number of variables grouped in a few dimensions in their analysis aiming to select peer institutions. Similarly, the IU Northwest peer institution report discuses many variables that are used during a peer selection process. Other researchers like Archer, Reiss, Armacost, Sun, Fu (2009) or Weeks, Puckett, Daron (2000) focus on fewer variables while selecting peer groups.

Weights

After making decisions on the type of comparison group, methods of selecting institutions, and dimensions and variables for peer analyses, it is time for another very important step: the choice of weighting scheme. There is no agreement among scholars whether weighting in necessary during the selection of peer institutions. Some scholars (Szelest, 1996; Xu, 2008) have made conscious decisions not to weight the variables/factors in their studies. One given reason rests on the assumption that variables/ factors may receive special considerations in pre-final analysis procedures so they do not need weighting in the final stage of peer comparison. For example, size variable is frequently considered in the initial processes of peer comparisons and is captured through multiple measures, so it may not need additional weight in the final step. Other researchers, such as Week et al (2000), have made a decision to weight the selection variables to give greater or lesser emphasis to key factors related to each campus's mission and programs. Similarly, Hom (2008) indicate that for peer grouping study for California's system of 109 community colleges staff needed to weight the specific criteria that applied to accountability programs.

Summary

Thus this present research not only surveys fifteen years (1996-2011) of scholarly literature on selecting peer institutions for four-year colleges including Szelest's (1996) methodology but also evaluates research on peer institutions for community colleges and explores how to adapt the methodology to the 2-year setting. As such, it highlights best practices around the most frequently used methodological approaches, dimensions upon which comparisons are often based, and the individual variables and metrics used in identifying peers. The research refers to approaches already employed (by others) on community colleges for peer selections such as usage of CCSSE benchmarks for formation of community college clusters (Hurley, 2009) or peer groupings implemented in California system of 109 community colleges (Hom, 2008).

Dataset Development

A dataset was developed to include 35 (public) NYS community colleges for potential analysis. Because the target institution to which peer selections are to be made is Columbia-

Greene Community College, a Carnegie Associate's--Public Rural-serving Small College (2010), potential peer institutions with the similar classification 'Associate's Public College' were chosen for exploration. Following the input from college leaders and the literature on intra/inter-state benchmarking, a decision was made early in the process to consider as possible peers only community colleges within New York State. The main reason for focusing on institutions from one state lies in fact that states vary considerably in the ways community colleges are regulated, governed, and funded. For example, in some states local taxes comprise a substantial revenue source for two year colleges, whereas in other states all funds are received from the state (Bers, 2006). Similarly, some states have statewide faculty contracts, which limit an institution's autonomy to make decisions about employees' salaries and benefits whereas other states have much open policies related to faculty employment (Bers, 2006). Thus a decision was made to limit the pool of possible peers to only New York State colleges taking in to consideration that Columbia-Greene Community College is located in this state. Additionally, the comparison group is restricted to public institutions due to the public control of the target institution, which is a part of the State University of New York (SUNY) system. Extraction of institutions with these criteria (public, New York State institution, Associate's College) from the IPEDS data analysis tool resulted in a dataset of 35 institutions comprising 29 community colleges from the SUNY system and 6 community colleges from the CUNY (City University of New York) system.

Missing data are a concern in any quantitative analysis. This is true even with IPEDS data for which NCES has the power to impose monetary (and worse!) penalties for institutions that do not submit timely or accurate data. There are no doubt myriad reasons why data may show up as missing in IPEDS, including applicability, reporting errors, or even a result of extracting data from one particular IPEDS survey like the GASB financials survey as it appears that public universities should use that specific reporting form, but in reality a handful of public institutions use the FASB financial instrument. As discussed below, the analytic methods used in this research require complete data. Missing data excludes institutions from the analyses. These instances were very few, as only a few isolated instances of missing data were identified. In these instances, mean substitution was used. In addition, a flag was added to the underlying data file so that if campus leaders chose to inspect the raw data for any particular school, they could identify instances where mean substitution was used.

The rationale for using mean substitution is that because of the number of measures used (43), it is believed that using the mean value on one or two measures will not adversely affect the analyses. Again, we included a flag in the dataset to mark those measures (and institutions) in which mean substitution was used so that we could revisit the details of the data should these institutions find their way into the final peer listing. Finally with respect to missing data, it is worth noting that there were no instances in which we needed to remove a prospective institution from the analysis.

Variables Development

After selecting only public New York State Associate's Colleges, we chose variables based on their appropriateness in capturing dimensions of finance, size, complexity, and quality. We based our selection of variables on a re-evaluation of variables used in Szelest's study (1996) and examination of the most popular variables used by other researchers in the last fifteen years. Additionally, the top administrators were asked to identify which important variables they believe should be taken into consideration based on their experiences with selecting Columbia-Greene peers over the past fifteen years. That administrative input was essential for our selection of variables which become have become currently important for Columbia-Greene. The final analysis includes nine financial, five size, three quality, and twenty-six complexity measures.

Finance

The measures of institutional finance address both overall support and more specific expenditure functionality. We capture total from the IPEDS dataset. Specific expenditure account categories of instruction, academic support, student services, and institutional support are evaluated in terms of their share of core expenditures, as defined by IPEDS. Thus each specific expenditure is divided by the total operating and non-operating expenditures. Similarly, for calculation of total revenues we include total revenues from operating and non-operating revenues. In terms of percent of budget from different sources we evaluate the percentages of revenue generated from state appropriations, tuition and fees, and local appropriations. Local appropriations are of particular import as they constitute a unique revenue stream for the community college sector.

Size

The size measures are categorized in two groups of measuring: that represent the size of student body and the size of the faculty body. Total student FTE is used to capture both size and mission of institutions. FTE students are calculated by combining full-time headcount and one-third of the part-time headcount enrolment, per the IPEDS definition. Additionally, the size of the entering full-time first-time freshmen cohort as a percentage of all undergraduate students and entering transfer students as a percent of new students are included in the analyses. In terms of faculty body we evaluate the number of full-time and part-time employees, and the number of full-time tenured track and full-time instructional lecturers, which helps to illustrate some important employment patterns of community colleges. All size data come from IPEDS.

Complexity

The twenty-six complexity measures address student body composition, faculty composition, technical emphasis, socio-economic characteristics of service counties, degree awarded distributions, and the residential nature of the campus. Commonly accepted indicators of student body complexity include students' socio-economic distribution based on the percent of freshmen who are Pell recipients, the percent of freshmen local grant recipients, and the percentage of institutional grant recipients. Additionally, age distribution as a proportion of undergraduates of traditional age (i.e., 18 to 24 year olds and 25 to 65 year olds), the percent of part-time students, and diversification of the student body defined by the percentage with minority classification are included in the analyses. To further evaluate the student body of community colleges we made a decision to evaluate the percentage of non-degree enrollment to reflect an essential component of the two-year college mission. We use one individual measurement of faculty complexity: the percent of full-time faculty who are tenured or tenure-track, which is a crucial indicator of composition of faculty body at community colleges. Emphasis on technical education derives from the percent of degrees awarded in technical majors versus the percent of degrees awarded in liberal art, social services, and business majors. Three indicators of social-economic profile of the surrounding community or wealth of the community are also incorporated into the analyses. These include: county(s) population (2011) served by a college, estimated median household income 2006-2010 from county(s) served by a college, and estimate unemployment rate (August 2011-September 2012) in a county(s). These variables are especially important when we take into consideration the unique symbiosis of community colleges and their communities. The residential nature is measured by the presence or absence of residential housing for students. Interestingly, a few years ago this indicator would not be relevant to community colleges, which in majority did not have residence halls. But more recently, many of them have made a decision to add on-campus housing options to their service offerings. Lastly, due to the fact that athletes are more likely to live in residence halls, we decided to include a measure for whether colleges are members of the National Junior College Athletic Association (NJCAA) or not.

Quality

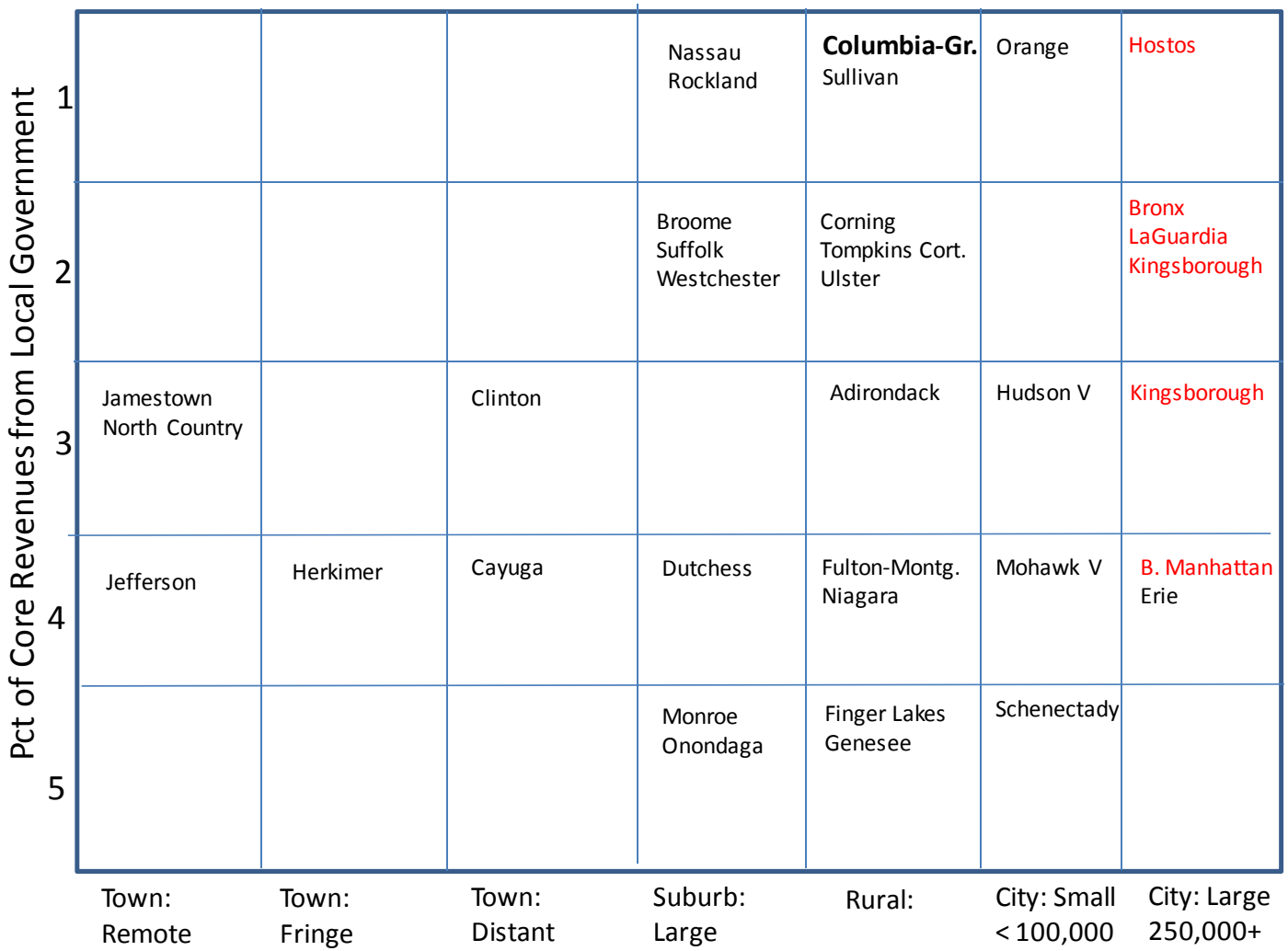
Unfortunately, it is not easy to directly verify the quality of higher education institutions due to a lack of well-defined and measureable indicators. In particular, the traditional proxies for quality input variables are not available for community colleges which in majority have an open enrollment policy and enroll students with minimal requirements like a high school diploma or its' equivalent. In terms of quality output variables we focus our analysis on three

measurements: first year retention rate of full-time first-time freshmen, the graduation rate, and transfer out rate. The evaluation of these variable helps to illustrate some aspects of a college mission. The transfer out rate is an especially relevant indicator for community colleges, which in majority, prepare students not only for graduation but also for transfer to four-year colleges.

Methodology

As in previous peer institution explorations, we conducted a number of preliminary examinations by looking at institutional attributes such as athletics conference, the presence or absence residence halls, as well as by various demographic and ecological characteristics. In the past, we have found that surveying the institutional landscape and mapping out institutional typologies to be an excellent means of educating campus stakeholders about institutional similarities and dissimilarities.

Quintile Groupings of Local Support by Degree of Urbaneness



In addition to showing where each institution falls on these distributions, we have highlighted our City University of New York (CUNY) colleges in red. CUNY schools have separate funding and administrative funding structures within New York State, so it is important to highlight this difference for campus leaders. Other typologies developed for initial information sharing might include juxtaposing enrollment by the percentage of students receiving Pell grants, or student selectivity with other financial resource measures like percentage of budget allocated to instruction or student support services.

Examining these institutional typologies is also informative for the analysts. Deans and senior staff often have "insider insights" into other institutions and their cultures owing to either personal experience or professional collaborations/interactions with their counterparts across the country. This can help inform variable and measure selection, as well as aid in adding additional context to the eventual result set.

Once the institutional landscape is satisfactorily explored and campus leaders are familiarized with the data typologies, we then turn to statistical techniques to begin selecting peer institutions. The rank distance method used by Berthold (1996) is very similar to that used by the University of Kansas and described by Teeter and Christal (1987), but uses a percentile rank order of institutions on each measure rather than Z scores to calculate similarity/dissimilarity. A second method, cluster analysis, utilizes principal components analysis and factor scores to group universities that are determined to be similar across specified dimensions into clusters. This technique was developed by Terenzini et al. (1980), who were amongst this technique's early pioneers in the late 1970s.

The Kansas classification described by Teeter and Christal (1987) utilized a weighting scheme to elevate the importance of certain variables after standardization. While the rank-distance analysis conducted for this research does not use explicit weights for the variables chosen, an implicit weighting scheme is active in that nine financial, five sizes, twenty-six complexity, and three quality measures are used in the analysis. Hence, elements of finance and size are more dominant in assessing institutional similarity/dissimilarity with the target institution. In addition, it should be noted that many of the measures used are highly correlated with each other, so they in effect may very well be measuring the same variable or dimension. Reducing the number of measures used in the analysis, and which measures, could influence where institutions fall out in proximity to the target institution. Hence our multi-method approach.

Due to space and visual presentation limitations, Table 1 shows only three of the nine Financials measures used; two of the five size measures, six of the twenty-six complexity measures, and three of the quality measures used.

Table 1 – Initial Extraction using the Rank-Distance method

		Financials			Size		Complexity						Quality		
	Composite Rank	Rnk - Expend_ Tot	Rnk - Core_Rev enues	Rnk - Core_Rev _Loc_app _pct	Rnk - FTE_enr oll	Rnk - FT_TTrac k_Fac	Rnk - UG_pct_ PT	Rnk - pct_age_ 2565	Rnk - pct_FTFT _ug_PEL L	Rnk - Stu_pct _min	Rnk - Deg_Asso c_pct_tec hnical	Rnk - median _income	Rnk - FT_retention _rate	Rnk - Grad_rate	Rnk - Trans_o ut
SUNY Columbia-Greene	**0**	**33**	**33**	**4.5**	**34**	**33**	**10**	**7**	**23.5**	**25**	**20**	**15**	**16.5**	**9**	**24.5**
SUNY Adirondack	255	30	30	20	27	21	18	8.5	26	35	22	13	23.5	22	22
SUNY Fulton-Montgomery	318	32	31	28	31	34	29	17	12.5	26	15	31	31.5	2	10
SUNY Jefferson CC	335	29	26	24	29	25	19	5.5	17.5	24	26	30	28.5	9	18
SUNY Ulster CC	352	28	28	10.5	30	26	2	27	27	21	34	9	19.5	6	34.5
SUNY Cayuga CCC	353	20	21	24	26	31	11	5.5	5	33	17	20	19.5	20	32
SUNY Corning CC	367	24	25	7.5	24	22	5	24	15	32	9	26	23.5	16.5	24.5
SUNY Clinton CCC	381	34	34	17.5	32	29	21	34	10.5	30	14	22	33	12.5	13
SUNY Finger Lakes CC	408	22	17	32	20	17	12	24	20	28	28	17	28.5	3.5	18
SUNY Sullivan CCC	431	31	32	6	35	32	27	27	4	11	8	21	35	32	1
SUNY Schenectady CCC	436	27	29	35	22	27.5	1	11.5	15	20	23	12	26	26.5	13
SUNY Orange CC	439	16	18	4.5	18	15	9	24	32.5	10	11	6	7.5	26.5	10
SUNY North Country CC	450	35	35	20	33	35	3	17	17.5	34	35	28	34	20	27
SUNY Tompkins Cortland (	456	21	23	13.5	23	23	7	35	15	23	31	19	21.5	12.5	2.5
SUNY Mohawk Valley CC	463	18	14	28	16	19	30	11.5	9	19	5	24	13.5	16.5	24.5
SUNY Jamestown	480	26	24	17.5	25	24	34	1.5	10.5	27	32	32	13.5	1	32
SUNY Broome CCC	490	19	19	10.5	17	13	35	17	25	31	2	27	16.5	7	34.5
SUNY Genesee CC	493	23	22	32	19	30	4	30.5	12.5	29	33	18	28.5	5	2.5
SUNY Niagara CC	496	17	20	24	15	20	25	30.5	29	22	21	25	11	12.5	29
SUNY Rockland CC	497	15	16	3	14	18	24	10	35	9	25	3	1	20	18
CUNY Hostos CC	502	12	12	1.5	21	14	15	17	2	2	29	34.5	11	33	32
SUNY Herkimer CC	503	25	27	28	28	27.5	33	30.5	7.5	16	30	33	31.5	3.5	5
SUNY Erie CC	510	9	10	28	7	8	32	3.5	19	14	3	23	21.5	23	18
CUNY Bronx CC	526	10	7	7.5	12	9	13	17	1	1	7	34.5	16.5	35	29
SUNY Dutchess CC	529	14	15	22	13	16	6	30.5	34	13	18	5	9	16.5	18
SUNY Onondaga CC	531	13	13	32	11	11	17	8.5	23.5	18	4	16	25	26.5	13
SUNY Westchester CC	576	7	9	9	10	12	8	1.5	31	7	19	4	16.5	34	5
CUNY LaGuardia CC	585	4	4	13.5	6	7	14	17	6	4	13	10.5	4.5	30	29
SUNY Hudson Valley CC	588	11	11	20	9	10	16	22	28	17	1	8	28.5	12.5	5
CUNT Queensborough CC	617	8	8	13.5	8	4	23	17	21	5	6	10.5	2.5	26.5	7.5
SUNY Suffolk CCC	629	2	2	13.5	1	3	20	27	30	15	16	2	7.5	26.5	18
CUNY Kingsborough CC	639	5	6	16	5	6	22	17	7.5	6	24	29	4.5	9	24.5
SUNY Monroe CC	650	6	5	34	4	5	26	3.5	22	12	10	14	11	16.5	10
CUNY Bourough Manhatta	651	3	1	28	3	2	28	17	3	3	27	7	6	31	18
SUNY Nassau CC	700	1	3	1.5	2	1	31	33	32.5	8	12	1	2.5	26.5	7.5

In order to explore the possible impact of collinearity among measures, as well as redundancy and attendant issues around inherent weighting by virtue of the differing number of measures in each dimension, we re-ran the rank-distance analysis using differing numbers of measures in the financial, size, complexity and quality. Some analysis runs were similar, and some quite divergent in terms of proximity to the reference institution. Overall, there is enough variation in the resulting peer set to give one pause about relying solely on this method of extracting peer institutions.

To address these concerns, we employ factor analysis (varimax rotation, and Kaiser's criterion for Eigenvalue selection) and a cluster analysis technique (complete linkage, hierarchical aggolomerative). The factor analysis uses principle components analysis to reduce

the original forty-three measures to eleven factors that reflect institutional dimensions of import. By definition, principle components analysis partitions the observed variance in the measures to unique factors that are completely uncorrelated. The researcher can though influence factor composition by choosing the extraction technique, and in deciding where to halt factor formation, so some subjectivity is still present, albeit in a limited manner. The dimensions that surfaced in this analysis are characterized as reflecting: Size and wealth; Socio-economic status; Student body complexity; Faculty and support; Transfer emphasis; Business and Liberal Arts & Science emphasis in associate degree programs ; Academic support, Student services support; non-Traditional emphasis; Business certificate emphasis; and Liberal arts and sciences emphasis in certificate programs. The factor scores are exported and saved in the dataset, and are then used in a cluster analysis. The progression of institutional clustering via a dendogram diagram can then be examined to determine how institutions cluster with the target institution.

Each of the factors receives equal weight in building the clusters, and complete data is required for each institution. Initially, a conscious decision was made not to weight the factors, as no design induced implicit weighting scheme existed. After the first pass through, a weighting scheme was considered as senior campus officials believed that certain institutional or student body characteristics were in fact more important than others to the college mission and operations. Based on conversations with senior staff, it was decided to weight the dimensions into high, medium, and low importance categories. While a considerable amount of time and energy could have been invested in estimating more precise weights, given that these were largely 'opinion' data in the first place, the high, medium, and low classifications were deemed satisfactory. The dimensions and their weights were thusly defined:

Size, Wealth	Socio economic	Student Body Complexity	Faculty and Support	Transfer Emphasis	Bus/ Liberal Arts	Acad Suppport	Student Services Support	Non-Traditional Emphasis	Bus Certificate Emphasis	Lib Arts Certif Emphasis
High	High	Medium	Medium	High	High	High	Low	High	Low	Low
1.00	1.00	0.66	0.66	1.00	1.00	1.00	0.33	1.00	0.33	0.33

The cluster analysis calculates a standard Euclidean distance measure for each institution based on the standardized factor scores multiplied by their respective weights, and uses the "complete linkage" hierarchical agglomerative technique to group institutions into relatively homogeneous clusters. The clusters are formed based on the minimum maximum distance score between institutions, which is compared at each successive step until the researcher decides to stop cluster formation (based on professional judgment about diminishing returns). Each institution's cluster can be as small as two campuses, or can be built

larger to incorporate larger numbers, but at each successive step, the number of institutions that join clusters is variable, and depends on the clustering algorithm, the weights assigned to factors (or not) and the researcher's objective.

The underlying purpose of this analysis is to identify a small number of institutions that group closest to the target institution. Institutions can be grouped by use of a dendogram, which traces the clustering pattern of any institution to successive institutions or groups of institutions. By definition, similarity between institutions becomes less distinct as the clusters incorporate additional schools. A dendogram is then produced based on the underlying weighted factors and the distance between institutions on them. Visual inspection is then used to determine where to stop the clustering process as more and more institutions join the initial cluster.

Results

Univariate statistics for the forty-three measures used are reported in Appendix A. Even though only public community colleges in New York State are included in the analysis, a brief review of the means and standard deviations suggests a great deal of variability on many of the measures across these institutions. This further reinforces the need for a comparison strategy. Unlike our prior explorations (1989, 1996, 2006) to identify peer institutions for public research universities that showed that the financial measures exhibited the most variability, followed by the size and then quality measures, in this analysis, there is considerably across these measures.

The (truncated) bivariate results reported in the correlation matrix in Appendix B indicate that measures, in general, are highly correlated with each other, and reinforces the concerns noted above around redundancy of measures. For example, core revenues have a Pearson's correlation coefficient above 0.50 with several other financial measures. Furthermore, it is also highly correlated with freshman retention, the graduation rate, and the percentage of the student population that is minority. Other measures were also highly correlated both within and across the hypothetical dimensions of finance, size, quality, and complexity. While more in-depth discussion of these relationships is not entertained here due to space limitations, the important implication is that a factor analytic technique that controls for multicolinearity is a suitable approach to effectively understanding this data set. That said, the rank distance method is still seen as beneficial in terms of educating campus decision makers about relevant data and its spread among institutions.

The second method used to develop a set of peer institutions is a factor and cluster analysis technique. When the forty-three measures described above are subjected to principal components analysis, with varimax rotation and using Kaiser's criterion for Eigenvalue

selection, eleven factors emerge which explain eight-five percent of total variance in the data set. Appendix C shows the factor loadings and the resulting dimensions.

These results suggest that size and wealth measures largely load along a similar dimension (size and wealth) that explains the most variance (26.8%) of all the eleven dimensions extracted. The Socio-economic factor, comprised of measures such as the percentage of full-time undergraduates on Pell grants, median county income, the percentage of core revenue provided from tuition and fees, and the unemployment rate explain just over ten percent (10.9%) of the variance in the dataset. The remaining factors explain from 7.4 to 42 of the dataset variance.

As noted earlier, after an initial exploratory cluster analysis was conducted without factor weights, it was decided that using weights might provide a better acceptance of the clustering solution by campus-decision makers.

Appendix D illustrates the dendogram that graphically depicts the institutional clustering sequence that results when the unweighted factor scores are submitted to the clustering algorithm. Appendix E depicts the resulting dendogram when weighted factors are used. Of primary interest in this exercise are those institutions that cluster with Columbia-Greene, the target institution. Examining the dendogram in Appendix E shows that Columbia-Greene first clusters with University of Adirondack CC and Jefferson CC. These two institutions are then joined by Cayuga CC. At the next iteration, Finger Lakes CC, Ulster CC, and Broome CC join this small cluster of four institutions. Then Jamestown CC joins this group, followed by Corning CC. Then the CUNY schools of Bronx CC and Hostos CC join the cluster. At the next iteration eight schools join the growing cluster, followed by a larger cluster composed of thirteen schools, then by two, and then by a final single institution, and all schools have been clustered.

The decision the researcher must make at this point is to determine where to stop the clustering. In this exercise, the decision was made to group the clusters at the stage right before the CUNY schools would have joined in what is a cluster of SUNY schools, rounded out by Jamestown CC and Corning CC. This seems a natural stopping point, due to the inherent differences between governance and funding structures between the SUNY and CUNY systems. And further supported by the fact that if the CUNY schools were included, it would not be reasonable to include additional schools, as the cluster to form after they join would bring in an additional eight schools, making the peer set too large at eighteen institutions.

Now that a cluster of peer institutions has been formed (Adirondack, Jefferson, Cayuga, Finger Lakes, Ulster, Broome, Jamestown, and Corning CCs), we might ask “how it might best be described?” These schools range in size from 1,400 to 5,100 students, with from 43 to 137 full-time tenured, tenure-track faculty. They serve similarly sized populations on non-traditionally

aged students, but have varying levels of non-degree students. In addition, their operating budgets run from twenty to over fifty million dollars. A more empirical approach would be to examine the original percentile rank measures for the peer cluster. One could also examine institutional rank on the factor scores themselves.

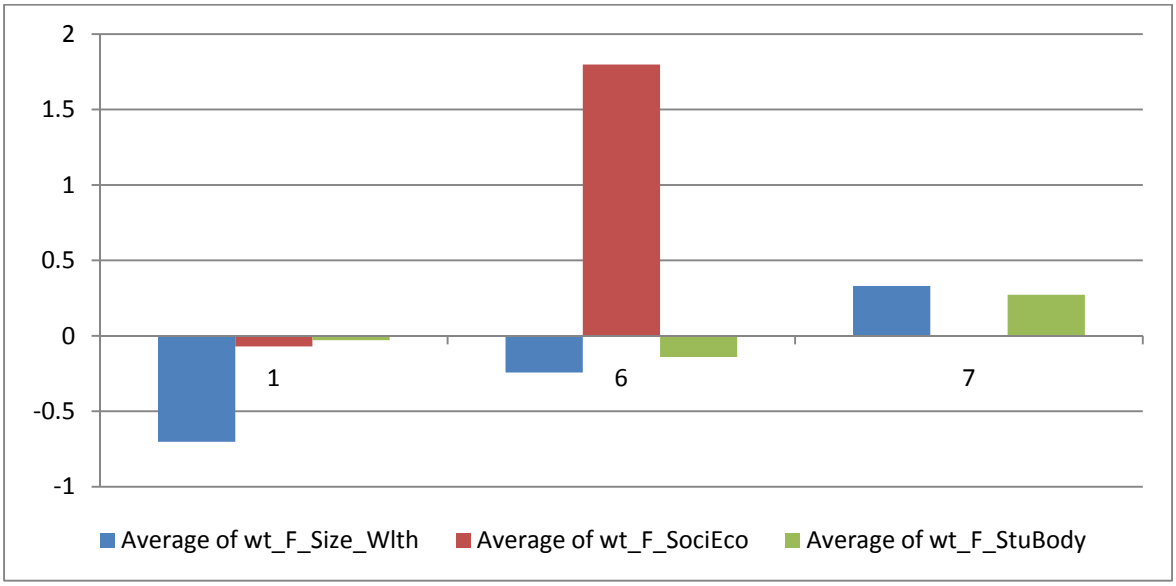
Table 3 – Rank on Individual Metrics for Cluster Peers

	Financials			Size		Complexity						Quality		
	Rnk - Expend_ Tot	Rnk - Core_Rev enues	Rnk - Core_Rev _Loc_app _pct	Rnk - FTE_enr oll	Rnk - FT_TTrac k_Fac	Rnk - UG_pct_ PT	Rnk - pct_age_ 2565	Rnk - pct_FTFT _ug_PEL L	Rnk - Stu_pct _min	Rnk - Deg_Asso c_pct_tec hnical	Rnk - median _income	Rnk - FT_retention _rate	Rnk - Grad_rate	Rnk - Trans_o ut
SUNY Columbia-Greene	**33**	**33**	**4.5**	**34**	**33**	**10**	**7**	**23.5**	**25**	**20**	**15**	**16.5**	**9**	**24.5**
SUNY Adirondack	30	30	20	27	21	18	8.5	26	35	22	13	23.5	22	22
SUNY Jefferson CC	29	26	24	29	25	19	5.5	17.5	24	26	30	28.5	9	18
SUNY Cayuga CCC	20	21	24	26	31	11	5.5	5	33	17	20	19.5	20	32
SUNY Finger Lakes CC	22	17	32	20	17	12	24	20	28	28	17	28.5	3.5	18
SUNY Ulster CC	28	28	10.5	30	26	2	27	27	21	34	9	19.5	6	34.5
SUNY Broome CCC	19	19	10.5	17	13	35	17	25	31	2	27	16.5	7	34.5
SUNY Jamestown	26	24	17.5	25	24	34	1.5	10.5	27	32	32	13.5	1	32
SUNY Corning CC	24	25	7.5	24	22	5	24	15	32	9	26	23.5	16.5	24.5

Alternative ways of looking at the inherent attributes of the institutions in the peer clusters is to graph the factor scores themselves. Chart 1 below uses the mean factor scores to examine three of the institutional clusters from the eleven cluster final l solution used to determine the nine member Columbia-Greene peer group described above. The first cluster represents Columbia-Greene and the schools listed in Table 3 above. The second cluster includes a grouping of three schools: SUNY Orange CC, SUNY Dutchess CC, and SUNY Rockland CC. The third cluster includes a grouping of six schools: SUNY Erie CC, SUNY Hudson Valley CC, SUNY Mohawk Valley CC, SUNY Monroe CC, SUNY Onondaga CC, and SUNY Niagara CC. Quick visual inspection shows that the Columbia-Greene cluster (1) is indeed different from the other two clusters on the first three factor dimensions. Differences exist among all of the eleven clusters, but only three were chosen for this demonstration to reduce visual complexity. Of import is the fact that these particular dimensions were chosen for inspection because between them they explain nearly 50 percent (45.1%) of the variance in the institution dataset.

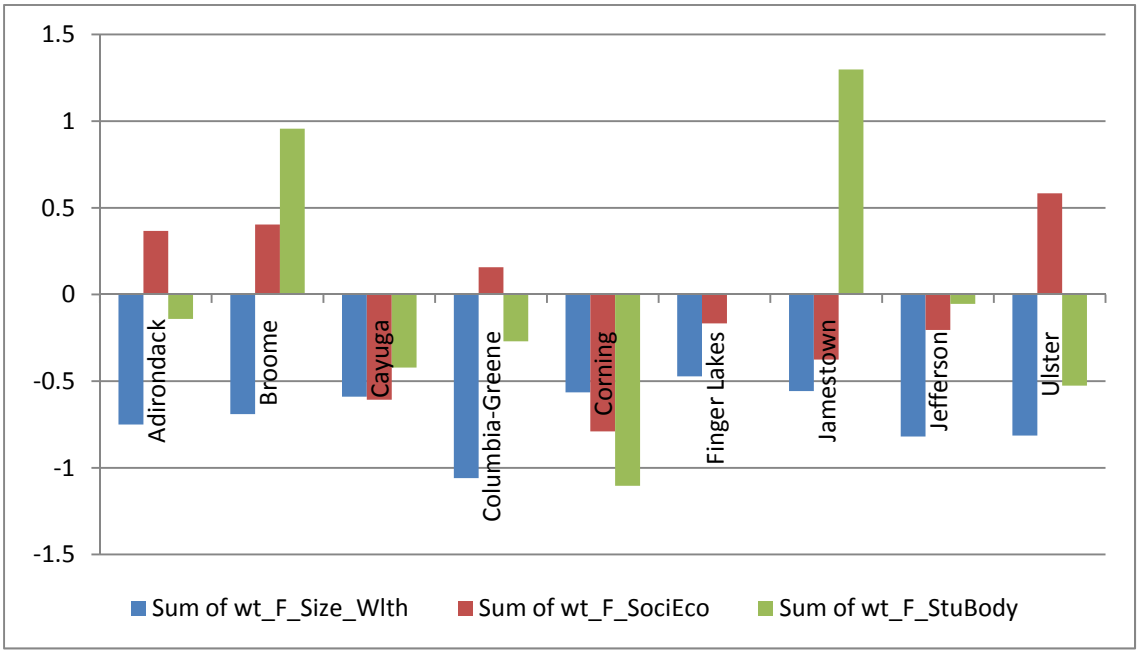
The Columbia-Greene cluster has a considerably lower value on the size and wealth dimension than the second cluster, and considerably less than the third cluster. While closer to average on the socio-economic dimension, the Columbia-Greene cluster also exhibits lower values than the other two clusters on this dimension, but the second cluster of schools has considerably higher values on this dimension than either of the other two clusters. Finally, while the student body complexity of Columbia-Greene's cluster is about the average value for all schools in the dataset, the schools in the second cluster have lower values, on average, and the schools in the third cluster have higher values on the student body complexity measure, on average.

Chart 1 – Mean factor scores for three clusters of institutions



An alternative to looking at cluster differences to build confidence in the peer group candidates is to look at the attributes of the institutions that are in within the cluster that includes the target institution and highlight their similarities. Chart 2 below shows the mean factor scores for the nine institutions in the final Columbia-Greene peer cluster. Once again, only the first three dimensions of size and wealth socio-economic status, and student body complexity are examined in this particular chart.

Chart 2 – Within Cluster Attributes



It is important to keep in mind that the factors scores were weighted in the final solution. Visual inspection seems to confirm that these institutions are more homogeneous than heterogeneous on these dimensions. While less similarity is observed on the student body complexity dimension than on the size and wealth or socio-economic dimensions, we must keep in mind that the student body complexity dimension only had 'medium' weight, while the other two had 'high' weights. And the setting of weights is a subjective decision made by campus leaders.

Discussion

In summary, the rank distance and factor and cluster analysis techniques provided an overlapping group of peer institutions for the target institution, Columbia-Greene Community College (C-GCC). In both analyses, campus decision makers have opportunity to play an integral role in developing the list of variables and their respective measures used to differentiate institutions. With both techniques, the institutional research staff, as well as higher level campus decision makers, can clearly see how C-GCC compares to other institutions across financial, size, complexity, and quality measures. Increased familiarity with and knowledge about these aspects of one's own institution and its chosen peers is of importance as we move forward with programmatic initiatives. Benchmarking to external institutions is often requested/expected by governing bodies, and having an up-to-date set of benchmark institutions adds confidence to the exercise.

There are limitations to these methods. The rank distance method employed did not assign weights to the individual measures. While an implicit weighting scheme was in effect due to the different number of measures used to represent finance, size, quality, and complexity variables, arguments can certainly be made to add measure weighting, or to alter the number of measures. As demonstrated, the number of measures used can indeed have an impact on the result set. In the past, analyses were guided by a desire to seek peer institutions more closely related on the financial and size variables, and this analysis was conducted similarly. We will need to revisit this approach as we work with campus leaders to develop a formal set of peer institutions.

Another limitation of the rank distance method is that basing the distance measure on percentile ranks instead of on factor or standardized scores potentially minimizes the magnitude of the differences between institutions. The percentile rank approach creates a distance measure based on the rank order of institutions for different measures rather than upon the magnitude of their differences from each other. The actual distances in the raw data may be greater or smaller than the distance between ranks.

A final limitation of this methodology worth noting is that many of the measures used, as noted, are highly correlated with each other. In other words, to a certain degree, they may be measuring the same institutional aspects. While the measures used address different concerns campus decision makers harbor, the end result may be confounded by the highly related nature of the measures.

The factor and clustering technique, which alleviates the problem of highly correlated measures by factoring them into eleven completely uncorrelated dimensions has an advantage in this respect. In this analysis, we decided to use weights on each of the eleven dimensions to provide for a more robust clustering solution.

A well noted limitation of factor analysis is that the factors (dimensions) used for clustering are more difficult to comprehend. This is particularly true with respect to the percentile ranks used in the first analysis. While standardized factor scores do not easily lend themselves to meaningful interpretation, once can still compare factor scores across institutions, or by cluster, to convey a sense of similarity/dissimilarity.

Both of these methods provide a means of identifying peer institutions. Neither should be viewed as a turn-key approach. The rationale for the undertaking in the first place plays a significant role in choosing variables and measures of them for consideration. Acceptance of a peer institution group by campus decision makers and relevant external audiences largely depends on accommodating and incorporating their intuition, concerns, and political objectives. The peer review process is a learning process. Through it we learn not only about the funding, quality, or size of other institutions, but more importantly, we learn about how our own institution stands in those respects.

Future Research

Future research might address the methodological limitations noted above. These include important methodological aspects, such as the sources of variables and selection of variables --- that in turn strongly influence the composition of the eventual peer groupings.

Due to resource, accessibility, and other constraints, this study has focused only on data available through the IPEDS database. However, there are other reliable sources of institutional data from sources such as the National Research Council (NRC), and the National Science Foundation (NSF) which can provide additional measures for peer analyses. Looking to the future, these sources can be used to incorporate variables that better measure, for example, the quality dimension through faculty work products such as the number of publications per faculty or the number of citations per faculty. Other possibilities may exist as well.

References:

Aldenderfer, M. S., & Blashfield, R. K. (1984). Cluster Analysis. Beverly Hills, CA: Sage

Archer, S. J., Reiss E., Armacost R. L., Sun Y., & Fu, Y. (2009). *A Large Metropolitan Research University's Approach to Benchmarking Peer Selection.* Proceeding of Association for Institutional Research 49th Annual Conference, Atlanta, Georgia.

Bers, T.H. (2006). Limitations of Community College Benchmarking and Benchmarks. *New Direction for Community Colleges*, no. 134, Summer 2006.

Berthold, C. A. (1996). *Aids to Navigation: Using Interinstitutional Databases in the University of Maryland System*. Paper presented at the 36th Annual Forum of the Association for Institutional Research, Albuquerque, NM, May 1996.

Bostian, B., Manning, T.M. (2006). Using Benchmark and Assessment Data to Facilitate Institutional Change. *New Direction for Community Colleges*, no. 134, Summer 2006.

Brinkman, P. T. and Teeter, D. J. (1987). Methods for Selecting Comparison Groups, in *Conducting Interinstitutional Comparisons*, Paul T. Brinkman (ed), New Directions for Institutional Research, no. 53., Vol XIV, Number 1., San Francisco: Jossey-Bass.

Gaylor, S.S. (2009). *Use of a Comparison Group and Modeling to Inform Decision-Making and Planning.* Proceeding of Association for Institutional Research 49th Annual Conference, Atlanta, Georgia.

Hom, W. (2008). Peer Grouping: The Refinement of Performance Indicators. New Forums Press, 16 (1), 45-51.

Hurley, R.G. (2002a). *Determining community college institutional peer groups and assessing the stability of institutional peer group membership over specified time periods.* Unpublished doctoral dissertation, University of South Florida, Tampa, FL.

Hurley, R.G. (2002b). Identification and assessment of community college peer institutional selection systems. *Community College Review*, 29 (4), 1-27.

Hurley, R.G. (2009). Formation of Community College Clusters Using the CCSSE Benchmarks for Extra-Large Community Colleges. *New Forums Press*, 16 (2), 103-108.

Ingram, J. A. (1995). Using IPEDS Data for Selecting Peer Institutions. (ERIC Document Reproduction Service No. ED387010).

IU Northwest Peer Institution Selection and Analysis (2006) Report presented by the Board of Trustees.

Juhnke, R. (2006). The National Community College Benchmark Project. *New Direction for Community Colleges*, no. 134, Summer 2006.

Lang, D. W. (2000). Similarities and Differences: A Case Study in Measuring Diversity and Selecting Peers in Higher Education. *Higher Education 39*: 93–129, 2000. Kluwer Academic Publishers. Printed in the Netherlands.

Lang, D. W., & and Zha, Q., (2004). Comparing Universities: A Case Study between Canada and China. *Higher Education Policy*, 2004, 17, (339–354).

McClenney, K.M. (2006). Benchmarking Effective Educational Practice. *New Direction for Community Colleges*, no. 134, Summer 2006.

Musial-Demurat, J., & Szelest, B. P., (2011). *The "Art and Science" of Developing Institutional Peers: Methods of Exploring and Determining Peer Institutions.* Proceeding of North East Association for Institutional Research 38th Annual Conference, Boston, Massachusetts.

Nzeukou, M., & Muntal, D. (2010). *A Knowledge-Based Selection Methodology of Peer Institutions.* Proceeding of Association for Institutional Research 50th Annual Conference, Chicago, Illinois.

Teeter, D. J. & Brinkman, P. T. (1992). Peer Institutions in *The Primer for Institutional Research*, Whiteley, M.A., Porter, J.D., and Fenske, R.H. (eds), Tallahassee: Association for Institutional Research.

Teeter, D. J. & Christal, M. E. (1987.) Establishing Peer Groups: A Comparison of Methodologies. *Planning for Higher Education*, Vol. 15, No. 2, 1987.

Terenzini, P.T., Hartmark, L., Lorang, W.G. Jr., & Shirley, R.C.. (1980). A Conceptual and Methodological Approach to the Identification of Peer Institutions. *Research in Higher Education,* Vol. 12, No. 4, 1980, Agathon Press, Inc.

Weeks, S. F., Puckett, D., & Daron, R. (2000). Developing peer groups for the Oregon University System: From politics to analysis (and back). *Research in Higher Education, 41,* 1–20.

Xu, J. (2008).Using the IPEDS Peer Analysis System in Peer Group Selection*. Professional File, Association for Institutional Research,* Number 110, Winter 2008.

Zhao, J., & Dean, D. C. (1997). *Selecting Peer Institutions: A Hybrid Approach.* Paper presented at the 1997 AIR Forum in Orlando, FL.

Appendix A – Univariate Statistics

	Mean	Std. Deviation	Analysis N	Missing N
Complexity				
Core_Expenses	45.91	8.31	35	0
Core_Exp_Instruct_pct	8.26	3.12	35	0
Core_Exp_Acad_Supt_pct	10.37	2.53	35	0
Core_Exp_Stu_Serv	18.74	4.60	35	0
Core_Exp_Instl_Supt_pct	6,915.14	5,130.87	35	0
Core_Revenues	84,838,321.00	63,274,421.83	35	0
Core_Rev_Tuit_Fees_pct	20.17	6.02	35	0
Core_Rev_State_app_pct	21.06	4.54	35	0
Core_Rev_Loc_app_pct	19.11	6.06	35	0
Tot_Emp_FT	456.34	298.42	35	0
Tot_Emp_PT	547.97	463.57	35	0
Size				
FTE_enroll	84,992,931.57	64,536,164.12	35	0
FT_TTrack_Fac	135.86	103.90	35	0
FT_Fac_InstrLect	34.06	29.69	35	0
Complexity				
FTFT_pct_of_Ugs	19.23	3.83	35	0
Transfers_pct_of_new	21.05	5.31	35	0
UG_pct_PT	40.71	6.91	35	0
pct_enrl_nondeg	20.28	10.92	35	0
NJCAA	0.97	0.17	35	0
pct_age_18_24	58.38	6.51	35	0
pct_age_2565	27.50	3.41	35	0
pct_FTFT_ug_PELL	60.69	13.12	35	0
pct_FTFT_st_loc_grant_aid	57.26	12.23	35	0
pct_FTFT_instl_grant_aid	5.40	7.36	35	0
res_halls	0.29	0.46	35	0
Stu_pct_min	29.24	25.36	35	0
Fac_pct_FT	36.03	14.04	35	0
Deg_Assoc_tot	1,138.29	838.06	35	0
Deg_Assoc_pct_technical	4.00	2.93	35	0
Deg_Assoc_pct_lib_arts	41.41	9.25	35	0
Deg_Assoc_pct_Soc_Serv	30.92	8.43	35	0
Deg_Assoc_pct_Bus	16.46	7.88	35	0
Certif_1_2yrs_Tot	68.00	72.17	35	0
Cert_pct_technical	11.49	12.26	35	0
Cert_pct_lib_arts	14.56	20.10	35	0
Cert_pct_Soc_Serv	51.59	31.02	35	0
Cert_pct_Bus	10.46	19.31	35	0
unemploy_rate	9.39	1.74	35	0
county_pop	627,030.83	714,121.81	35	0
median_income	53,803.69	13,970.71	35	0
Quality				
FT_retention_rate	60.03	7.04	35	0
Grad_rate	21.14	6.37	35	0
Trans_out	19.03	3.91	35	0

Appendix B – (truncated) Correlation Matrix (a complete correlation matrix is available from the authors, upon request)

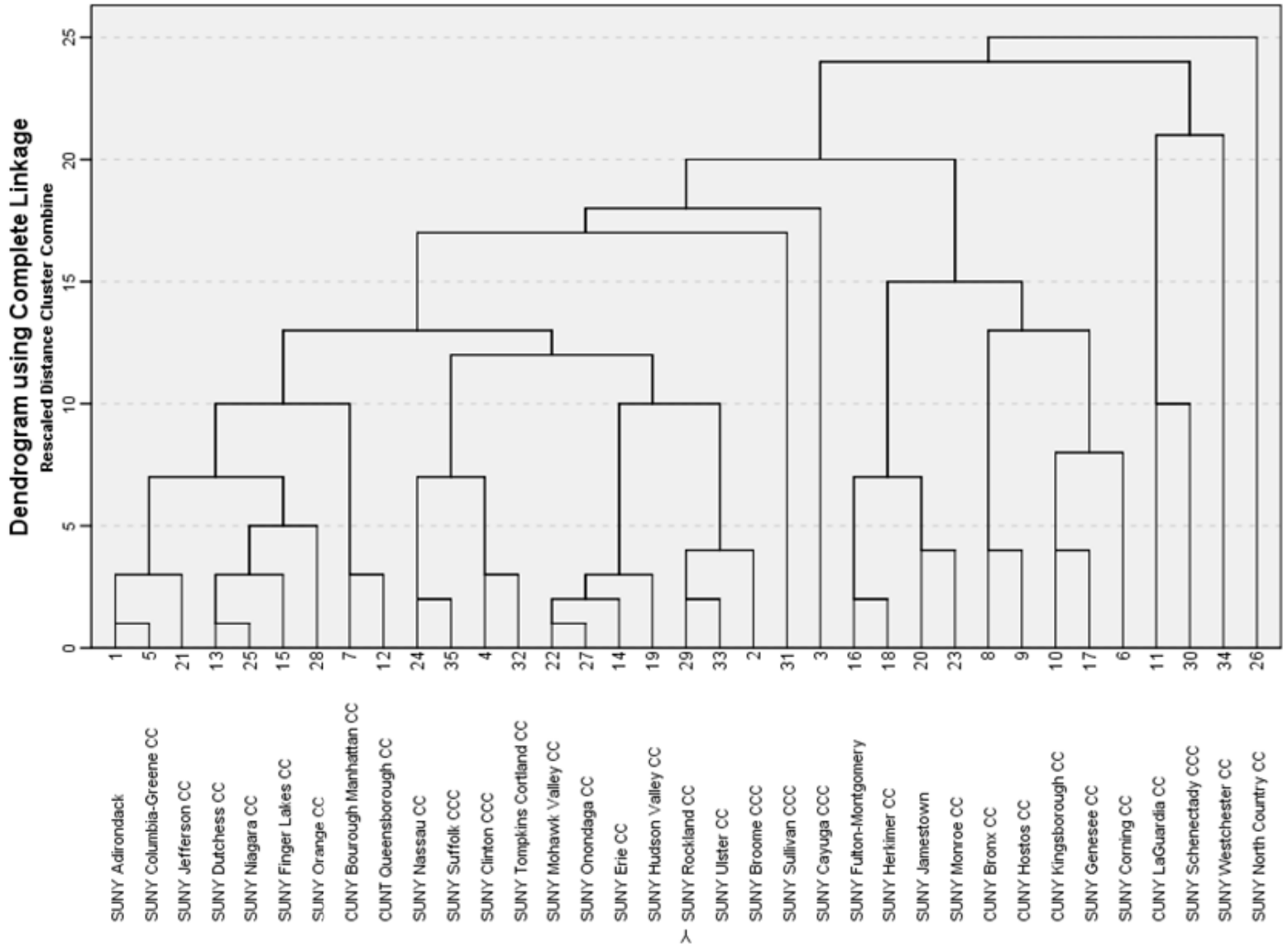
	Core_Expenses	Core_Exp_Instruct_pct	Core_Revenues	Core_Rev_Loc_app_pct	FTE_enroll	FT_TTrack_Fac	FT_Fac_InstrLect	UG_pct_PT	pct_enrl_nondeg	pct_age_25-65	pct_FTFT_ug_PELL	Stu_pct_min	Fac_pct_FT	Deg_Assoc_tot	Deg_Assoc_pct_technical	unemploy_rate	county_pop	median_income	FT_retention_rate	Grad_rate	Trans_out
Core_Expenses	1	.393*	.991**	0.18	.975**	.951**	.742**	-0.26	-.594**	0.04	-0.09	.641**	0.19	.941**	0.24	-0.27	.831**	.513**	.607**	-.517**	0.01
Core_Exp_Instruct_pct		1.00	.366*	0.19	.449**	.431**	0.17	-0.06	-0.25	-0.04	-.628**	0.08	0.22	.399*	0.32	-.453**	0.28	.568**	.486**	-0.08	0.05
Core_Revenues			1.00	0.13	.962**	.941**	.772**	-0.25	-.607**	0.08	-0.01	.676**	0.21	.942**	0.25	-0.23	.842**	.447**	.590**	-.510**	-0.01
Core_Rev_Loc_app_pct				1.00	0.06	0.20	0.08	-0.06	-.343*	-0.17	-0.14	.407*	0.26	-0.01	0.00	0.11	0.25	0.29	0.29	-.358*	-0.06
FTE_enroll					1.00	.947**	.730**	-0.27	-.530**	0.05	-0.18	.511**	0.12	.978**	0.26	-.361*	.768**	.545**	.597**	-.409*	0.07
FT_TTrack_Fac						1.00	.784**	-.341*	-.610**	0.01	-0.08	.608**	0.16	.912**	0.33	-0.24	.808**	.458**	.588**	-.470**	0.03
FT_Fac_InstrLect							1.00	-0.27	-.515**	0.10	0.11	.682**	0.22	.738**	0.30	0.01	.759**	0.14	.543**	-0.31	-0.03
UG_pct_PT								1.00	.708**	-0.16	-0.06	-0.11	-0.10	-0.32	-0.32	-0.05	-0.13	0.04	-0.16	-0.15	0.03
pct_enrl_nondeg									1.00	-0.32	-0.06	-.613**	-.356*	-.541**	-0.26	-0.08	-.530**	-0.18	-.530**	.336*	0.17
pct_age_2565										1.00	0.06	0.04	0.31	0.06	0.14	0.05	0.05	-0.10	0.10	-0.08	-0.30
pct_FTFT_ug_PELL											1.00	.334*	0.00	-0.14	-0.06	.646**	0.15	-.756**	-0.32	-0.10	-0.13
Stu_pct_min												1.00	.373*	.479**	0.06	0.26	.812**	0.08	.476**	-.652**	-0.07
Fac_pct_FT													1.00	0.05	0.21	0.08	0.24	0.10	0.04	-0.33	0.21
Deg_Assoc_tot														1.00	0.24	-.340*	.743**	.461**	.580**	-0.30	0.03
Deg_Assoc_pct_technical															1.00	-0.11	0.18	-0.02	0.00	-0.25	0.12
unemploy_rate																1.00	0.05	-.699**	-0.32	-0.02	-0.32
county_pop																	1.00	0.20	.593**	-.510**	-0.10
median_income																		1.00	.457**	-0.29	0.25
FT_retention_rate																			1.00	-0.16	-.365*
Grad_rate																				1.00	-0.10
Trans_out																					1.00

Appendix C – Factor Matrix

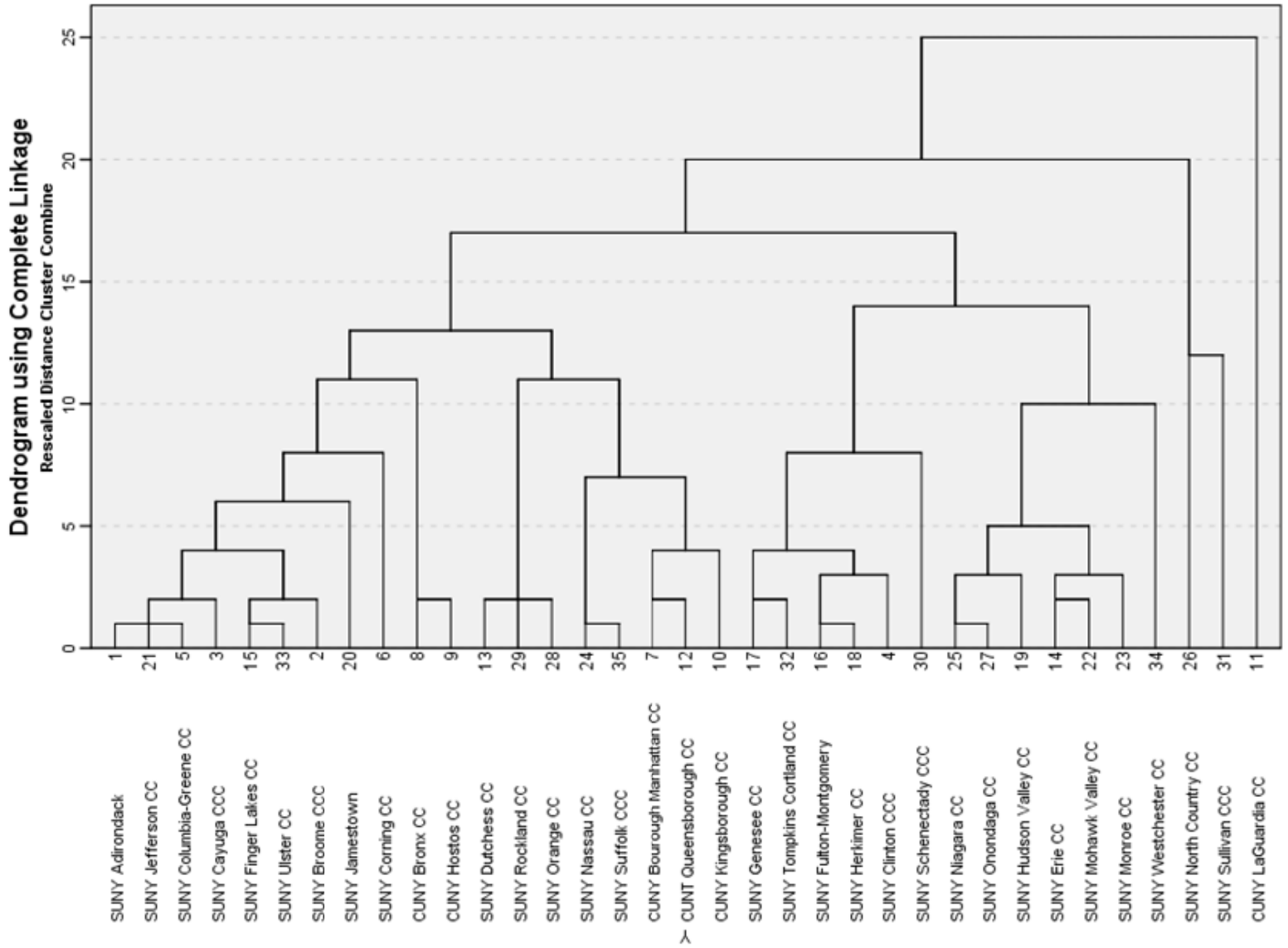
Rotated Component Matrix[a]

	Size, Wealth	Socio economic	Student Body Complexity	Faculty and Support	Transfer Emphasis	Bus/ Liberal Arts	Acad Suppport	Student Services Support	Non-Traditional Emphasis	Bus Certificate Emphasis	Lib Arts Certif Emphasis
Pct of Variance Explained	26.8	10.9	7.4	5.8	5.7	5.2	4.8	4.8	4.7	4.3	4.2
Tot_Emp_FT	.968	.096	.021	.082	.019	.010	-.031	-.101	.066	.068	.088
Core_Revenues	.964	.076	.013	.088	-.002	-.097	-.064	-.026	.070	-.001	.073
Expend_Tot	.960	.146	.017	.092	.013	-.066	-.066	-.011	.037	.011	.104
Core_Expenses	.959	.150	.022	.087	.015	-.060	-.069	-.011	.042	.011	.112
FTE_enroll	.954	.219	.034	-.015	.088	-.016	.027	-.041	.084	-.001	.072
Deg_Assoc_tot	.949	.157	.082	-.080	.059	-.017	.081	-.020	.083	-.014	.021
FT_TTrack_Fac	.944	.126	.063	.078	.023	.001	-.066	-.114	-.007	.029	.093
Tot_Emp_PT	.934	.128	.028	-.188	-.074	.018	-.023	-.021	-.122	-.033	-.022
county_pop	.867	-.122	-.157	.223	-.082	-.157	-.100	.067	-.081	.024	.092
FT_Fac_InstrLect	.834	-.136	-.068	.075	-.041	-.027	-.087	-.042	.174	.134	-.192
Stu_pct_min	.669	-.258	-.107	.428	-.162	-.174	-.328	.152	-.127	.093	-.016
FT_retention_rate	.637	.354	-.081	.135	-.452	.001	.212	.010	-.118	-.072	-.032
pct_enrl_nondeg	-.592	.034	-.495	-.430	.360	-.100	.079	.032	-.073	-.021	.066
Deg_Assoc_pct_Soc_Serv	-.566	-.144	-.013	-.306	.169	.045	-.353	.082	.130	.402	.214
pct_FTFT_ug_PELL	.028	-.958	.000	.033	-.017	-.137	-.052	.053	-.034	-.106	.085
median_income	.371	.833	-.028	.092	.097	.072	-.082	.001	-.133	-.061	.026
pct_FTFT_st_loc_grant_aid	-.164	-.818	.254	-.187	.206	.103	.023	-.035	-.065	.018	.094
Core_Rev_Tuit_Fees_pct	-.029	.735	.169	-.347	.134	.080	-.053	.189	.218	.053	.190
unemploy_rate	-.168	-.729	-.045	.133	-.258	.107	-.186	.199	-.021	.206	-.066
Core_Exp_Instruct_pct	.325	.601	-.043	.271	.047	.024	.292	-.338	-.082	.189	-.003
FTFT_pct_of_Ugs	-.191	-.010	.935	.025	.115	.016	.074	-.009	-.034	.054	-.132
UG_pct_PT	-.277	.084	-.853	-.092	.136	-.144	-.016	.096	-.084	-.032	-.055
Transfers_pct_of_new	.000	-.002	-.566	.192	-.014	-.003	-.099	.171	.149	.074	.474
pct_age_18_24	.445	.384	.564	.138	-.085	.256	-.253	.100	.093	.241	.112
res_halls	-.300	-.270	.548	-.224	.372	.054	-.044	.145	.126	.115	.168
Fac_pct_FT	.088	-.010	.001	.867	.151	.021	-.040	-.026	.258	.075	-.062
pct_FTFT_instl_grant_aid	-.399	-.074	-.173	-.546	.020	.017	-.100	.366	.257	.136	.247
Core_Rev_Loc_app_pct	.110	.156	-.062	.466	-.256	.363	-.315	.029	-.459	.232	.251
Trans_out	-.023	.143	.140	.169	.848	-.013	-.150	.075	-.094	.011	-.163
Core_Exp_Instl_Supt_pct	-.057	-.159	.200	.046	-.597	.142	-.320	-.015	-.083	.167	-.225
Deg_Assoc_pct_Bus	.279	-.038	-.220	.061	.162	-.811	.074	.041	-.001	-.195	-.053
Deg_Assoc_pct_lib_arts	.171	.045	.069	.168	-.293	.742	.262	.187	-.096	-.232	-.116
NJCAA	-.235	.066	.009	-.047	.270	.666	-.010	-.002	.064	-.127	-.155
Core_Exp_Acad_Supt_pct	-.201	.035	.038	.033	-.099	.032	.752	.311	.254	-.054	-.011
Grad_rate	-.429	-.004	.284	-.349	-.051	.075	.587	.137	-.043	.012	-.129
Core_Rev_State_app_pct	.014	.400	-.176	.014	.355	.122	.509	-.223	.009	.196	.031
Core_Exp_Stu_Serv	.108	-.164	.029	-.003	.246	.123	.107	.802	.079	.127	-.023
Deg_Assoc_pct_technical	.217	-.015	.157	.094	.166	.039	-.176	-.767	.280	.099	.031
Certif_1_2yrs_Tot	.252	.296	.013	-.020	.193	-.081	.115	-.106	.731	.243	.092
pct_age_2565	.018	-.049	.018	.276	-.364	.064	.048	-.002	.728	-.293	.044
Cert_pct_technical	.092	-.128	.024	.061	.051	.388	.208	-.425	.467	.276	-.072
Cert_pct_Bus	-.109	.000	-.116	-.081	.023	.023	.005	.001	.003	-.866	-.003
Cert_pct_lib_arts	-.341	.126	.053	.137	-.091	.070	.062	.109	.006	.134	-.798
Cert_pct_Soc_Serv	-.003	.249	-.033	-.078	-.199	-.201	.062	.038	.014	.491	.662

Appendix D – Dendogram, unWeighted Factors



Appendix E – Dendogram, Weighted Factors



EXAMINING THE THREAT OF NONRESPONSE BIAS AS A FOLLOW-UP TO THE NATIONAL SURVEY OF STUDENT ENGAGEMENT

Debra Allen
Assistant Director
Office of Institutional Research
University of Maine

Theodore Coladarci
Director
Office of Institutional Research
University of Maine

The National Survey of Student Engagement (NSSE), an online survey administered to freshmen and seniors, can be used to measure the quality of student experiences. NSSE survey items, described by NSSE as representing "empirically confirmed good practices," relate to individual student behaviors as well as student perceptions of their college experience. Institutions—over 750 last year—use NSSE to support decision making, design goals, and analyze progress in such areas as accreditation, accountability reporting, strategic planning, and program assessment (Banga, Pike, & Hansen, 2009).

NSSE can be a valuable tool, but with a national response rate of approximately 27% and roughly one third of institutions achieving response rates below 30% (NSSE, 2011), there are concerns regarding the degree to which institutions can generalize their results to their student population. Low response rates do not necessarily suggest a lack of representativeness, however; a survey yielding a low response rate may still produce a sample that is representative of its population (Dey, 1997; Groves, 2006). It is only when there are discrepancies between responders and nonresponders in perceptions or behaviors relevant to the survey topic that nonresponse bias is introduced and becomes a threat to the validity of inferences made from the survey results. NSSE acknowledges the impact that nonresponse bias may have on the interpretation of an institution's results and therefore encourages institutions to conduct their own nonresponse studies (Chen, 2006).

In short, our purpose in conducting the present study was to meet NSSE's call for institutional-level nonresponse studies. Our institution, the University of Maine, is a land-grant university with a total student population of approximately 11,000 (roughly 8,270 of whom are degree-seeking undergraduates). UMaine administered the web-based NSSE to all freshmen and seniors in spring 2011, achieving a response rate of approximately 21%. To determine the

degree to which these respondents are representative of the remaining 79% of freshmen and seniors, we addressed the following questions:

a) How do the demographic characteristics of nonresponders compare with those of the responders?
b) What reasons for nonresponse are subsequently offered by nonresponders?
c) How do nonresponders' perceptions of their UMaine experience compare with those of responders, using a selection of items from the NSSE survey?

Related Literature

NSSE Overview

NSSE emerged from the efforts of a design team, lead by Peter Ewell of the National Center for Higher Education Management Systems, that had been tasked by Pew Charitable Trusts to develop an instrument to measure the extent to which college students show good educational practices and to assess what they gain from their college experience (Kuh, 2009). The survey was first administered to 276 institutions in 2000; in 2011, 751 institutions from the United States and Canada participated (NSSE, 2011). Institutions use NSSE to identify areas where institutional policies or practices may be improved to promote good educational practices, and to serve as an external accountability measure of overall quality (NSSE, 2011). The Voluntary System of Accountability (VSA), an initiative through which institutions report measures of student outcomes, chose NSSE as one of the options schools can use for assessing student engagement. NSSE data, along with other information provided in the spirit of accountability and public disclosure, appear conspicuously on the participating institution's website, in the "College Portrait." In addition to engagement data, the College Portrait provides general consumer information as well as measures of student success and progress, learning outcomes, and perceptions and experiences.

The three core purposes of the NSSE are to provide actionable data to institutions so that they can improve the undergraduate experience, highlight and document effective educational higher education practices, and advocate for public acceptance and use of standard measures for college quality (Kuh, 2009). Through five sets of questions, students are asked about (a) their participation in sports and activities, study time, interaction with faculty members; (b) what they see their institution as requiring of them; (c) their perceptions of their college environment (including factors believed to impact satisfaction, academic achievement, and persistence); (d) information regarding their socioeconomic and educational background; and e) their educational and personal growth since starting at the institution.

For ease in analysis and interpretation, NSSE developed five benchmark scales of effective educational practice that capture institutional characteristics and student behavior highly aligned with both learning and personal development. Comprising a total of 42 items, the five benchmark scales are Level of Academic Challenge, Active and Collaborative Learning, Student-Faculty Interaction, Enriching Educational Experiences, and Supportive Campus Environment (Kuh, 2009).

Although NSSE is a well-known and frequently used survey, validity concerns have been raised regarding the accuracy of student self-reports (Porter, Rumann, & Pontius, 2011), the weak relationship with student academic outcomes (Gordon, Ludlum, & Hoey, 2008), and low response rates (Porter & Whitcomb, 2005). In light of these concerns, institutions should take steps to verify the validity of the data collected at their own institution. In fact, Chen et. al. (2009), in their outline of best practices for analyzing NSSE data, suggest that determining the quality of an individual institution's data should be a priority for any analyst using NSSE data. They stress the importance of verifying that population estimates are accurate, and recommend

that institutions consider sampling error, analyze the potential for nonresponse bias, and examine the proportional representation of student subgroups within their responder samples.

Nonresponse bias in survey research

Over time, survey response rates have suffered a noticeable decline (Dey, 1997). As a result, the awareness of and concerns regarding nonresponse bias has also grown in recent years. The following is a more comprehensive definition of nonresponse bias and a summary of the methods used to examine its existence.

Definition of nonresponse bias. As mentioned above, the literature on nonresponse bias suggests that bias is not necessarily a function of low response rates. Rather, it is only when there is a discrepancy between respondents and nonrespondents on relevant attitudes, perceptions, and behaviors that bias is introduced. Low response rates then serve to exacerbate the level of bias (Groves, 2006; Pike 2008).

Nonresponse bias, and the degree to which it is a problem, is often related to the reasons for nonresponse (Groves, 2006; Rogelberg & Luong, 1998). Rogelberg and Luong (1998) outline the four major classes of nonresponse as inaccessibility, inability to respond, carelessness, and noncompliance. Each reason is likely to affect bias in a different way, something that Groves (2006) stresses should be taken into account by survey researchers. For example, nonresponse due to an inability to contact a person is likely to introduce a different level of bias than nonresponse because of a refusal to answer questions about the particular subject. Both reasons will have an impact on response rate, but biased responses are more likely with the latter. The former may be completely unrelated to the attitudes, behaviors, or perceptions of interest in the survey.

Thus, there are four important considerations when interpreting survey results: response rates across various subgroups in the population of interest; demographic differences between

responders and nonresponders; distinctions between responders and nonresponders in the attitudes, perceptions, or behaviors measured by the survey; and reasons for nonresponse. The first two can be examined using existing data that are often readily available, but one must collect data from the nonresponder group in order to address the latter two concerns.

Methods for examining nonresponse bias. Nonresponse bias can be examined using a number of methods. There are three approaches researchers regard most promising for studying nonresponse (Dey, 1997; Groves, 2006; Hartman, Fuqua, & Jenkins, 1986; Porter & Whitcombe, 2005; Rogelberg & Luong, 1998). In the *archival approach*, one compares nonresponders and responders on a number of relevant demographic variables and then examining each variable's relationship with the survey responses. In a *wave analysis*, one compares early and late responders, assuming that late responders are most similar to nonresponders. And in a *follow-up analysis*, one obtains responses from a sample of nonresponders and then examines the degree to which the two groups differ on survey items of interest.

These three approaches have both strengths and weaknesses. For example, although the analysis of demographic variables used in the archival approach can be conducted with a simple matching of data, the information provided only gives a partial indicator of the extent to which bias exists; because it does not provide any information on nonresponders (Groves, 2006). A wave analysis is also relatively easy to conduct, particularly if the survey was administered through a process of multiple reminders, but it assumes that nonresponse bias will be systematically distributed over time (Hartman, Fuqua, & Jenkins, 1986). Because of these considerations, the follow-up analysis is a common approach to understanding nonresponse. Its primary benefits are that it allows for analyses of the attitudes and behaviors of both responders and nonresponders (Porter & Whitcombe, 2005) and therefore can provide a basis for estimating their differences—and, therefore, the extent of any bias (Hartman, Fuqua, & Jenkins, 1986).

That said, the follow-up approach is not without its weaknesses. Its primary weakness (ironically) is the risk of additional bias introduced with the choice of method for data collection. If the method used to collect responses from the follow-up sample distorts who responds and the answers they furnish, the responses will not provide an unbiased view of nonresponders (Dey, 1997; Porter & Whitcombe, 2005; Rogelberg & Luong, 1998). For example, telephone surveys may produce biased results (Dillman, Sangster, Tarnai, & Rockwood, 1996). Having reviewed the literature on the comparisons of responses to mailed or phone surveys, Dillman et. al. propose that telephone interviews are more likely than mail questionnaires to produce (a) socially desirable and acquiescent answers, (b) question-order effects, (c) quick answers that reflect a general standard held by the respondent, and (d) extremeness on response scales. These limitations call for caution when interpreting follow-up studies conducted through telephone surveys.

Analyses of nonresponse bias in NSSE Surveys

NSSE researchers have used both the archival and follow-up approaches to examine nonresponse.

Archival approach. NSSE researchers have consistently found significantly lower response rates among men and part-time students than women and full-time students (NSSE, 2011). NSSE uses a weighting procedure in their institutional report to compensate for such differences.

In their multi-level study, Porter and Umbach (2006) used the NSSE to examine how response rates vary by the makeup of the student body and institutional characteristics. With a sample of approximately 167,000 students across 321 schools, these researchers also found women were more likely to respond than men. In addition to differences associated with gender,

their results showed that student ability and such social environment factors as density, urbanity, and the percentage of part-time students also affected institutional response rates.

NSSE (2008) examined the relationship between levels of high school engagement, as measured by the Beginning College of Student Engagement, and whether or not a student responded to the NSSE in the spring of the freshman year. Based on data from approximately 35,000 students across 89 institutions, the analyses revealed no relationship between high school engagement and propensity to respond.

Follow-up studies. Two national NSSE follow-up studies suggest the existence of nonresponse bias. In a 2001 study, the Indiana Center for Survey Research (CSR) conducted a nonresponse analysis based on follow-up telephone surveys with 553 nonresponders from 21 institutions (Kuh, 2003). The interviews included 21 engagement and 3 demographic items from the survey. Freshmen nonresponders scored higher than respondents on nine items, while responders only scored higher on three items. Senior nonresponders scored higher than respondents on six items, and responders scored higher on the same three items seen in the first-year group. In general the results showed a slightly higher level of engagement among nonresponders than responders (although the CSR researchers acknowledged the need for caution in interpreting their results due to the potential bias introduced by the use of a telephone interview).

We see somewhat similar results in a later study, also conducted by the CSR (NSSE, 2006). The second study included phone interviews with 1,408 nonresponders from 24 different institutions. The telephone interviews included 17 questions, with items representing student-faculty interaction, the campus environment, and developmental-gain subscales. Four demographic items also were included. The results of the telephone interviews suggest nonresponders were more likely than respondents to view faculty, staff, and their campus as

supportive. However, these two groups did not differ in student-faculty interaction or developmental gains.

McInnis (2006) used an additional mailing of the survey itself rather than a telephone survey to reach first-year nonresponders. McInnis received surveys from 25 of 94 nonresponders (26.6% response rate). Similar to the previous two NSSE studies conducted by CSR there were minimal differences. The only scale that showed a significant difference was the faculty interaction scale, with nonrespondents showing higher mean scores than respondents.

The results of the national nonresponse bias studies conducted by CSR and the small-scale study conducted by McInnis (2006) suggest there is potential for nonresponse bias to threaten the generalizability of NSSE results. Although each study suggests a slightly higher level of engagement in some areas among nonresponders, the threat of bias associated with NSSE's use of follow-up telephone surveys and the small scale of the McInnis study do not provide strong evidence that the same differences may be present at all schools. Again, the degree to which such a bias exists is likely to differ across institutions. As we consider the results of the 2011 NSSE results for UMaine, it therefore is helpful to know how responders may differ from nonresponders, in terms of both their demographic characteristics and their perceptions of the UMaine experience.

Method

As reported early the three research questions we addressed in this study of nonresponse bias are:

(a) How do the demographic characteristics of nonresponders compare with those of the responders?

(b) What reasons for nonresponse are subsequently offered by nonresponders?

(c) How do nonresponders' perceptions of their UMaine experience compare with those of responders, using a selection of items from the NSSE survey?

We used the archival approach to answer the first question and a follow-up analysis to address the second and third questions.

Archival approach. We began by matching NSSE's list of responders and nonresponders to UMaine's spring 2011 student database. We then created a dataset comprising these student characteristics: gender, residency (Maine resident, nonresident), enrollment status (part-time, full-time), cumulative GPA (below 2.5, 2.5-2.9, 3.0-3.4, 3.5 and above), transfer status (new student, transfer student), living situation (on-campus, off-campus), and college of major. We used the χ^2 test of independence to determine whether there was a relationship between NSSE participation and the respective demographic variables.

Follow-up analysis. To assess the perceptions of NSSE nonresponders, we conducted brief telephone interviews with 50 freshmen and 50 seniors whom we randomly sampled from the list of UMaine's nonresponders. Its possible biases notwithstanding, we chose this method because of the short timeframe it permitted and its relatively inexpensive cost.

To contact the students, we pulled random samples of approximately 50 freshman and 50 senior names and telephone numbers from the nonresponder list provided by NSSE. We called students during both day and evening hours to reach working and non-working students alike. In the event that a student was not home, we did not leave a message (to relieve the student of the burden of calling back). We attempted to contact each student in our initial sample three times. Once we had either reached or exhausted three attempts to contact each student, we repeated the process with three additional random samples of 50 freshmen and 50 seniors. In total, we attempted to reach approximately 370 students. The data collection occurred between June 1, 2011 and August 11, 2011.

To keep the interviews to two to three minutes, we asked only five questions of the students. We began by asking why they did not respond to the NSSE, followed by four questions taken verbatim from the survey:

(a) How would you rate your relationships with faculty members? (Please use a scale from 1 (unavailable and unhelpful) to 7 (available and helpful) with four being right in the middle of the two extremes).

(b) Overall, how would you evaluate the quality of academic advising you have received at UMaine? (Please use excellent, good, fair, or poor).

(c) How would you evaluate your entire educational experience at UMaine? (Please use excellent, good, fair, or poor).

(d) If you could start over again, would you still go to UMaine? (Please use definitely yes, probably yes, probably no, or definitely no).

We chose these questions because they provide a view of a student's overall level of satisfaction and perceived relationships with faculty members—and without creating a complicated interaction between interviewer and interviewee. The questions are each self-contained (i.e., they do not require interviewees to use short-term memory to refer back to a previous question) and straightforward, and they offer simple response options. (The interview script is available upon request.)

In the analysis phase of the project, we compared the responses to the four questions above with the responses provided by UMaine NSSE participants. We used regression analysis to examine if there was a statistically significant difference between responders and the telephone interviewees in student-faculty relationship ratings. Because NSSE, in its standard reporting, takes into account level, gender, and enrollment status (either through a separation of results or a weighting procedure), we included these characteristics as control variables.

Specifically, we regressed the student-faculty rating on a nonresponder indicator variable (0 = NSSE responder, 1 = telephone interviewee), level (0 = freshman, 1 = senior), gender (0 = male, 1 = female), and enrollment status (0 = full-time, 1 = part-time).

To determine if responders and telephone interviewees differed in their overall satisfaction with their UMaine experience, we first collapsed categories to create dichotomous variables from the responses to each of the three overall satisfaction questions. We transformed the overall advising and overall educational experience responses to *good/excellent* or *fair/poor*, and the likelihood of returning to UMaine response to *definitely yes/probably yes* or *probably no/definitely no*. We then used logistic regression, a methodology which allows for a dichotomous dependent variable, to regress the transformed responses on, as before, the nonresponder indicator variable (0 = NSSE responder, 1 = telephone interviewee), level (0 = freshman, 1 = senior), gender (0 = male, 1 = female), and enrollment status (0 = full-time, 1 = part-time).

Results

Demographic Comparisons

Table 1 displays the overall and class-level response rates. Overall, approximately 21% of the 4,178 students who received invitations to complete the NSSE responded. There was a statistically significant difference in response rates between freshmen and seniors ($p < .01$): The freshman response rate was 19% compared with 24% among seniors. Such a difference is not unusual, however: NSSE reported response rates of approximately 25% and 28%, respectively (NSSE, 2011).

Table 1. *Response Rates by Class*

	Freshmen	Seniors	Total
Total Surveys Administered	2,057	2,121	4,178
Respondents	391	502	893
Non-Respondents	1,666	1,619	3,285
UMaine Response rates	19%	24%	21%
Overall NSSE response rates	25%	28%	27%

Note. Adapted from *UMaine Institutional Report 2011 (Respondent Characteristics),* National Survey of Student Engagement, 2011.

Tables 2 and 3 provide freshman and senior response rates broken down by gender, residency, enrollment status, transfer status, cumulative GPA, and college of major.[1] The tables show the results of the χ^2 tests of independence, which assess whether there were differences across groups in the proportion of students who responded to the survey, representing an over- or under-representation among respondents. For example, the results in Table 2 show a statistically significant difference related to gender. One can see that females had a higher response rate (26.5%) than males (15.3%) and, further, were more highly represented among the respondents (61.4% vs. 38.6%). This distribution of males and females is in contrast to that in the total student population (47.9% vs. 52.1%). If there was no relationship between gender and response, the split between females and males among the respondents would have been more reflective of that seen in the total population.

Among freshmen, a significantly higher proportion of females, first-time students, and students living on campus responded to the survey. As for seniors, more likely to respond were

[1] We created our dataset from the spring database, which only includes students who are registered for courses during the spring semester. Because the names supplied to NSSE were taken from the fall 2010 student database, some students who received surveys were not registered for classes in spring 2011. To restrict the sample to only students who were enrolled during the time of the survey administration, we excluded these students. This resulted in the exclusion of six freshmen and 13 seniors who responded to the NSSE survey.

females, full-time students, nonresidents, and students living on campus. Academic achievement, as measured by cumulative GPA, also was related to survey participation: For both freshmen and seniors, the response rate of students with GPAs above 3.5 was roughly double that of students with GPAs below 2.5. Across colleges,[2] there were differences in response rates among seniors but not among freshmen. The College of Natural Sciences, Forestry, and Agriculture enjoyed the highest senior response rate (32.5%), while the College of Business, Public Policy, and Health showed the lowest (18.6%).

[2] BPPH = College of Business, Public Policy, and Health, EHD = College of Education and Human Development, ENGR = College of Engineering, LAS = College of Liberal Arts and Sciences, NSFA = College of Natural Sciences, Forestry, and Agriculture. Further, DLL = Division of Lifelong Learning and EXPL = Explorations (a program for undecided students and/or students requiring additional academic preparation).

Table 2. *Demographic Comparisons: Freshmen*

Demographic Groups	UMaine Population	NSSE Respondents	Response Rate	% of Population	% of Respondents	χ^2 Test of Independence χ^2	*df*	*p*
Gender								
Females	896	237	26.5%	47.9%	61.4%			
Males	976	149	15.3%	52.1%	38.6%	35.7	1	< .01
Enrollment status								
Full-time	1,789	374	20.9%	95.6%	96.9%			
Part-time	83	12	14.5%	4.4%	3.1%	2.0	1	.16
Transfer status								
New	1,783	376	21.1%	95.4%	97.4%			
Transfer	86	10	11.6%	4.6%	2.6%	4.5	1	< .05
Residency								
Resident	1,501	306	20.4%	80.2%	79.3%			
Nonresident	371	80	21.6%	19.8%	20.7%	.3	1	.62
Living situation								
On-campus	1,513	332	21.9%	80.2%	86.0%			
Off-campus	359	54	15.4%	19.2%	14.0%	8.4	1	< .01
College								
BPPH	134	25	18.7%	7.2%	6.5%			
EHD	157	26	16.6%	8.4%	6.7%			
ENGR	325	61	18.8%	17.4%	15.8%			
NSFA	428	99	23.1%	22.9%	25.7%			
LAS	558	131	23.5%	29.8%	33.9%			
(EXPL)	223	33	14.8%	11.9%	8.6%			
(DLL)	47	11	23.4%	2.5%	2.9%	11.9	6	.07
GPA								
Below 2.5	685	108	15.8%	37.0%	28.1%			
2.5 - 2.99	407	64	15.7%	22.0%	16.7%			
3.0 - 3.49	408	93	22.8%	22.0%	24.2%			
3.5 or higher	352	119	33.8%	19.4%	31.7%	54.2	3	< .01

Table 3. *Demographic Comparisons: Seniors*

Demographic Groups	UMaine Population	NSSE Respondents	Response Rate	% of Population	% of Respondents	χ^2 Test of Independence χ^2	*df*	*p*
Gender								
Females	935	267	28.6%	46.5%	54.0%			
Males	1,075	227	21.1%	53.5%	46.0%	14.9	1	< .01
Enrollment status								
Full-time	1,570	408	26.0%	78.1%	82.6%			
Part-time	440	86	19.6%	21.9%	17.4%	7.7	1	< .01
Transfer status								
New	1,405	353	25.1%	70.2%	71.8%			
Transfer	596	139	23.3%	29.8%	28.2%	.7	1	.40
Residency								
Resident	1,758	420	23.9%	87.5%	85.0%			
Nonresident	252	74	29.4%	12.5%	15.0%	3.6	1	.06
Living situation								
On-campus	282	101	35.8%	14.0%	20.5%			
Off-campus	1,728	393	22.7%	86.0%	79.5%	26.1	1	< .01
College								
BPPH	247	46	18.6%	12.3%	9.3%			
EHD	225	56	24.9%	11.2%	11.3%			
ENGR	404	89	22.0%	20.1%	18.0%			
NSFA	502	163	32.5%	25.0%	33.0%			
LAS	608	138	22.7%	30.2%	28.0%			
(DLL)	24	2	8.3%	1.2%	0.4%	27.6	5	< .01
GPA								
Below 2.5	229	29	12.7%	11.4%	5.9%			
2.5 - 2.99	540	107	19.8%	26.9%	21.7%			
3.0 - 3.49	724	195	26.9%	36.1%	39.5%			
3.5 or higher	515	163	31.7%	26.4%	33.5%	40.2	3	< .01

In summary, the results of the χ^2 tests of independence show statistically significant differences across demographic groups. An overview of the groups with disproportionately high response rates appears in Table 4.

Table 4. *Summary of Demographic Comparisons*

More likely to respond among freshmen were:
• Females • New students (as opposed to transfers) • Students living on campus • Students with higher GPAs
More likely to respond among seniors were:
• Females • Full-time students • Students living on campus • Students in the college of NSFA • Students with higher GPAs

Although there were differences in response rates across demographic groups, such differences are only indicative of nonresponse bias if there were also discrepancies in responses to pertinent survey items. To identify whether such a threat exists, we conducted between-group comparisons using the demographic categories in Table 4 on the four items used in the nonresponder analysis (relationships with faculty members, quality of academic advising, perception of overall experience, and likelihood of attending again) and the five benchmark scores (Academic Challenge, Active and Collaborative Learning, Student-Faculty Interaction, Enriching Educational Experiences, Supportive Campus Environment). We used the χ^2 test of independence for the ordinal and nominal items and the independent sample *t* test or one-way analysis of variance for those with interval responses. The following is a summary of the statistically significant findings, with the complete results available upon request.

Among freshmen, there was a statistically significant difference associated with living situation: Freshmen living off campus had a more positive view of their interaction with faculty members (M = 35.8, SD = 20.5) than those living on campus (M = 29.3, SD = 16.8), $t(339) = 2.40$, $p < .05$. This difference corresponded to an effect size of approximately one third of a standard deviation ($d = .35$). Also, there was a significant effect associated with GPA and the Academic Challenge benchmark ($F(3, 329) = 2.81$, $p < .05$). However, follow-up pairwise comparisons were not statistically significant. Such a contradictory finding can be attributed to the conservative nature of the pairwise comparison test which, in order to reduce the probability of Type 1 error, corrects for the multiple comparisons being made.

The threat of nonresponse bias appears to be more pronounced among seniors, with discrepancies seen in relation to gender, college, and GPA. Males and females differed significantly in perceptions of their overall educational experience ($\chi^2(1, N = 423) = 5.61$, $p < .01$): 85% of females indicated their overall educational experience was *good* or *excellent* compared with 76% of males. In addition to being more satisfied with their overall experience, senior females also showed slightly higher Academic Challenge benchmark scores than males ($t(446) = 3.0$, $p < .01$), corresponding to an effect size of roughly one quarter of a standard deviation ($d = .28$).

Seniors of varying achievement levels differed in their perceptions of their relationships with faculty members ($F(2, 434) = 4.5$, $p < .01$) and the support provided by the campus environment ($F(3, 417) = 3.4$, $p < .05$). Tukey post-hoc comparisons indicate that students with GPAs of 3.5 or higher reported significantly more favorable sentiments regarding interactions with faculty (M = 5.5, SD = 1.2) than students with GPAs below 2.5 (M = 4.6, SD = 1.6), equaling an effect size of .30. Students with GPAs of 3.5 or higher also scored more highly on

the Supportive Campus Environment benchmark (M = 56.6, SD = 18.0) than students with GPAs of 2.5 or below (M = 43.6, SD = 23.5), corresponding to an effect size of .30.

Finally, seniors across colleges differed in their perceptions of the quality of academic advising they received ($\chi^2(4) = 11.5$, $p < .05$) and the support provided by the campus environment ($F(4, 416) = 5.0$, $p < .01$). ENGR seniors were the most positive in regard to academic advising (75% indicating *good* or *excellent*), while their LAS counterparts were the least positive (51% reporting *good* or *excellent*). Students in EHD were highest on the Supportive Campus Environment benchmark (M = 61.0, SD = 16.9), whereas students in NSFA (M = 51.4, SD = 18.6) and LAS (M = 51.8, SD = 18.4) were the lowest. The differences between the EHD students and those in NSFA and LAS correspond to effect sizes of .26 and .25, respectively.

Follow-up telephone interviews among nonresponders

Response rates. Table 5 displays a summary of the number of calls attempted, and the number and percentage of students who opted to participate in the telephone interviews. Approximately one third of the students with valid phone numbers for whom contact attempts were made participated in the interviews. Combined, almost 80% of the freshmen and seniors we ultimately were able to reach agreed to participate in the telephone interview. The telephone interviewees represent approximately 3% of the nonresponder population as a whole.

Table 5. *Response Rates for Follow-Up Analysis*

	Freshmen	Seniors
Total phone numbers attempted	193	175
Incorrect or disconnected numbers	41	31
Total valid numbers	152	144
Declined to be interviewed	11	15
Total telephone survey participants	50	50
Total not reached	91	79
Telephone survey participants as percentage of students reached	82%	77%
Telephone survey participants as percentage of valid numbers	33%	35%
Telephone survey participants as percentage of all nonresponders	3%	3%

Representativeness of telephone sample. Tables 6 and 7 report the demographic characteristics of the telephone interviewees compared with the characteristics of the nonresponder population as a whole. We used χ^2 goodness of fit tests to examine whether the differences between the two groups were statistically significant. The results show that the sample of interviewees was generally representative of the population of nonresponders. The one area where the nonresponder and telephone survey samples differed is in the proportion of freshmen in the various colleges: EXPL students were more highly represented among telephone interviewees than nonresponders (28% vs. 12.8%), while the opposite was true for BPPH (2% vs. 7.3%) and ENGR (12% vs. 17.8%) students.

Table 6. *Nonresponder Population vs. Telephone Survey Interviewees: Demographic Characteristics of Freshmen*

Demographic Groups	Nonresponder Population		Telephone Interviewees		χ^2 Goodness of Fit Test		
	n	%	*n*	%	χ^2	*df*	*p*
Gender							
Females	659	44.3%	23	46.0%			
Males	827	55.7%	27	54.0%	.06	1	.81
Enrollment Status							
Full-time	1,415	95.2%	47	94.0%			
Part-time	71	4.8%	3	6.0%	.16	1	.69
Transfer Status							
First-year	1,407	94.9%	49	98.0%			
Transfer	76	5.1%	1	2.0%	.99	1	.32
Residency							
In-state	1,195	80.4%	42	84.0%			
Out-of-state	291	19.6%	8	16.0%	.41	1	.52
Living Situation							
On-campus	1,181	79.5%	35	70.0%			
Off-campus	305	20.5%	15	30.0%	2.77	1	.10
College							
BPPH	109	7.3%	1	2.0%			
EHD	131	8.8%	3	6.0%			
ENGR	264	17.8%	6	12.0%			
NSFA	329	22.1%	11	22.0%			
LAS	427	28.7%	15	30.0%			
(EXPL)	190	12.8%	14	28.0%			
(DLL)	36	2.4%	0	0.0%	12.03	5	.03
GPA							
Below 2.5	566	39.4%	24	48.0%			
2.5 - 2.99	332	23.1%	14	28.0%			
3.0 - 3.49	307	21.3%	4	8.0%			
3.5 or higher	233	16.2%	8	16.0%	5.61	3	.13

Table 7. *Nonresponder Population vs. Telephone Survey Interviewees: Demographic Characteristics of Seniors*

	Nonresponder Population		Telephone Interviewees		χ^2 Goodness of Fit Test		
Demographic Groups	*n*	%	*n*	%	χ^2	*df*	*p*
Gender							
Females	668	44.1%	25	50.0%			
Males	848	55.9%	25	50.0%	.71	1	.40
Enrollment Status							
Full-time	1,162	76.6%	37	74.0%			
Part-time	354	23.4%	13	16.0%	.19	1	.66
Transfer Status							
First-year	1,052	69.7%	32	64.0%			
Transfer	457	30.3%	18	36.0%	.77	1	.38
Residency							
In-state	1,338	88.3%	42	84.0%			
Out-of-state	178	11.7%	8	16.0%	.90	1	.34
Living Situation							
On-campus	181	11.9%	5	10.0%			
Off-campus	1,335	88.1%	45	90.0%	.17	1	.68
College							
BPPH	201	13.3%	5	10.0%			
EHD	169	11.1%	5	10.0%			
ENGR	315	20.8%	8	16.0%			
NSFA	339	22.4%	13	26.0%			
LAS	470	31.0%	19	38.0%			
(DLL)	22	1.5%		0%	2.06	4	.73
GPA							
Below 2.5	181	12.3%	7	14.0%			
2.5 - 2.99	414	28.2%	13	26.0%			
3.0 - 3.49	520	34.4%	16	32.0%			
3.5 or higher	352	24.0%	14	28.0%	.70	3	.87

Reasons for nonresponse. When asked the reason for their non-response to the NSSE, those students who did remember receiving the survey—approximately two thirds— offered two primary reasons: they were too busy, or they just did not get to it or feel like it. There were only minimal differences between freshmen and seniors in response to this question. Table 8 shows the breakdown by class level.

Table 8. *Reasons for Nonresponse*

	Freshmen		Seniors	
	n	%	*n*	%
Don't remember the survey	19	38.0%	18	36.7%
Was too busy	14	28.0%	13	26.5%
Just did not get to it or feel like it	17	34.0%	16	32.7%
Other	0	0.0%	2	4.1%

Note. One senior did not provide a reason for nonresponse.

Relationships with faculty members. Overall, telephone interviewees indicated a slightly more favorable perception of their relationships with faculty members than did NSSE responders. Table 9 displays the mean ratings for responders and telephone interviewees.

Table 9. *Responders vs. Telephone Interviewees: Relationships with Faculty Members*

	Responders			Telephone Interviewees		
	n	*M*	*SD*	*n*	*M*	*SD*
Overall	761	5.2	1.4	96	5.5	1.1
Level						
Freshmen	323	5.0	1.4	48	5.3	1.2
Seniors	438	5.3	1.4	48	5.7	1
Gender						
Males	324	5.2	1.4	50	5.4	1.0
Females	437	5.1	1.4	46	5.6	1.2
Enrollment status						
Full-time	674	5.1	1.4	80	5.4	1.1
Part-time	87	5.3	1.3	16	5.9	1.1

Note. Four telephone interviewees did not respond to the question.

To determine if there was a statistically significant difference between responders and telephone interviewees, we regressed the faculty relationship rating on an indicator variable distinguishing telephone interviewees from the NSSE survey responders (0 = NSSE survey responders, 1 = telephone interviewees,). We included gender (0 = male, 1 = female), class level (0 = freshman, 1 = senior), and enrollment status (0 = full-time, 1 = part-time) as control variables. The results, which appear in Table 10, indicate that overall the model is statistically significant ($F(4,852)=3.27$, $p < .05$) and, further, there is a statistically significant difference in ratings between responders and telephone interviewees ($t = 2.31$, $p < .05$). Telephone interviewees reported ratings that were approximately one third of a point higher than responders (based on a seven-point scale). Class level also was a statistically significant predictor ($t = 2.43$, $p < .01$), with seniors showing ratings approximately one quarter of a point higher than those of freshmen. Neither gender nor enrollment status were statistically significant predictors.

Although the response and class-level indicator variables were both statistically significant, the magnitude of their effects is rather small. The R^2 shows that the model only explains approximately 1.5% of the variance in the ratings.

Table 10. *Predicting Student-Faculty Relationship Ratings*

	Coefficients		*Overall Model*	
	b	*t*	R^2	*F*
Constant	4.88**	27.60		
Telephone interviewee indicator	.34*	2.31		
Class level	.24**	2.43		
Gender	-.05	-.56		
Enrollment status	.09	.58	.015	3.27

* $p < .05$
** $p < .01$

Overall satisfaction. Tables 11-12 display student responses to questions about the quality of academic advising received and their overall educational experience; Table 13 shows the responses when asked whether or not they would still attend UMaine if they had the chance to start over. For ease of interpretation, we reduced the four-point scales to dichotomous variables: *excellent/good* vs. *fair/poor* for academic advising and overall experience, and *definitely yes/probably yes* vs. *probably no/definitely no* for likelihood of attending UMaine again.

There was little difference between responders and telephone interviewees in their perceptions of the overall quality of academic advising they received (75% vs. 72% for freshmen and 62% vs. 61% for seniors). In contrast, telephone interviewees were more likely than responders to rate their overall educational experience as good or excellent (96% vs. 85% for freshmen and 88% vs. 81% for seniors), and to indicate that they would attend UMaine again if they had the chance to start over (90% vs. 82% for freshmen and 96% vs. 75% for seniors).

Table 11. *Responders vs. Telephone Interviewees: Quality of Academic Advising*

	Responders				Telephone Interviewees			
	Poor/Fair		Good/Excellent		Poor/Fair		Good/Excellent	
	n	%	*n*	%	*n*	%	*n*	%
Overall	233	32.2%	490	67.8%	32	33.3%	64	66.7%
Level								
Freshmen	76	24.9%	229	75.1%	13	27.7%	34	72.3%
Seniors	157	37.6%	261	62.4%	19	38.8%	30	61.2%
Gender								
Males	99	32.5%	206	67.5%	20	40.0%	30	60.0%
Females	134	32.1%	284	67.9%	12	26.1%	34	73.9%
Enrollment status								
Full-time	207	32.4%	431	67.6%	28	35.0%	52	65.0%
Part-time	26	30.6%	59	69.4%	4	25.0%	12	75.0%

Note. Four telephone interviewees did not respond to the question.

Table 12. *Responders vs. Telephone Interviewees: Overall Educational Experience*

	Responders				Telephone Interviewees			
	Poor/Fair		Good/Excellent		Poor/Fair		Good/Excellent	
	n	%	*n*	%	*n*	%	*n*	%
Overall	124	17.2%	599	82.8%	8	8.1%	91	91.9%
Level								
Freshmen	45	14.8%	260	85.2%	2	4.1%	47	95.9%
Seniors	79	18.9%	339	81.1%	6	12.0%	44	88.0%
Gender								
Males	65	21.3%	240	78.7%	4	7.8%	47	92.2%
Females	59	14.1%	359	85.9%	4	8.3%	44	91.7%
Enrollment status								
Full-time	106	16.6%	532	83.4%	8	9.6%	75	90.4%
Part-time	18	21.2%	67	78.8%	0	0.0%	16	100.0%

Note. One telephone interviewee did not respond to the question.

Table 13. *Responders vs. Telephone Interviewees: Likelihood of Attending Again*

	Responders				Telephone Interviewees			
	Definitely no/Probably no		Probably yes/Definitely yes		Definitely no/Probably no		Probably yes/Definitely yes	
	n	%	*n*	%	*n*	%	*n*	%
Overall	160	22.1%	565	77.9%	7	7.1%	92	92.9%
Level								
Freshmen	54	17.6%	252	82.4%	5	10.2%	44	89.8%
Seniors	106	25.3%	313	74.7%	2	4.0%	48	96.0%
Gender								
Males	69	22.6%	236	77.4%	3	5.9%	48	94.1%
Females	91	21.7%	329	78.3%	4	8.3%	44	91.7%
Enrollment status								
Full-time	139	21.7%	501	78.3%	7	8.4%	76	91.6%
Part-time	21	24.7%	64	75.3%	0	0.0%	16	100.0%

Note. One telephone interviewee did not respond to the question.

To identify whether there was a statistically difference between responders and telephone interviewees in how they responded to these three questions, we conducted three separate logistic regression analyses in which we regressed each of the variables described in Tables 11-13 on the nonresponder indicator variable, gender, class level, and enrollment-status indicators. The results, which appear in Table 14, show no statistically significant difference between responders and telephone interviewees in their perceptions of academic advising. However, telephone interviewees were more likely than responders to indicate their overall educational experience was positive ($\chi^2 = 5.27$, $p < .05$) and that they would attend UMaine if given the chance to do it again ($\chi^2 = 10.02$, $p < .01$). Enrollment status was not a significant predictor in either model, but females were more likely than males to positively rate their overall educational experience ($\chi^2 = 5.26$, $p < .05$).

The odds ratio is helpful in interpreting the magnitude of these statistically significant effects. The odds of the telephone interviewees indicating they had a positive overall experience (i.e., *good* or *excellent*) was almost two and a half times that of the NSSE responders, holding level, gender, and enrollment status constant. The odds ratio was higher when it came to indicating whether they would return to UMaine if they had to do it again. Here, the odds of the telephone interviewees stating they would return if given another chance was roughly three and a half times that of the NSSE survey responders.

Table 14. *Predicting Overall Satisfaction Items*

	Overall Educational Experience			Likelihood of Attending Again		
	B	χ^2	Odds Ratio	*B*	χ^2	Odds Ratio
Constant	.78	3.23	2.18	-.22	0.25	0.80
Telephone interviewees	.88*	5.27	2.41	1.28**	10.02	3.59
Class level	.32	2.39	1.37	-.50*	7.03	0.61
Gender	.44*	5.26	1.55	.00	0.00	1.00
Enrollment status	-.05	0.03	0.95	.09	0.11	1.09

* $p < .05$
** $p < .01$

Discussion

Overview of Findings

The purpose of this study was to identify whether there is evidence of nonresponder bias in the NSSE data collected from UMaine students in spring 2011. Specifically, we addressed the questions of whether nonresponders and responders were demographically similar, why nonresponders did not participate in the survey, and how responders and nonresponders may have differed in their perceptions of UMaine.

The demographic analysis suggests NSSE respondents did differ on such key characteristics as gender, enrollment status, living situation, GPA, and college. Females, students living on campus, and students with higher GPAs were among the freshmen most likely to respond; and females, full-time students, those living on campus, majors in NSFA, and students with higher GPAs were among the seniors most likely to respond. Many of these differences are consistent with what has been reported in survey research specific to higher education. Males, part-time students, and students with lower GPAs typically are less likely to respond to surveys than their counterparts (Kuh et al., 2001; Porter & Umbach, 2006; Sax, Gilmartin & Bryant, 2003). Although the differences across colleges may be partially related to a general propensity among students in certain programs to respond to surveys, these differences

also likely reflect differences among colleges in efforts aimed at bolstering student response to the survey.

The results of the demographic analyses of responders reveals that, in some cases, groups more highly represented among responders may have had differing perceptions from those underrepresented. Among freshmen, specifically, there were differences associated with living situation; among seniors, there were differences among gender, GPA, and college. For example, seniors with GPAs above 3.5 (who were more highly represented among responders than those with lower GPAs) were also more positive about their interactions with faculty members and the level of support provided by the campus environment. Although there were discrepancies among disproportionately represented groups, which suggest some degree of nonresponse bias, the effects are rather small, with *d*'s ranging from .25 to .35.

As mentioned, one of the purposes of the follow-up analysis was to gain insight into why students did not respond to the survey. The results of the telephone interviews reveal two key findings in this regard. First, the majority of interviewees confirmed they did in fact receive the email invitation to participate in the survey. Second, interviewees offered a lack of time or motivation as their primary reasons for nonresponse. Although it is possible that either of these reasons could correlate with student engagement, there was no evidence to suggest that students consciously did not respond because of their dissatisfaction with UMaine.

With the follow-up analysis, we sought to identify whether responders and nonresponders differed in their perceptions of UMaine. To keep interviews simple and practical, we only included four overall measures of satisfaction rather than items specifically related to student behaviors. Although this limitation restricts one's ability to draw conclusions about levels of engagement, the questions do provide a view of students' level of satisfaction with their faculty interactions, the quality of advising they received, and the overall experience in general. These

are important considerations in their own right. And when combined with the question regarding a student's likelihood of returning to UMaine given a second chance, they can discriminate between students who had positive UMaine experiences and those having had less than positive experiences.

The results of the follow-up analysis suggest that, with the exception of academic advising, telephone interviewees had a more favorable view of their overall experience than responders. This should be interpreted with caution for two reasons. First, the use of telephone interviews is likely (and ironically) to introduce bias: Students may have a greater tendency to provide favorable answers on the phone than in a paper or online survey (Dillman et. al., 1996). In this respect, it is not surprising that the present results indicate more positive views among telephone interviewees. Second, the magnitude of some differences between the groups was quite small. For example, statistical significance notwithstanding, the telephone interviewees reported faculty interaction ratings that were only one third of a point (on a seven-point scale) higher than those of the responders.

These limitations, however, should not be interpreted as meaning that the telephone survey results are inflated and carry little import. If students were willing to express on the phone their discontent with their academic advising experience, they arguably would have been equally willing to disclose an unequivocal dissatisfaction with their UMaine experience. Erring on the side of caution, then, perhaps the best conclusion is by way of what these data do not suggest: They do not indicate that nonresponders are any less satisfied with their UMaine experience than responders.

Implications

Three major conclusions surface from our analyses: (a) there is evidence to suggest that NSSE responders are not demographically representative of the student population, (b)

nonresponse among students was primarily due to their lack of time or motivation, and (c) the evidence does not indicate that NSSE responders as a whole were more satisfied with their UMaine experience than nonresponders. Each of these conclusions has implications that will help UMaine better understand the NSSE results and their use.

Demographic differences. There were significant differences in response rates across demographic groups. Fortunately, the differences associated with gender and enrollment status are accounted for by a weighting procedure in NSSE's standard reporting. However, NSSE does not account for differences associated with living situation, GPA, and college of major. The discrepancies in the perceptions of students across groups within these demographic categories, although modest, are an issue that should be considered when interpreting the results. The campus-wide results will be more heavily impacted by the perceptions of overrepresented groups than those of the underrepresented, which could produce results that are more or less favorable than would have been found if respondents were demographically similar to the student population.

Reason for Response. The UMaine community can find comfort in the fact that there did not appear to be a problem with the process through which the survey invitations were sent out and, further, that students did not indicate their lack of response was due to strong negative feelings toward UMaine or the survey itself. In most cases, nonresponse was a function of a lack of time or general forgetfulness.

Nonresponse bias. A concern about the NSSE, and other surveys of a similar nature, is that students who respond may be more engaged in their college experience than those who did not (Kuh, 2003; Porter & Umbach, 2006; Porter & Whitcomb, 2005). The findings from the follow-up study fail to support such a concern, revealing no evidence to suggest responders were more satisfied with their experience than nonresponders. Further contradicting the presumption

that responders are more engaged, the demographic analyses revealed that students in underrepresented groups did not indicate consistently less favorable perceptions than students in overrepresented groups. For some groups on some items, it was the students more highly represented who were the most positive, but in other cases it was the underrepresented groups that responded more favorably.

Taken together, the findings from the demographic and follow-up analyses hold at least two implications regarding nonresponse bias. First, although there may be some degree of nonresponse bias, the results are not necessarily an inflated view of student perceptions. Second, any bias appears to be more a function of response rate differences across demographic groups than a fundamental difference between responders and nonresponders in general. The latter, coupled with the fact that the differences between overrepresented and underrepresented groups are small, suggests that disaggregating the results by demographic categories may help reduce the potential negative impact of nonresponse bias on the interpretation of the results. Had the follow-up study shown the perceptions of the nonresponders in general differed greatly from those of the responders, there would be little potential for minimizing the bias because the views of the nonresponders would remain unknown.

Concluding thoughts

The NSSE provides UMaine with meaningful feedback on student perceptions of their UMaine experience, and the results of the follow-up interviews suggest there is no reason to believe that responders as a whole are any more satisfied with their experience than nonresponders. However, some caution is advised when interpreting the results due to varying response rates and student perceptions across key demographic groups. Although the differences identified in this study are small and not likely to have a marked impact on the overall conclusions, they do point to the need for UMaine to be cautious when interpreting the campus wide results, and, in particular, to disaggregate the data beyond that provided in the standard NSSE reports. In our view, the UMaine results should be disaggregated by GPA, living situation, and college—the three areas where there were both response rate and perceptual differences in our data.

References

Banga, T.W., Pike, G., Hansen, M. (2009). The use of engagement data in accreditation planning and assessment. *New Directions for Institutional Research (141),* 21 – 34.

Bradburn, N.M. (1992). Presidential Address: A response to the non-response problem. *Public Opinion Quarterly*, 56, 391 – 398.

Chen, P.D. (2006). *Nonresponse effect in large-scale student surveys: Lessons learned from the National Survey of Student Engagement*. Paper presented at the NASPA International Assessment and Retention Conference, Phoenix, AZ.

Chen, P.D., Gonyea, R.M., Sarraf, S.A., BrckaLorenz, A., Korkmaz, A., Lambert, A.D., Shoup, R., Williams, J.M. (2009). Analyzing and interpreting NSSE data. *New Directions for Institutional Research (141),* 35 – 54.

Dey, E.L (1997). Working with low survey response rates: The efficacy of weighting adjustments. *Research in Higher Education, 18*(2), 215 – 227).

Dillman, D.A., Sangster, R.L., Tarnai, J., & Rockwood, T.H. (1996). Understanding differences in people's answers to telephone and mail surveys. *New Directions for Evaluation, 70*, 45 – 61.

Groves, R.M. (2006). Nonresponse rates and nonresponse bias in household surveys. *Public Opinion Quarterly, 70*(5), 646 – 675.

Hartman, B.W., Fuqua, D.R., & Jenkins, S.J. (1986). The problem of and remedies for nonresponse bias in educational surveys. *The Journal of Experimental Education, 54*(2), 85 – 90.

Kuh, G.D. (2003). *The National Survey of Student Engagement: Conceptual framework and overview of psychometric properties*. Bloomington, IN: Indiana Center for Postsecondary Research and Planning.

Kuh, G.D. (2009). The National Survey of Student Engagement: Conceptual and empirical foundations. *New Directions for Institutional Research (141)*, 5 – 20.

Kuh, G.D., Hayek, J.C., Carini, R.M., Ouimet, J.A., Gonyea, R.M. & Kennedy, J. (2001). *NSSE Technical and Norms Report*. Bloomington, IN: Indiana Center for Postsecondary Research and Planning.

McInnis, E.D. (2006). *Nonresponse bias in student assessment surveys: A comparison of respondents and non-respondents on the National Survey of Student Engagement in an independent comprehensive Catholic university*. Unpublished doctoral dissertation, Marywood University.

National Survey of Student Engagement. (2006). *Do students that respond to NSSE differ from those that choose not to respond to NSSE?* Retrieved from National Survey of Student Engagement website: http://nsse.iub.edu/pdf/psychometric_portfolio/OtherIndicators_NonresponseError_2005.pdf

National Survey of Student Engagement. (2008). *Nonresponse bias: Do previously engaged first-year students respond more?* Retrieved from National Survey of Student Engagement website: http://nsse.iub.edu/pdf/psychometric_portfolio/OtherIndicators_EngagedResponders.pdf

National Survey of Student Engagement. (2011). *Institutional Report for University of Maine*.

Pike, G. (2008). Using weighting adjustments to compensate for survey nonresponse. *Research in Higher Education, 49*(2), 153 – 171.

Porter, S.R., Rumann, C., & Pontius, J. (2011). The validity of student engagement survey questions: Can we accurately measure academic challenge? *New Directions in Institutional Research*, (150), 87 – 98.

Porter, S. R., & Whitcomb, M.E. (2005). Non-response in student surveys: The role of demographics, engagement, and personality. *Research in Higher Education, 46*(2), 127 – 152.

Porter, S. & Umbach, P. (2006). Student survey response rates across institutions: Why do they vary*? Research in Higher Education, 47*(2), 229 – 247.

Rogelberg, S. G. & Luong, A. (1998). Nonresponse to mailed surveys: A review and guide. *Current Directions in Psychological Science, 7*(2), 60 – 65.

Sax, L.J., Gilmartin, S., & Bryant, A.N. (2003). Assessing response rates and nonresponse bias in web and paper surveys. *Research in Higher Education, 44*(4), 409 – 432.

Maximizing the Utility of Alumni Feedback

Susan Tammaro

Dean of Institutional Research and Assessment

Regis College

Abstract

An alumni survey designed to assess institutional effectiveness, identify internship & career opportunities for current students, and obtain information to support fundraising and recruitment was implemented at Regis College. The ways in which the results were used are detailed, followed by a discussion of lessons learned and plans for future research and actions.

Maximizing the Utility of Alumni Feedback

Assessing institutional effectiveness is a "complicated collage of evaluation and assessment challenges for institutions" (Volkwein, 2010a, p. 26). Alumni surveys are a powerful, but sometimes underutilized assessment tool. Alumni can provide a unique perspective of institutional effectiveness that is more complete than that of current students or any other constituency group. Alumni have direct experience with both an institution and with the impact of their education once they graduate. As Volkwein points out (2010b), the alumni perspective and connection is increasingly important to institutions of higher learning because alumni are now recognized as important sources of both information and financial support. Maintaining an accurate database of contact information, reaching alumni in an effective and efficient manner, and getting alumni to respond to requests for information all present challenges. An alumni survey was implemented at Regis College despite those challenges. The purpose of this was to improve our database of alumni information, identify internship and career opportunities for current students, obtain information concerning institutional effectiveness to prepare for a reaccreditation review, and to obtain information that would support future fundraising and recruitment efforts. As Volkwein succintly states, "Alumni are important sources of information and support, and alumni studies should occupy a prominent place in the institutional research portfolio"(2010b, p. 137).

Alumni surveys have been used for a variety of purposes and can have a significant impact on public policy and advancement of higher education. Cabrera, Weerts, and Zulick (2005) discuss the three primary purposes of alumni surveys: 1) outcomes data, 2 engagement

and competencies information, and 3) alumni giving. Previous literature indicates that inclination to give can be predicted by the quality of an individual's educational experience, the extent to which an institution prepared the graduate for a career, the extent to which a graduate maintains contact with the institution, the graduate's current impressions of the institution, and the graduate's capacity to give (Cabrera, Weerts, and Zulick, 2005). All of these factors can be assessed with an alumni survey. This knowledge can then be used for targeted fundraising appeals.

Alumni surveys are typically implemented for a rather limited purpose by a single constituency group (Borden, 2005). For example, Davidson-Shivers, Inpornjivit & Sellers (2004) surveyed 125 alumni of an instructional design master's and doctoral program (along with 100 current students) in order to evaluate the programs and facilitate strategic planning. Landrum and Lisenbe (2008) also used an alumni survey to evaluate instructional and departmental quality. This information was used for both shaping the direction of an academic department, and to inform students about opportunities available to them after graduation.

Bossart, Wentz and Heller (2009) described the results of an alumni survey administered at the University of Wisconson-Strout. Consistent with previous research, their findings indicated that alumni were very satisfied with their program, would attend UW-Strout again if they could do it over, and felt that their education was worth their investment in time and money. In 2008 Hennessy (as cited in Bossart, Wentz and Heller, 2009) reported that 78% of college graduates would attend the same university again if they could do it over. The UW-Strout results also showed that career advising and academic advising earned the lowest alumni ratings, which is consistent with previous surveys, such as the survey at Southwest Texas State University (Ogletree, 1999). Career and academic advising are areas that are increasingly important.

College students, and their families, are focused on the "value proposition" of a college education more strongly than ever before, which leads to an increased desire for explicit outcomes data and career services as they make their college decisions. Alumni research can provide important information to help meet these demands.

Borden (2005) points out that it is both possible and desirable for campuses to align alumni surveys to serve multiple purposes, rather than for a limited purpose by a single constituency group. It is the role of the institutional researcher to implement such a survey, and to ensure that the results of the survey are interpreted, disseminated and applied to policy decisions. Borden states that effective use of alumni survey results are "pivotal to linking improvement and accountability" (Borden, 2005, p.70). This position is consistent with the recommendations made by Volkwein (2010a & 20010b). In addition to a multifunctional survey, Davidson-Shivers, Inpornjivit & Sellers (2004) state that for data from alumni to continue to be useful, the databases must be maintained and feedback updated. Hoey & Gardner (1999) report results of an ongoing alumni and employer survey program used to improve institutional effectiveness. They point out that the maximum effectiveness of this approach does not begin to accrue until several cycles of data collection occur. At least three cycles of data collection are needed for trend analysis to begin.

This paper describes a multifunctional alumni survey which was implemented at Regis College. The survey was intended to meet the needs of our career planning, academic planning, institutional advancement and enrollment offices; to help us assess institutional effectiveness; and to provide baseline data that would enable us to analyze institutional trends going forward.

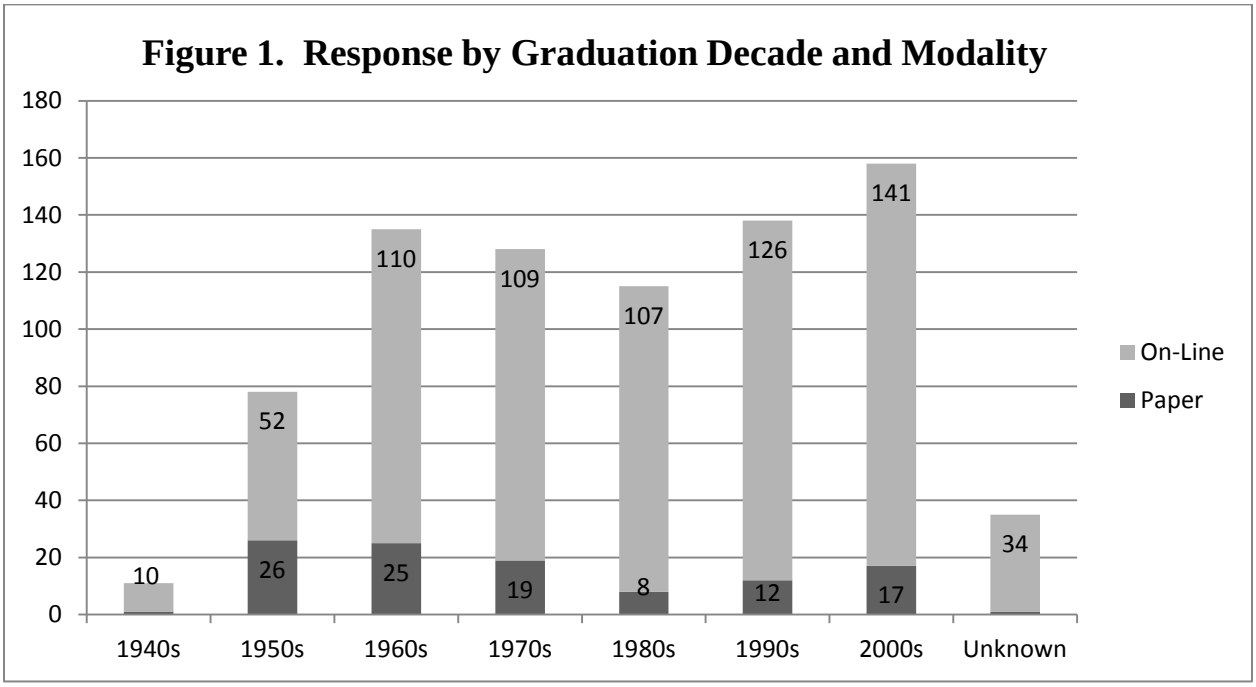
Method

A survey was made available to all Regis College Alumni in electronic and paper formats: through a link on our alumnae page, in an email to all alumni who have provided an email address, through alumni Facebook pages, as an insert in our alumni magazine, and in the materials packet for all annual reunion attendees. All electronic requests for information included a link to the survey formatted in SurveyMonkey; the paper requests included a copy of the survey and a return envelope. The data collection began May 1, 2012 and continued until July 31, 2012. Respondents were asked to indicate their level of agreement with 25 statements designed to assess their opinion of the value and benefits of their Regis College degree such as "Regis prepared me to succeed in my career" and "the education I received at Regis was worth the investment in time and money" or to assess services such as "Regis provides valuable academic advising" and "Regis provides strong career development services." They were also asked to rate 20 items indicating how much emphasis they believe Regis College should place on a variety of experiences or services such as career advising, study abroad opportunities, a broad liberal arts education, a global education, and faculty/student interaction outside of the classroom. Finally, respondents were asked to provide information about perceived importance of contributing to Regis, their contact information; year of graduation and major; information about additional degrees attained; employment status, employer and salary; volunteer and community service work; and accomplishments they are particularly proud of. The survey questions are provided in the Appendix.

Results

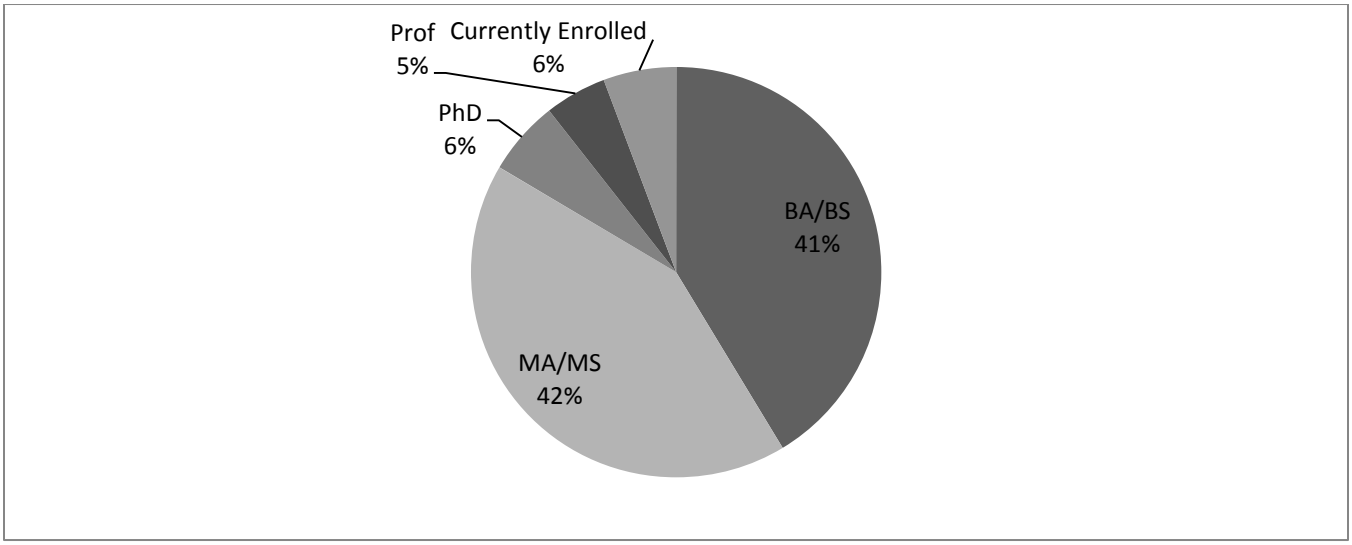
Seven hundred ninety eight alumni returned surveys by the end of July, 2012. The vast majority of responses were electronic: 689 SurveyMonkey responses and 109 paper responses, with 76 of the paper surveys originating in our alumni magazine, and 33 in annual reunion packages. As shown in Figure 1, responses were well distributed across graduation decades, and the preference to respond electronically was equally distributed. A comparison of paper and electronic responses yielded no significant differences. Paper responders were not older than electronic responders, nor were they likely to show attitudes different from the electronic responders.

Figure 1. Response by Graduation Decade and Modality



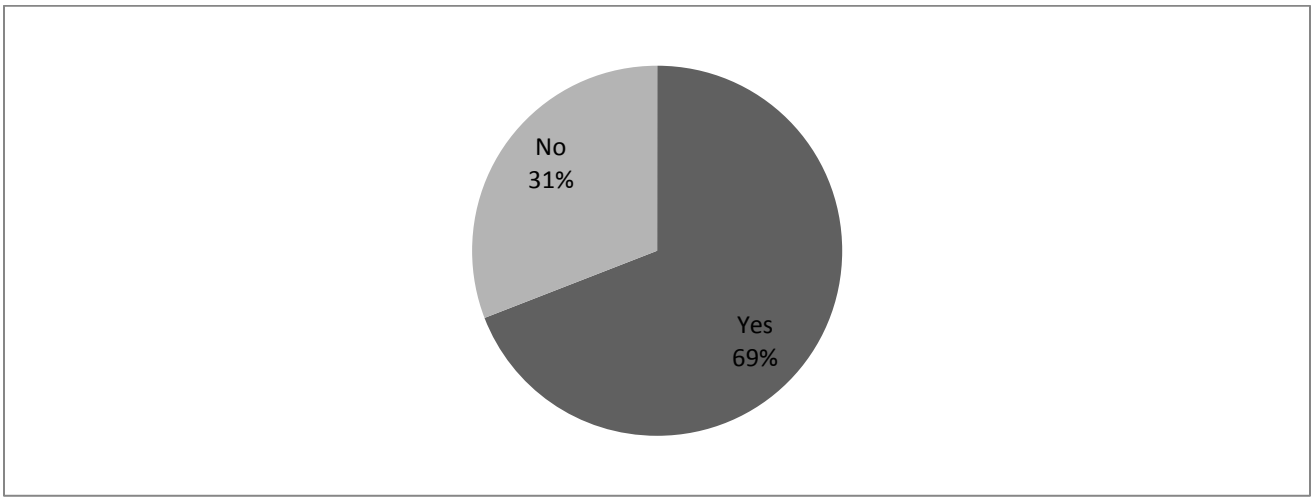
The majority (59%) of survey respondents has either obtained an advanced degree, or is currently enrolled in a graduate program, as shown in Figure 2.

Figure 2. Degree status of Regis Graduates



In addition to the 59% of respondents who already have at least one advanced degree, 30% of all respondents are considering furthering their education. The desire for additional education was most noticible among recent graduates, those who completed their education between 2007 and 2011, as shown in Figure 3.

Figure 3. % of 2007 – 2011 graduates who are considering advanced education



Figures 4 and 5 show salaries reported by the respondents.

Figure 4. Current salary of all survey respondents.

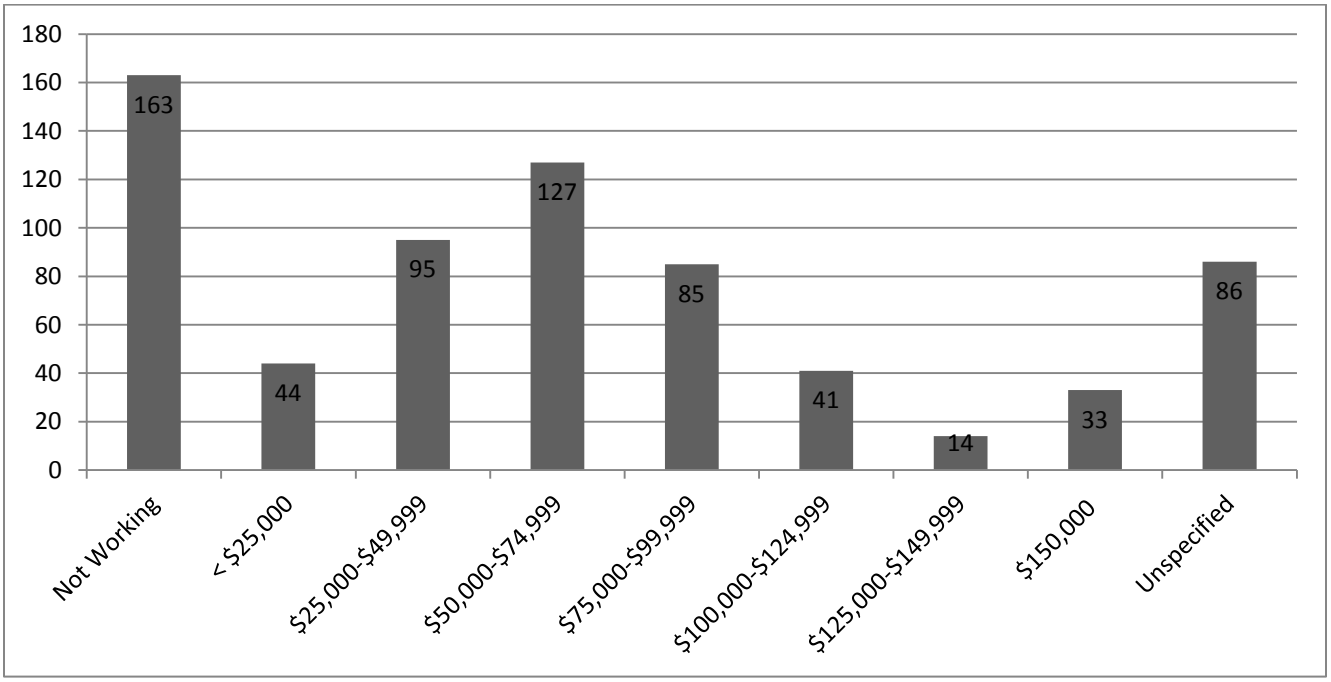
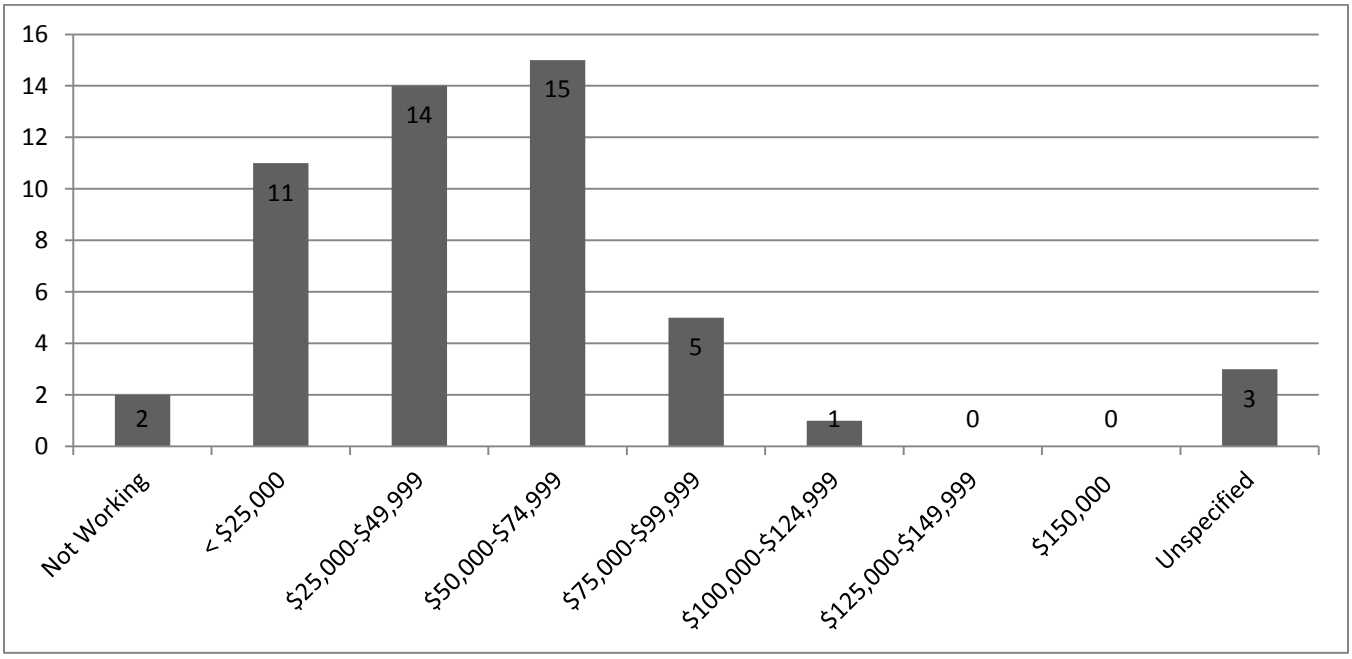


Figure 5. Current salary of 2007-2011 graduates.



Very, very few respondents reported that they were currently seeking employment, and most are employed full time, as shown in Table 1.

Table 1. Employment status		
	All Respondents	2007-2011 Graduates
Employed Full Time	60%	77%
Employed Part Time	13%	17%
Not Employed, Not Seeking Employment	23%	4%
Not Employed, Seeking Employment	4%	2%

Respondents provided an impressive list of professional accomplishments, service/volunteer/advocacy work, and recognitions/rewards/honors that they have received. A very brief sample, selected to show the diversity of experiences in provided in Table 2.

Table 2. Sample accomplishments, advocacy work, and recognitions

Professional Accomplishments

Bringing several products to market in oncology and hematology
I am known throughout the country as a tenured, proficient, Latin teacher
Working with to help them combat childhood obesity
COO of a Rehabilitation Hospital
Being a member of the federal judiciary for 22 years
Being executive director or a domestic violence/sexual assault program

Service/Volunteer/Advocacy Work

I am a guardian ad litem, representing the interests of abused/neglected children in court
Dog Bones - Therapy Dog team
Board of Directors; Historical Society
Trustee of Family Foundation that supports grassroots community projects
Working for the UN in peacekeeping operations
Immigration Advocacy and Skill Training

Recognitions, Awards, Honors

National Park Service Star Award for helping to develop/pilot new education programs
Resident of the year. Medical School Class President
Army's White Plume Award for service to Soldiers and their Families
Grant recipient from the Geraldine Dodge Foundation for work in education
Elected first woman Mayor of my city

Respondents were asked to indicate how important it is for them to contribute financially to Regis College and, if they do feel it is important, they were asked to describe their motivation for

giving. Table 3 shows attitudes toward giving for all respondents, and that 2007-2011 graduates are more likely to feel that it is important.

Table 3. Responses to, "How important is it for you to contribute financially to Regis College?

	All Respondents	2007-2011 Graduates
Very Important	**29%**	**38%**
Somewhat Important	**52%**	**44%**
Not Important	**19%**	**18%**

As shown in Table 4, reasons for giving varied a bit between all respondents and the most recent graduates. Recent graduates were less inclined to cite the desire to "give back" as their motivation, and slightly more inclined to cite peer encouragement, ensuring an excellent education for future students, and the tax benefits of charitable giving.

Table 4. Motivation for Giving

	All Respondents	2007-2011 Graduates
Regis College gave me an exceptional education; I want to give back.	**57%**	**31%**
Fellow Regis College alums encourage me to give	**9%**	**14%**
Regis needs my support to ensure an excellent education for future students	**60%**	**63%**
The tax benefits of charitable giving	**13%**	**20%**

In addition to giving financially, respondents indicated that they felt it was quite important to contribute to Regis College in other ways, with the younger alums most likely to feel this is important, as shown in Table 5.

Table 5. Responses to, "How important is it for you to contribute to Regis College in other ways?		
	All Respondents	**2007-2011 Graduates**
Very Important	**21%**	**38%**
Somewhat Important	**53%**	**44%**
Not Important	**26%**	**18%**

Respondents were asked to indicate their agreement with a series of statements about Regis on a 5 point likert scale. These responses provided the information we need to assess and improve our institutional effectiveness. Finally, they provided opinions regarding the things they believe we should be emphasizing going forward.

Discussion

The Regis College Alumni Survey provided invaluable content and methodological information for our institution, and for others considering implementing a similar survey. Responses were well distributed across graduation decades. The vast majority of responses (86%) were electronic. Interestingly, alums graduating in the 1940s were just as likely to respond electronically as our most recent graduates. Paper responders were not older than the electronic responders, nor did they reveal different attitudes than the electronic responders. This suggests that the use of on-line communication technologies has become sufficiently ubiquitous that we can use survey tools such as SurveyMonkey and assume that we are accessing a representative sample of our alumni population. We cannot, however, assume that a sample such as this is unbiased. All respondents were contacted through Regis Alumni sources. It is likely that we were contacting graduates who are motivated to stay in touch with Regis and our respondents were a self-selected group who were motivated to provide feedback. It is highly

likely that their opinions were more positive than a true random sample of graduates would hold. Given most of the goals of this survey -- to improve our database of alumni information, identify internship and career opportunities for current students, obtain “success stories” for recruitment purposes, and obtain information that would support future fundraising efforts, this sample is appropriate. It is important to recognize, however, that this sample does not provide a true measure of institutional effectiveness. Never-the-less results did identify important institutional issues we should address and it did identify specific issues we need to obtain additional information about, using a more systematic sample.

The majority of our respondents (59%) have obtained an advanced degree since graduating from Regis and most (69%) of our 2007-2011 graduates are considering additional education, even though 39% of this group already has an advanced degree or are currently enrolled in a graduate program. We will be using this information to learn more about the graduate programs they are interested in, as we expand our graduate programming at Regis.

Likewise, almost all of our respondents are employed. Only 4% overall and 2% of the 2007-2011 graduates reported that they are currently seeking employment. This is excellent news, but this is an area that is probably impacted by response bias. It is more likely that our graduates who are feeling successful would respond to the survey than those who are not feeling successful. The results must be interpreted with caution, therefore. Despite the probability that these results do not provide a full picture of alumni employment, they do provide an excellent source of information for Institutional Advancement, recruitment, and for career and networking opportunities or classroom speakers. Most respondents included specific information about their work and their employers. This is an invaluable resource for us going forward. Likewise, the salary information provided helps us as we discuss the paths our alums of various majors took

with our current and potential students. Information about professional accomplishments, service and advocacy work, and awards and recognitions is equally valuable.

Not surprisingly, given our biased sample, the majority of respondents indicated that it is important for them to contribute financially to Regis College. It was surprising, however, to learn that our recent graduates were the ones who were the most likely to indicate that it is very important. Likewise, most respondents indicated that it was important to contribute in other ways and the young alums were again more likely to indicate that this is so. This is a significant finding. Young alums are telling us that they are ready, willing, and able to be involved. This is a relatively untapped resource. Although young alums usually have less financial means to give, it is important to establish a relationship and begin the mutually beneficial habits that will sustain both Regis and our graduates. Graduates who cannot give a great deal financially still have a much to offer experientially. Internship placements and career opportunities are very important to us. Further, we know that people who give in one manner tend to be more inclined to give in other ways. This means that alums who can provide opportunities or service now will be also be inclined to give financially when they can. Likewise, our financial donors are likely to provide additional types of experiential support if we ask.

This survey has had an immediate impact on our operations at Regis. Based on the feedback that was much less positive than we would have liked we have already made dramatic changes to our career services and advising services. We have hired a new Director of Career and Internship Services and a task force is currently preparing a report on a revised academic advising model with a goal of implementing the new model in the fall of 2013. The alumni employment and experience information is being added to the career and internship database. Faculty have access to contact and experience information for classroom speakers, focus groups

and advisory boards. Institutional Advancement is taking full advantage of the updated contact information and the information about the alums who feel it is important to contribute to Regis. Information about graduate programs our alums are in and are considering attending is informing our own curriculum development as we consider how to best prepare our students for their future endeavors. Finally, we are using the information about what our graduates are doing in our admissions and recruitment messaging.

We will be conducting follow up research to address some of the questions these results raised. For example, we want to learn more about the areas alums advised us to emphasize and about the areas in which they indicated that we have room for improvement. We will also be asking our respondents what we can or should do to foster relationships with our graduates, which we know are mutually beneficial.

Although we do not plan to conduct another full scale survey such as this one for at least five years, we will be conducting targeted annual surveys. We will be getting in touch with graduates of specific majors as those programs undergo review, we will be following up with specific populations to learn more about how their experience compares with other students. Specifically, we want to learn about the experiences and opinions of graduates who are traditionally underserved, first generation, and/or low income. We want to learn all we can to ensure that we are maximizing the experience, and the probability of success, for future students from these vulnerable populations.

We will be following up with specific academic ability groupings – do students who come to us with a high ability profile experience Regis and their life after graduation differently, or do we succeed at closing the gaps between these groups? Finally, we will use these results as

baseline data and follow up with specific questions so we can track institutional effectiveness trends.

Future data collection will take advantage of electronic surveys. We will be holding focus groups, and we will intentionally contact a balanced sample of graduates in order to more accurately assess our ability to fulfill our mission. In addition, we will continue to work with those alumni who are interested and motivated to maintain contact with their alma mater. We have learned that alums, especially young alums, are an underutilized resource. They are motivated to give, and are telling us that they want to maintain a connection.

References

Borden, V. M. (2005). Making an impact with alumni surveys. New Directions for Institutional Research, 126, 61 - 72.

Bossart, S., Wentz, M., and Heller, T. (2009). Using alumni perspectives for university evaluation and planning. College Student Journal, 43, 411-428.

Cabrera, A.F., Weerts, D. J., and Zulick, B.J. (2005). Making an impact with alumni surveys. New Directions for Institutional Research, 126, 5 – 17.

Davidson-Shivers, G., Inpornjivit, K., & Sellers, K. (2004). Using alumni and student databases for program evaluation and planning. College Student Journal, 4, 510-520.

Hoey, J. J. & Gardner, D. C. (1999). Using surveys of alumni and their employers to improve an institution. New Directions for Institutional Research, 101, 43 – 59.

Landrum, R.E. & Lisenbe, N.R. (2008). Use of alumni perceptions to evaluate instructional and departmental quality. College Student Journal, 42, 408-415.

Ogletree, S. M. (1999). Improving career advising: Responding to alumni surveys. Journal of Instructional Psychology, 26, 42 – 45.

Volkwein, J. F. (2010a). A model for assessing institutional effectiveness. New Directions for Institutional Research, Assessment Supplement 2009, 13 – 27. DOI: 10.1002/ir.

Volkwein, J. F. (2010b). Assessing alumni outcomes. New Directions for Institutional Research, Assessment Supplement 2009, 125-139. DOI: 10.1002/ir.

APPENDIX

Regis College 2012 Alumni Survey

Dear Regis Graduate,

Your opinion is one of the most important indicators of the effectiveness of a Regis education.

The perspective of alumni, who can evaluate how their experience has influenced their present work, activities, and beliefs, provides important feedback that we use to shape the things we do for current and future students. Your perceptions help us gain a complete picture of how well we are doing and what areas need improvements.

Please take a few minutes to complete the accompanying Alumni Survey. Your responses and those of your former classmates will be used to advance the mission of Regis College and to guide and enrich the experience of future students.

Please know that every response is significant and that we value your perspective.

Thank you for your support of your alma mater.

1. Please indicate your level of agreement with the following statements:

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Regis prepared me to succeed in my career.					
If given the opportunity to start over, I would again choose to attend Regis.					
The education I received at Regis made a significant contribution to the general quality of my life.					
The education I received at Regis deepened my understanding of moral and ethical problems.					
Regis empowered me to challenge myself academically.					
Regis empowered me to serve and to lead.					
Regis is a diverse and welcoming community.					
The education I received at Regis was worth the investment in time and money.					
Regis increased my appreciation of art, music, and theater.					
My spiritual life was enhanced at Regis.					
Since graduation I have felt an increasing loyalty to Regis.					
I would recommend Regis to others.					
Regis offers numerous opportunities to learn outside the classroom.					
Regis provides valuable academic advising.					
Regis provides strong career development services.					
Faculty members at Regis are excellent.					
Regis provides strong support and attention to individual students.					
Regis should be concerned about the level of drinking and/or drug use on campus.					
Regis should be concerned about discrimination or harassment on campus.					
Regis should be concerned about declining academic standards.					

2. Using a scale in which 1 is poor and 5 is excellent, how would you rate the following?

	Poor				Excellent
My overall experience with Regis College as a student.	**1**	**2**	**3**	**4**	**5**
The value of a Regis College degree in the job market.	**1**	**2**	**3**	**4**	**5**
My treatment as an alum.	**1**	**2**	**3**	**4**	**5**
My current feeling of connection to Regis College.	**1**	**2**	**3**	**4**	**5**

3. Using a scale in which 1 is "none at all" and 4 is "a great deal" please indicate how much emphasis you believe Regis College should place on each of the following:

	None At All			A Great Deal
Faculty/student interaction outside the classroom	**1**	**2**	**3**	**4**
Academic advising	**1**	**2**	**3**	**4**
Career advising	**1**	**2**	**3**	**4**
Leadership development	**1**	**2**	**3**	**4**
Community service	**1**	**2**	**3**	**4**
Internships	**1**	**2**	**3**	**4**
A global education	**1**	**2**	**3**	**4**
Study abroad opportunities	**1**	**2**	**3**	**4**
Faculty research	**1**	**2**	**3**	**4**
Student research	**1**	**2**	**3**	**4**
A broad liberal arts education	**1**	**2**	**3**	**4**
Intercollegiate athletics	**1**	**2**	**3**	**4**
Extracurricular activities (other than athletics)	**1**	**2**	**3**	**4**
Commitment to Catholic mission	**1**	**2**	**3**	**4**
Heritage of Sisters of Saint Joseph	**1**	**2**	**3**	**4**
Campus Ministry activities	**1**	**2**	**3**	**4**
Skills valuable in the workforce	**1**	**2**	**3**	**4**
Moral/ethical development	**1**	**2**	**3**	**4**
Need-based financial aid	**1**	**2**	**3**	**4**
Merit-based financial aid	**1**	**2**	**3**	**4**

4. In what year did you graduate? _____

5. What was your major? _____

6. What was your favorite class at Regis? _____

7. Please indicate the highest level of education you completed
   - _____ Bachelor's degree
   - _____ Master's degree
     Program of study, degree, and school _____
   - _____ Professional degree (Law, Medicine, etc)
     Program of study, degree, and school _____
   - _____ Doctorate
     Program of study, degree, and school _____

8. Are you currently enrolled in a graduate program?
   - _____ Yes
     Program of study, degree, and school _____
   - _____ No

9. Are you considering continuing your education?
   - _____ Yes
     Program and degree _____
   - _____ No

10. Current employment status
    - _____ Employed full time
      Employer and position _____
    - _____ Employed part time
      Employer and position _____
    - _____ Not employed, seeking employment
    - _____ Not employed, not seeking employment

11. Current Salary range
    - _____ I am not currently working
    - _____ Less than $25,000
    - _____ $25,000 – $49,999
    - _____ $50,000 – $74,999
    - _____ $75,000 – $99,999
    - _____ $100,000 – $124,999
    - _____ $125,000 – $149,999
    - _____ $150,000 or over
    - _____ I prefer not to say

12. Please share a professional accomplishment you are proud of.

13. Please tell us about any community service/volunteer work/advocacy work you are involved with.

14. Please tell us about any professional and/or community recognitions (awards or honors) since graduation.

15. How important is it for you to contribute financially to Regis College?
    - _____ Very important
    - _____ Somewhat important
    - _____ Not important

16. If it is somewhat or very important to contribute financially to Regis College, which of the following describes your motivation to do so (indicate all that apply)?
    - _____ Regis College gave me an exceptional education; I want to give back.
    - _____ Fellow Regis College alums encourage me to give
    - _____ Regis College needs my support to ensure an excellent education for future students
    - _____ The tax benefits of charitable giving
    - _____ Other _____

17. How important is it for you to contribute to Regis College in other ways?
    - _____ Very important
    - _____ Somewhat important
    - _____ Not important

18. Please provide your preferred mailing address:_____

19. Please provide your preferred email address_____

20. Please provide your preferred telephone number_____

NCES Projection Methodology: Institutional Research Applications

J. R. Robles, PhD
Center for Planning and Institutional Effectiveness
State University of New York
Empire State College

November 2012
NEAIR 39th annual meeting
Bethesda, MD

The NCES report of projections for 2020, include forecasts for several indicators and strata within the post-secondary educational system. A Holt-Winter filter model is presented as a generalization of the NCES techniques with comparable results. Applications to enrollment and completions time series are discussed in the context of institutional research.

1 Introduction

NCES Reports focusing on projections, which include the *Projections of Education Statistics to 2020* (Hussar and Bailey, 2011), use global and stratified time series to predict enrollments and completions, which are of particular importance for institutional research (IR). NCES projection techniques rely on classic concepts in time series analysis: linear models and smoothing. However, standard practices in educational research are focused on traditional cross-sectional linear models (Henson, Hull and Williams, 2010). This has a two-fold impact on the use of projections: projection figures may be misinterpreted or underutilized, as the origins of such projections are obscure, due to the lack of familiarity with the techniques. Second, IR departments may be limited in the use of these techniques to make their own projections or adapt the national projection to specific contexts as needed. Here, NCES projection methodology is explained and

examples of its use are provided, as well as a comparison between technique variations and a discussion of the uses of these procedures in IR. NCES method (Hussar and Bailey ,2011, p.78) includes two versions of an exponential smoothing procedure, and a linear trend model with external predictors.These techniques have complex extensions in the field of time series modeling with applications to institutional data (Weiler,1980;Li and Cheng, 2007; Cryer and Chan, 2008; Huang et. al, 2011).[1] In this paper, the discussion is limited to the *exponential smoothing* techniques and a well know model that generalizes both specifications. NCES projections use other models, including linear equations for completions, and some of those equations include external regressors tied to population changes. The discussion here is limited to the smoothing techniques, given the wider range of applications to IR, in situations in which external regressors may not be available or convenient to use. On the other hand, IR researchers may be more familiar with the regression-based models and may benefit more from an illustration of the smoothing techniques.

1.1 Exponential Smoothing

Exponential smoothing has two versions: single and double. These terms correspond to a more general formulation, that of Holt-Winters smoothing models (Winters,1960).

The single exponential smoothing procedure employed by the NCES is described as follows:

$$a_t = \alpha x_t + (1 - \alpha) a_{(t-1)} \tag{1}$$

with

$$0 < \alpha < 1$$

, where a_t is the smoothed value at time t, x_t is the input value at time t, and α is the smoothing parameter. This model has been used extensively in several disciplines, and it is also known as the Exponentially Weighted Moving Average (EWMA) model. One important aspect of the EWMA model is its relationship with more general models for time series. In particular, EWMA can be considered equivalent to an ARIMA(0,1,1) specification with no Auto-Regressive (AR) component and a Moving Average (MA) coefficient $1-\alpha$, with $1/\alpha$ indicating the number of time points used for the MA (size of the moving window). In practice, some of the software implementations of the Holt-Winters model optimize the α parameter by minimizing the consecutive lead-out errors (from t

[1]Time series analysis of educational data, specially enrollment series often involve highly technical treatments. Fundamental issues such as stationarity, seasonality and transformations are not treated here due to space considerations and to keep the technical details at a minimum. The reader is encourage to review those topics in the relevant literature.

to $t+1$), which can render a different parameter space than the standard ARIMA(0,1,1) using different constraints. There are practical ways to estimate the α parameter which are especially useful for spreadsheet implementations, and there are also rules of thumb on how to determine the α value (Cryer and Chan, 2008). One important property to keep in mind is that when α approaches 0, EWMA resembles a pure MA model, and when α approaches 1 becomes a $random\ walk$ model. For most practical purposes the EWMA or exponential smoothing will deliver a different performance than these simpler models when the α parameter is far from the extremes of the parametric space.

EWMA incorporates what is called a $level$ component of the series, with the emphasis on the MA term. In the case of series with a strong $trend$ component, the Holt-Winters generalization of the EWMA model provides away to incorporate the trend component into the model. An integrated level and trend smoother can be formed by adding the trend (slope) term to the EWMA, :

$$a_t = \alpha(x_t - s_{t-p}) + (1-\alpha)(a_{t-1} + b_{t-1}) \quad (2)$$

$$b_t = \beta(a_t - a_{t-1}) + (1-\beta)b_{t-1} \quad (3)$$

where b_t is the slope at time t and β is the smoothing parameter. This is a Holt-Winters level-trend models with parameters $[\alpha, \beta]$, referred in the NCES reports as $double\ exponential\ smoothing$. In this case, the optimization of parameter α, β is a more complex affair than for EWMA, requiring the identification of level and trend components of the series. Nevertheless, Holt-Winters models are implemented in most statistical software packages and may be used as smoothers even with spreadsheet software.

In this paper, the α specification (level) is compared with the α, β specification (level-trend) for illustration purposes, in order to show how these different Holt-Winters specifications can perform with some example data. These specifications are called $exponential\ smoothing$ and $double\ exponential\ smoothing$ in the NCES reports.

1.2 Forecast Performance metrics

The accuracy of the predictions are analyzed using the Mean Absolute Percentage Error (MAPE) metric, typically predicting the value of the series at tn+1, from the prior series values $(t_0 - t_n)$. MAP error can be defined as:

$$e_t = 100\frac{|x_t - \hat{x}_t|}{x_t} \quad (4)$$

where e_t is the MAP error at time t, x_t is the observed value and $\hat{x}_t$ is the forecast value for time t.

Several aspects of this projection approach may be of special interest for the IR community: the interpretation and use the projection estimates across years, and the considerations to make when applying these projection techniques to their own data.

This article illustrates the issues involved in the interpretation of the projections and presents a comparison of two projection techniques with national public data, later highlighting how these techniques may be used with institution-specific data, making emphasis on the MAP error metric as used by the NCES projection report. There are many other forecasting error metrics, based upon model goodness of fit, prediction error, confidence band width, however the MAP error metric is used here to follow the NCES standards.

2 Method

2.1 Design

This is a secondary data analysis study. Data is extracted from the NCES data sources, and the projection models are implemented to compare the projection results of the different techniques. Variables Two time series were selected for the analysis: Enrollments in Public 4-year post-secondary institutions, and attainment in 4-year degrees in public post-secondary institutions. Each time series is accompanied by two stratification modifiers: gender and course load, both treated as categorical variables, to show the variability of the model performance across strata. The period of observation was 1991-2009, and the time-resolution was one data point per year.

2.2 Analysis

2.2.1 Comparison of projection techniques

Projections of enrollment and degrees conferred were compared using the MAPE metric, for the whole series (1991-2009), obtaining the MAPE estimate for lag1 (next year) projection for the full series. The models compared were the ERWMA and the Holt-Winters level-trend models. Following NCES report conventions , these are results are interpreted by their magnitude rather than statistical significance.

2.2.2 Stability of the enrollment projections for post-secondary institutions

Enrollment projection Mean Absolute Percent Error (MAPE) was analyzed for the 2011 projected value using 10 time lags, as reported by NCES. This analysis was combined with an Auto-correlation analysis of the enrollment series using a 10 year window. Results

taken from the NCES reports are used for secondary analysis, and independent analyses performed by the author are presented, using Holt-Winters models evaluated for 1991-2001 series to forecast 2002-2009 values for enrollment and completions series from IPEDS data lab.

3 Data sources

All secondary data sources: NCES projection and Reports tables, Integrated Postsecondary Education Data System (IPEDS) Data Center (Enrollment and Completions Surveys)

4 Results

4.1 Comparison between the Techniques

Several series were analyzed with the single and double exponential smoothing models, according to Holt-Winters specifications. These independent analyses were carried out on enrollment and completion series for national numbers in the period of 1991-2009. The results shown here are typically for models forecasting 2009 from the series 1991-2008 (1 year lead-out projections).

The single exponential (EWMA) model results show MAPE of 2.24% for Enrollments in Public 4 year institutions. For part-time enrollments, MAPE was 2.06 for females and 2.26 for males. For completions, bachelor degrees conferred by public institutions, MAPE estimates were 2.6 for females and 2.33 for male students. In all these EWMA models, the optimal parameter estimate for a was 0.99.

The Holt-Winters level-trend model (double exponential smoothing), for enrollments, yielded a MAPE estimate of 1.06%. For part-time, MAPE was 1.32 (Female), and 1.38(Male). For Bachelor degrees, MAPE estimate was 1.28 (Female), and 1.73 (Male). For this model, parameter estimates showed greater variation: the enrollment series with $a > 0.77$ and $b > 0.9$ for all strata. For the completions series, $a > 0.9$ and $b < 0.1$ in all the cases. Generally speaking, the completions series have a stronger trend component than the enrollment series for this particular dataset.

The MAPE differences between models are related to their goodness of fit. The level-trend Holt-Winters model shows better fit than the ERWMA, as shown in Figure 1. The better fit for the α, β double-exponential model may be due to the presence of a strong trend on this completions series. As can be seen in the figure 1, the smoothed

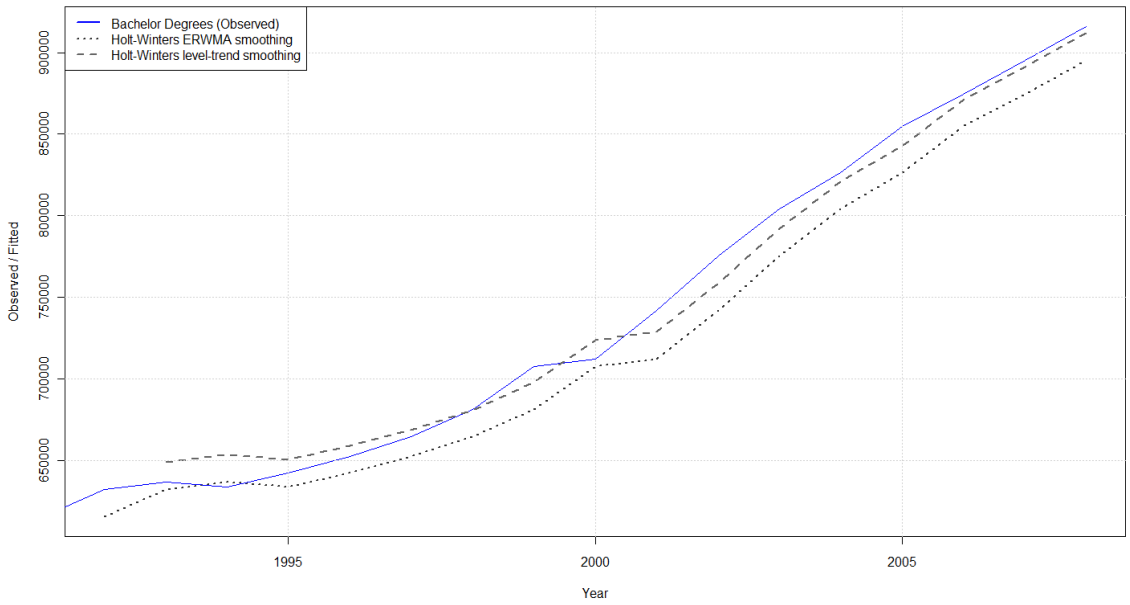


Figure 1: Comparison of single and double exponential smoothing: Bachelor Degrees (Female) 1991-2009

series for the level-trend model tends to be closer to the observed values, especially at the end of the time period, in which the linear trend is more dominant.

4.2 Stability of projection accuracy over time

The prediction accuracy decreases over time (a standard result for time-series projections). MAPE doubles in size from 1 year lag (1.7%) to 3 years lag (3.9%), and multiplies by a factor of 7+ at the 10 year lag (13.2%) (Hussar and Bailey, 2011, p. 119). This is a pattern which can be observed in many forecasting situations, but it is clearly illustrated by the NCES results.

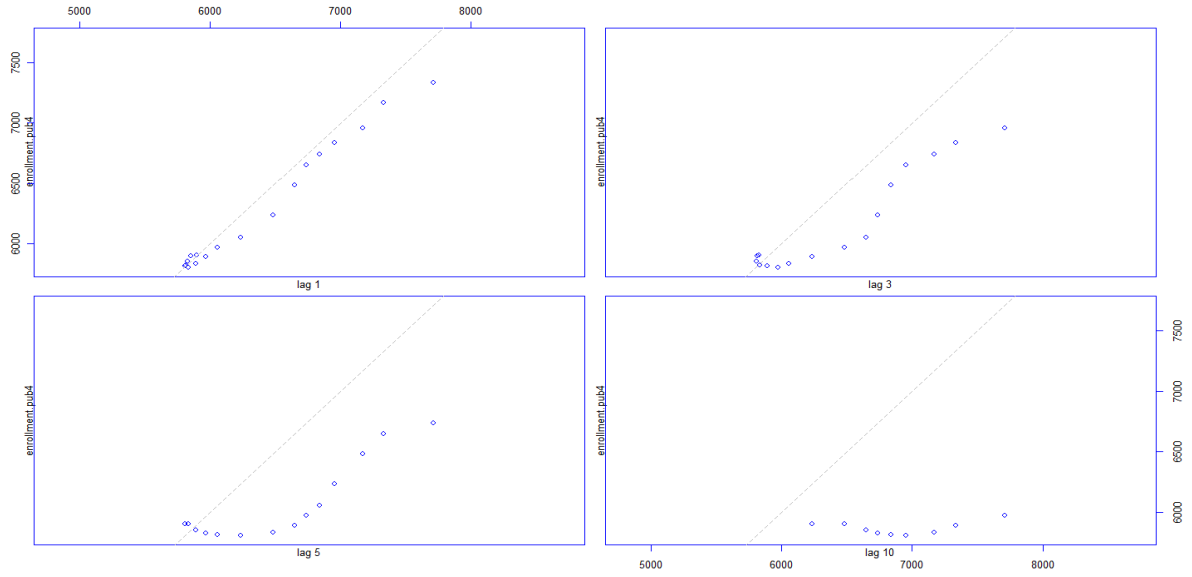


Figure 2: Lag-correlation plot: Enrollment in 4-year Public institutions 1991-2009. The circles represent observed data points, the center dotted line represent the projected values and the solid lines the upper and lower-bound of the 95% confidence interval (CI) for the projection.

One possibility would be to forecast the series using an auto-regressive model instead of exponential smoothing. However, further analysis reveals that such model would have similar issues in terms of long-term forecasting.

Lag-scatterplots (Figure 2), show how auto-correlation decreases sharply with years, from a strong auto-correlation in lag 1, to a weak relationship by lag 10 (ten years lead-out), consistent with the decrease in the projections accuracy exhibited by the MAP error metric . In this case, an AR model will have the same declining forecasting accuracy over time, given the weak serial correlation observed in the series just after a few lags (years).

So far, the analysis have focused on *point* estimates of the forecast values. However, a more comprehensive analysis of the forecasting model can be accomplished by including the *confidence interval* of the forecast, to put the forecasting accuracy in a better context.

Figure 3 shows Holt-Winters level-trend model forecasting enrollment in 4-year public institutions. This plot shows forecasts for 2002-2009 based upon the 1991-2001 series. The projected values describe a linear trend, which decreases in accuracy until the very last year in which the observed point re-aligns with this trend. This highlights the difficulties involved in the evaluation of forecasting models using a single data point. On the other hand, the plot shows how the confidence band for the projection expands over time, making the forecast band much narrower for short lead-out times.

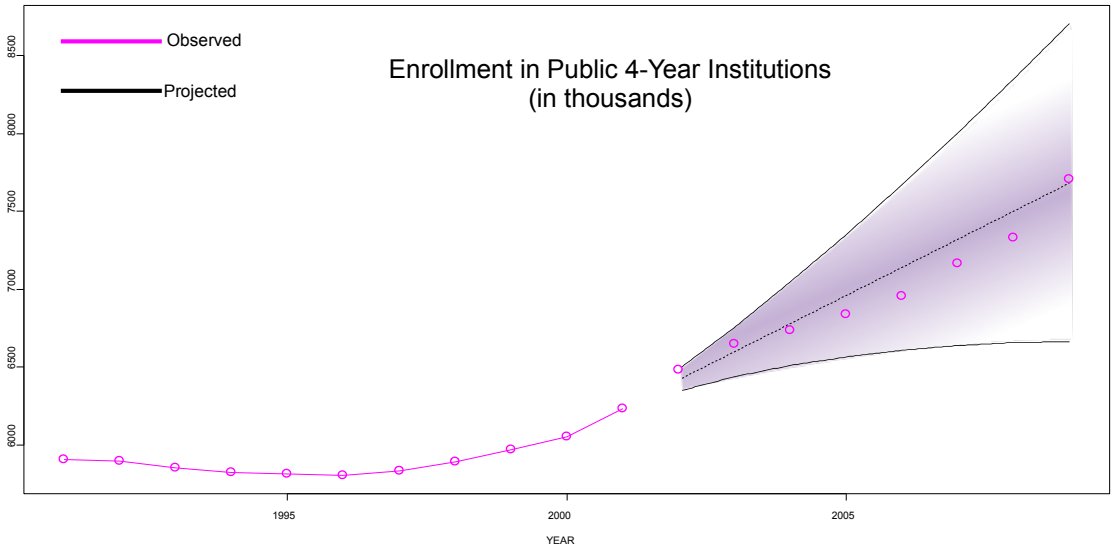


Figure 3: Holt-Winters Forecasting: Enrollment in 4-year Public institutions 1991-2009. The circles represent observed data points, the center dotted line represent the projected values and the solid lines the upper and lower-bound of the 95% confidence interval (CI) of the projection.

Figure 4 show how the presence of a strong trend component can stabilize the prediction accuracy, given that the model takes that trend into account, such as the level-trend Holt-Winters model used. It also shows how stratification plays a crucial role in the identification and interpretation of these forecasting models. For this case, while the confidence band widens over time, the projected value remain at a similar distance from the observed values, describing a rather parallel trend. In contrast with the prior series

shown in Figure 3, the strong linear trend keeps the accuracy of the forecast relatively stable.

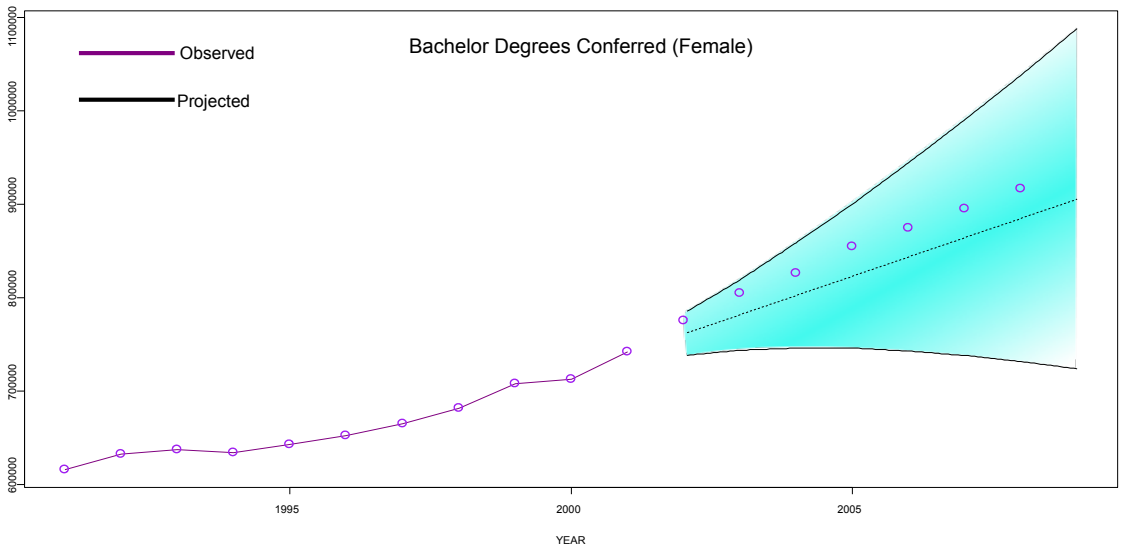


Figure 4: Holt-Winters Forecasting: Bachelor Degrees (Female) 1991-2009. The circles represent observed data points, the center dotted line represent the projected values and the solid lines the upper and lower-bound of the 95% CI.

The MAP error values as shown in Figure 5 indicate how the short-term forecast error is very small when compared to the long-term forecasting error. In this case, there is an initial negative trend, and then a period with no clear observable trend. Just after 2005 (the middle of the forecast period), the observed data start to show a positive trend. This result in MAP error estimates that grow from 2.9% in 2005 to 13.7% in 2009. When compared with Figure 4, this shows how the differences in the series, both the series used to fit the model and the one projected, can interact with the model specification to affect the stability of the forecasting accuracy.

For illustration purposes, the model based upon the 1991-2001 can be called a long-term model or *long-memory* models.[2]. A much short-term model can be built using the 2002-2006 series to forecast the 2007-2009 values. Such *short-memory* model won't include the effects of the negative trend observed at the beginning of the series.

[2]Long-memory models are a special kind of time series models, however, here the term is used just to draw the difference between the short and long-term impact on the forecast, and not in the strict sense of the definition of a long-memory model

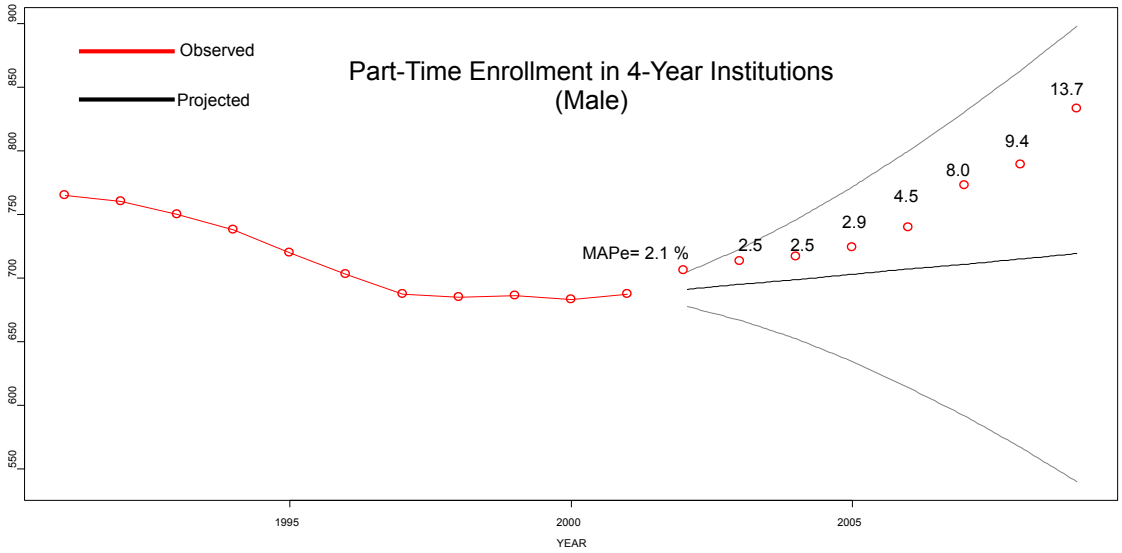


Figure 5: Holt-Winters Forecasting: Part-Time Enrollment (Male) 1991-2009. . The circles represent observed data points, the center dotted line represent the projected values and the solid lines the upper and lower-bound of the 95% CI. The numbers right above the points are the respective MAP error estimates for each projected value.

The contrast between the long and short-memory models is illustrated in Figure 6, which include projected series and confidence bands for both models. The shorter, narrower projection band covering just the 3 final point of the series corresponds to the short-memory model. This plot shows that even with the short memoy model, the changes in the series makes forecasting a difficult task for this kind of model. The projected series is much closer to the observed values but 2 of the 3 observed values fall outside the confidence band for the forecast. This may be an indication that a different kind of model is required for this series, and illustrates once again how stratification can affect modeling and forecasting.

5 Discussion

NCES projection reports illustrate two important properties of time series forecasts: sensitivity to stratification and differential accuracy of short-term vs long-term projections. Projection accuracy decreases as the lag between the observed and projected value in-

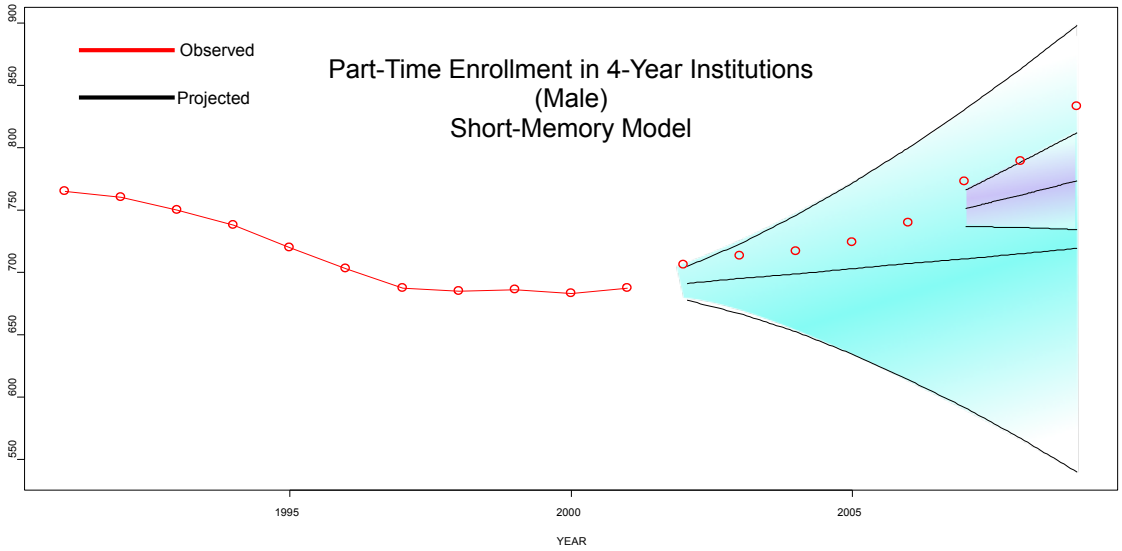


Figure 6: Comparison of long and short-memory Holt-Winters Forecasting with confidence band: Part-Time Enrollment (Male) 1991-2009

creases. This is a regular occurrence in time series projections, even with the large sample size. On the other hand, given how the Holt-Winters model parameters are optimized, short-term projections are favored by such procedure.

Caution should be exercised when making projections of enrollment and completions of particular institutions, or even interpreting the NCES projections, given that accuracy decreases sharply over time. Most series can be predicted within a 2% MAPE for the first year, but MAPE increases after 3+ years. The judgment about an acceptable error will depend on the institutional priorities and the sample size, which can have a strong influence the accuracy of the predictions. As to the different projection techniques, it is important to consider the combination of techniques and stratification. The same stratification variable can modify the accuracy of projections in different directions: for the ERWMA model, gender stratification affects the accuracy of predictions in opposite directions for enrollments vs completions. Overall, the Holt-Winters level-trend model, combining the MA and slope components, performs better with the NCES data. The use of NCES projections as reference values is recommended with the relevant stratification (institution type, sector, demographics).

It is important to recognize that several of the examples presented here contain a strong trend component, thus favoring the two parameter version of the model. For

practical applications in IR, checking both versions of the model could be a good approach, as with single-institution data with no strong trend, the EWMA model may provide a more parsimonious specification.

The NCES projection techniques can be applied using institution specific numbers to create statistically sound forecasts. These techniques can be applied to enrollment, completions and graduation and retention rates treated as time series.

6 Final Comments

The exponential smoothing projection approach provides the institutional researcher with a flexible tool to make statistically sound projections, with applications to enrollments and completions. The NCES projections are a very useful reference for IR scientists and practitioners, showing the robustness of the methodology and applicability across multiple strata.

Some necessary adaptations need to be made in order to apply these techniques to a specific institutions. There are important differences in the sheer volume of data, and the magnitude of the quantities handled. On the other hand, for a national series it is more meaningful to use external indicators (i.e. census data) in regression-type models for forecasting. For the specific institution, the relationship of those external regressors to the local numbers can be more indirect or delayed.

Another consideration that goes beyond this paper is using different time resolutions such as monthly or quarterly data. In such cases there's an additional component to be considered which is $seasonality$. In such cases, the Holt-Winters model can accommodate the seasonal component.

Regardless of the model chosen, projections are statistical estimates, which should be interpreted in the context of a confidence band. It should be highlighted that the projection error is an integral part of the model-building process, as stated by the NCES report:

> Projections of a time series usually differ from the final reported data due to errors from many sources, such as the properties of the projection methodologies, which depend on the validity of many assumptions. (Hussar and Bailey 2011, p. 1.)

Forecasting models are complex dynamic analytic components which need to be maintained and revisited on a regular basis, and forecasting error is just one element of quantitative feedback that must be used to improve the model. Given the relative simplicity of the Holt-Winters model, and the ability to make projections without external predictors,

this segment of the NCES methodology has shown to be useful for IR, provided that is used for short-term forecasting, and with the necessary caveats about the difference in the volumes of data.

References

1. Cryer, J. D. ; Chan, K.S. (2008). *Time series analysis*. Second Edition. New York: Springer.

2. Henson, R. K.; Hull, D. M. ; Williams, C. S. (2010). Methodology in Our Education Research Culture : Toward a Stronger Collective Quantitative Proficiency. *Educational Researcher*, 39, 229-240

3. Huang, Y.; Horng S.; He ,M; Fan, P.; Kao T.; Khan, M.; Lai, J.; Kuo, I. (2011) A hybrid forecasting model for enrollments based on aggregated fuzzy time series and particle swarm optimization. *Expert Systems with Applications*, 38, 8014–8023.

4. Hussar, W.J., and Bailey, T.M. (2011). *Projections of Education Statistics to 2020* (NCES 2011-026). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

5. Li, S.-T.; Cheng, Y.-C. (2007). Deterministic fuzzy time series model for forecasting enrollments. *Computers and Mathematics with Applications*, 53, 1904–1920.

6. Weiler, W. C. A Model for Short-Term Institutional Enrollment Forecasting. *The Journal of Higher Education*, 51,314-327.

7. Winters, P. (1960). Forecasting sales by exponentially weighted moving averages. *Management Science*, 6:324–342.

IR Report

Non-returner Survey: Why Students Leave

Laura Ariovich and W. Allen Richman

Prince George's Community College

310 Largo Rd
Largo, MD 20774

Abstract

Prince George's Community College has regularly conducted the Non-Returner Survey since 2001. The survey is administered in the Fall to students who were enrolled in the previous Spring, but did not enroll or graduate in the following Fall semester. A new methodology used in Fall 2011 raised the survey response rate, saved resources, and yielded, for the first time, an actionable data set.

Introduction

Prince George's Community College (PGCC) is a large suburban college located in Largo, Maryland, with a predominantly African American population. Offering a broad range of credit and non-credit programs, the College attracts over 40,000 credit and noncredit students annually. In Fall 2011, the College had a headcount of 14,647 credit students. The majority of these students were part-time (70%) and female (60%).

As do other Maryland community colleges, Prince George's Community College periodically surveys its non-returners, defined as those credit students who were enrolled in the Spring but did not return in the following Fall. There are two questions in the survey that are required for State reporting:

1. What was your main goal in attending PGCC in Spring 2011?
2. Do you believe you achieved the above goal at PGCC?

In the past, the methodology used by the Office of Planning, Assessment, and Institutional Research (OPAIR) consisted of identifying all non-returners and then drawing a random sample of 1,000 students, who would receive the survey questionnaire by postal mail. Students who did not reply would receive a second mailing. Even with the second mailing, the survey had very low response rates. Between 84 and 160 respondents—or about 1.7-3% of the actual non-returner population—filled out the survey between 2001 and 2007. The low response rate severely limited the survey's utility and did not help identify non-returners' reasons for leaving.

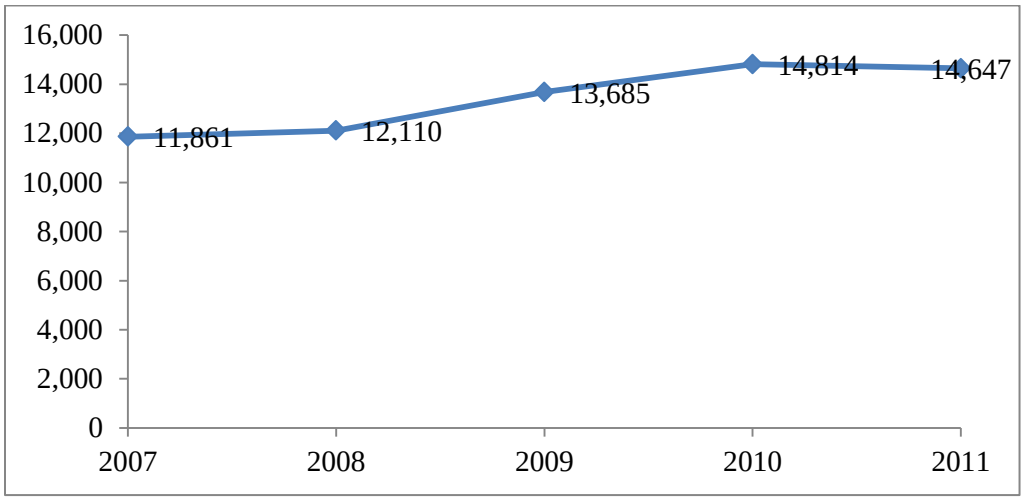
Moreover, the survey had little use to inform interventions aimed at reducing the non-returner population.

The purpose of this report is to underscore the importance of the non-returner survey in the context of the typical enrollment flow at PGCC, present a revamped methodology to survey non-returners, and discuss the survey findings and next steps to reduce the non-returner rate.

PGCC Enrollment "Flow" and the Importance of Studying Non-Returners

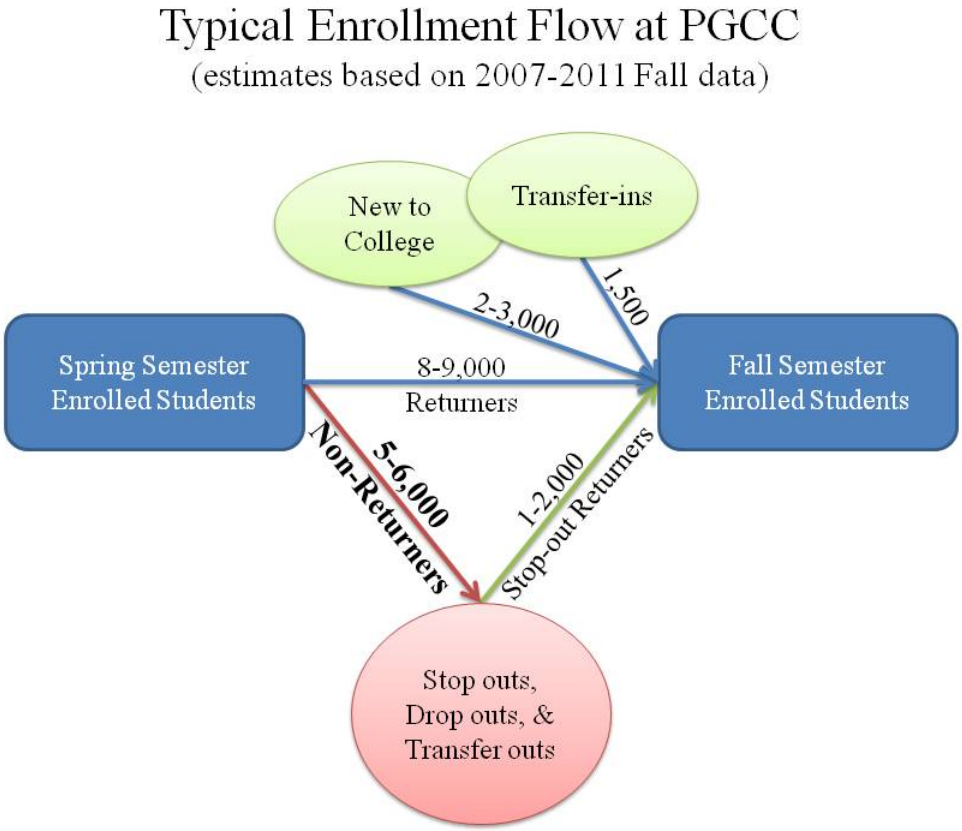
As background research for the survey, OPAIR examined the College's enrollment trends from 2007 to 2012. As seen in Figure 1, PGCC's Fall enrollment has been fairly consistent over time, notwithstanding a slight annual increase from 2008 to 2010.

Figure 1: PGCC Fall Credit Enrollment



However, the stability of overall enrollment trends is deceptive when the "flow" of students enrolling and not returning is not examined. An examination of the typical enrollment flow from the Spring to the Fall semester for 2007-2011 showed that each Spring the College loses 5,000 to 6,000 students, approaching 40% of the credit population. Despite the massive Spring exodus, the College manages to maintain its overall enrollment in the Fall by "replacing" the lost students with three sources of incoming students: students new to College, students who transfer into PGCC from other institutions, and students who renew their attendance after having stopped for one or more semesters (see Figure 2).

Figure 2: PGCC Enrollment Flow



Analyzing the student enrollment flow brought to the fore the previously overlooked loss and "replacement" of students from Spring to Fall. These data highlighted the need to learn more about the non-returner student population and take steps to reduce the non-returner rate.

Revamping the Non-Returner Survey

In fall 2011, OPAIR revamped the Non-returner Survey with the purpose of acquiring useful and actionable data. Instead of sending the survey through postal mail to a random sample of 1,000 students, an electronic survey was sent to all non-returning students with valid email addresses. After the initial email, four reminders were sent to those who had not yet responded. Reminders were sent on different days of the week and at different times during the day. All reminders produced an initial jump in the number of responses (though the size of this jump diminished over time).

In order to increase the Non-Returner Survey response rate, OPAIR relied on two strategies. The initial invitation to fill out the survey and all reminders were directly signed by PGCC President.

In addition, all respondents who filled out the survey within the first 25 days were entered into a raffle to win a $50 gift card (with the exception of those who were employed by PGCC at the time of the survey). The survey was open for a month, but the majority of respondents (close to 72%) filled out the survey by the deadline for the raffle.

Response Rate

The Non-returning Student Survey was sent by email as an electronic questionnaire. Out of the initial population of students who did not return in Fall 2011, 6,265 actually received the questionnaire; the rest (169 students) had no email addresses on file or had invalid email addresses. From this pool, 964 (15.4%) responded, yielding more than six times the best response rate of previous non-returner surveys. An analysis of demographic and other data for the 964 respondents showed that:

- 70% were female
- They had a mean age of 34
- They attended a median of 6 semesters at PGCC
- They completed a median of 26 hours at PGCC
- 40% were currently attending another institution
- 70% were working
- 60% planned to return to PGCC

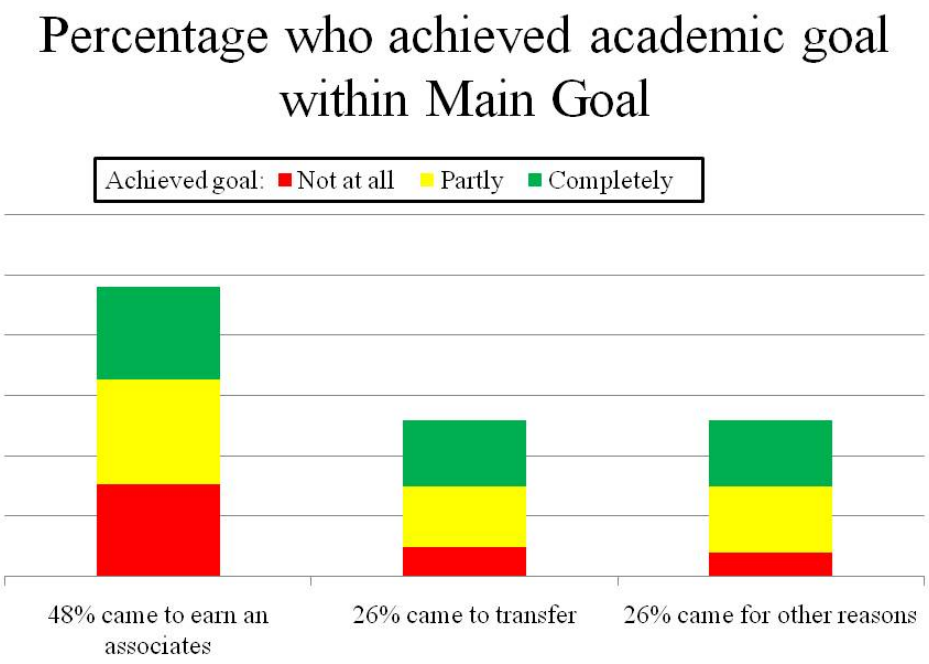
Although only the first three questions in the questionnaire were required, 96% of respondents completed the full survey. In addition, 65% of respondents chose to answer the open-ended question: “In what ways could PGCC better serve your educational needs?” As shown by these comments and by direct email replies sent by respondents, students valued the survey as an opportunity to convey their experiences, offer suggestions, and even ask for assistance to resume their college attendance.

Findings: What we learned about non-returners

An analysis of the mandatory questions showed that nearly 50% of non-returners came to PGCC to earn an associate’s degree, whereas smaller percentages came to transfer (26%) or for other reasons (26%). Among those who came to PGCC for an associate’s degree, one third (33%) did not achieve their goal, one third partially achieved their goal, and one third achieved their goal completely (see Figure 3). Among those who came to PGCC to transfer or for other reasons (e.g., update skills, personal enrichment, etc.), the rate of students not completing their goals was significantly smaller, around 15%. Thus, more non-returners came to PGCC to obtain an

associate's than to transfer or for other reasons. However, those seeking an associate's were significantly less likely to achieve their academic goal.

Figure 3



In addition to the mandatory questions, the survey asked students about any hurdles which may have prevented them from returning to the college in the Fall semester. The students ranked these potential barriers as "major reasons," "minor reasons," and "not a reason" for not enrolling in the Fall (see Table 1). Approximately one third of respondents reported leaving because they had achieved their academic goal or transferred to another institution. Examining only those students who reported leaving without obtaining their educational goal or transferring, the factors identified by most students as a "major reason" for leaving were not having money to enroll (43%), personal problems (38%), being unhappy with one's academic progress (25%), and being unhappy with the College's services for students (25%).

Table 1

Item	% Major Reason
I did not have the money to enroll.	43
I could not attend college due to personal problems.	38
I was unhappy with my academic progress.	26
I was unhappy with the services for students at PGCC.	25

Equally important, the survey helped identify factors that *were not perceived* by students as reasons for leaving. Surprisingly, these factors included being unable to find childcare, lack of transportation, moving away from the area, and being unhappy with activities for students at the College. In all these cases, 85% of respondents or more indicated that the listed item was "not a reason" for leaving (see Table 2).

Table 2

Item	% Not a Reason
I could not find child care so that I could attend classes.	88
I could not get to campus due to lack of transportation.	85
I moved away from the area.	85
I needed a break from school.	77
The classes or programs I wanted were not available.	76
My educational goal changed.	75

Student Feedback in response to the Open-Ended Question

As stated earlier, one of the impressive elements of the 2011 Non-Returner Survey dataset was that 65% of respondents typed answers to the open-ended question. A quick review of open-ended responses showed that most were detailed and somewhat lengthy. Given the richness of these data, students' comments were coded and analyzed with NVivo, a qualitative research software program. The analysis was conducted in three stages:

> Stage 1: Tentative categories were formulated based on a preliminary review of all comments.
>
> Stage 2: All comments were coded based on the tentative categories. As part of this process, the categories were reformulated to achieve a better fit with the data.
>
> Stage 3: Some categories were merged and others eliminated based on the type of comments and the number of quotes included in each category. All comments were then recoded using the final set of categories. The analysis focuses on the four categories in the final set that contained the larger number of comments.

The results of this analysis are summarized in Table 3. As shown in the table, roughly a quarter of comments reflected positive experiences with the College. However, there were also areas where students found barriers to success. Slightly over 25% of comments cited lack of responsiveness to student issues and concerns, including problems in specific areas such as advising and financial aid as well as more generalized concerns with interdepartmental communication and customer service. A much smaller but still sizeable set of concerns (13%)

addressed the lack of available courses at times that would fit students' schedules. The last set of comments (8%) had to do with students' difficulties paying for college and requests for greater flexibility or assistance in this area.

Table 3: Analysis of students' comments (summary)

Main categories (may overlap)	**Percent of all comments**	**Subcategories *within* main category (may overlap)**
Positive comments about PGCC	26%	*Goal achievement*
		Encompassing positive experience
		Positive experiences with faculty
		No complaints
Lack of college responsiveness	28%	*Problems with academic advising*
		Problems with financial aid
		Problems with faculty
		General problems with college responsiveness
Lack of course availability	13%	*Locations, times, days, and frequency*
		More online or hybrid courses
Affordability	8%	

Students' responses to the open-ended question offered a unique glance at their experiences with academic and nonacademic services. Understanding non-returners' perspectives is an essential step in any successful effort to remove hurdles to student success. A more detailed account of the main classes of comments and subcategories is presented below.

Main category: Positive Comments

Even though the wording of the question prompted respondents to think about ways to improve PGCC, over a quarter of those who did respond (26%) had positive things to say about the college. There were four subcategories of positive comments:

- Subcategory 1: Goal achievement
  Some students thanked the college for helping them achieve their educational goals. Students in this group had a variety of goals: preparing for transfer to a four-year university, completing one course or a few courses for a degree pursued at another institution, completing a class needed for teacher certification, or simply updating their skills.

- Subcategory 2: Encompassing positive experience

Some students declared explicitly that they had a positive experience at PGCC. In some cases, students praised the institution as a whole without providing further details. In other cases, students detailed specific aspects that they valued at the college, including their classes, the service received, the broad range of programs, and the flexible schedule.

- Subcategory 3: Positive experiences with faculty
  Some students emphasized their positive experiences with faculty. Students in this group thanked PGCC faculty for believing in them, for helping them achieve their educational and career goals, and for assisting them with specific course challenges and skills.

- Subcategory 4: No complaints
  Some students simply declared or implied that they had no complaints about their experience at PGCC. Students in this group used words such as "fine," "OK," and "fair" to characterize PGCC and/or their experience at the college. In some cases, students clarified that it was external reasons or personal problems, rather than something to do with the institution itself, which led to a temporary break in college attendance.

Main Category: Lack of College responsiveness

Over a quarter of those who responded to the open-ended question (28%) were not satisfied with the level or the quality of support they received at the college. In some cases, students complained about the customer service received at the college. In others, students expressed a need for greater empathy, additional help, or stronger guidance as they negotiated the challenges of their academic and personal lives. There were four subcategories of comments about the lack of college responsiveness:

- Subcategory 1: Problems with academic advising
  Some students complained about their experience with academic advising. Students expressed dissatisfaction with what they perceived as unfriendly staff and long waits. They also complained about having received incorrect advice as well as inconsistent advice from different advisors. Finally, students regretted having received insufficient guidance, with negative consequences down the road.

- Subcategory 2: Problems with financial aid
  As it happened with academic advising, some students were dissatisfied with what they perceived as unfriendly staff and long waiting times in the financial aid office. Others complained about insufficient guidance regarding the application process, eligibility criteria, and funding opportunities. In addition, students complained about not having received proper notification regarding important requirements and deadlines. Finally,

students perceived a lack of empathy and leniency towards those facing difficult life circumstances.

- Subcategory 3: Problems with faculty
  Some students complained about their experiences with faculty. Students expressed dissatisfaction with what they perceived as a lack of connection between students and faculty. In their view, some faculty members knew the materials but did not know or did not care enough about their students. Students complained also about insufficient support and guidance with in-class learning and take-home assignments. Finally, some students who struggled with academic or personal problems expressed a need for greater empathy and understanding from instructors.

- Subcategory 4: General problems with college responsiveness
  Some respondents complained about poor customer service and inadequate support for students in specific areas outside of academic advising, financial aid, or the classroom. Others felt that the problems with college responsiveness were systemic and thus exceeded a particular group of people or a specific department.

Main Category: Lack of Course availability

Almost 13% of those who responded to the open-ended question had suggestions and complaints about course availability. There were two subcategories of comments about course availability:

- Subcategory 1: Locations, times, days, and frequency
  For some students, it was a problem that classes were not available at specific locations, at specific times (especially in the evening), or on specific days to better fit their schedule. Other students expressed frustration at the fact that courses required for their programs were not offered regularly, which unnecessarily extended the time needed for completion. Students who expressed concerns about course availability often mentioned these problems in reference to upper-level courses or courses needed in the later stages of their programs.

- Subcategory 2: More online or hybrid courses
  Some students expressed an interest in greater availability of online or hybrid courses. It is important to note that within the whole group of comments about course availability, comments referring specifically to online or hybrid courses were in the minority.

Main Category: Affordability

Close to 8% of those who responded to the open-ended question were concerned about college affordability and most of them expressed a need for greater financial assistance. In particular, students were interested in grants, scholarships, and work/study options. Some of these comments reflect a need for better information and guidance about available financial aid opportunities and the process of applying for grants and scholarships. Some students may not be aware of the competitive nature and stringent requirements often associated with the disbursal of grant funds.

Summary and next steps

Since 2001, PGCC has surveyed non-returners, defined as those credit students who had attended classes in the Spring but did not re-enroll the following Fall. However, the College had approached the survey more as a mandatory reporting requirement than as an intentional effort to collect actionable data.

In 2011, OPAIR conducted an analysis of the typical student flow at PGCC as background research for that year's Non-Returner Survey. This analysis showed that 5,000 to 6,000 students enrolled in the Spring typically leave the following Fall. Interventions which might retain even 10-20% of the 6,000 potential non-returners would result in a 4-8% increase in Fall enrollments. Furthermore, aiding students who are at risk of exiting across these two semesters would likely have an impact on completion rates as well.

In order to learn more about non-returners, OPAIR adopted a new methodology to conduct the 2011 Non-Returner Survey. The new methodology dramatically increased the response rate from the low single digits to 15.4%. Furthermore, the survey produced high-quality data as shown by the high proportion of students completing the survey and providing detailed comments in response to the open-ended question. The new methodology had the additional advantage of saving resources when compared to the traditional method of sending repeated mailings to a subset of non-returners.

By ensuring high student participation and engagement with the survey, the new methodology produced a wealth of information about non-returners' experiences with academic and nonacademic services. In addition, the survey helped to identify major hurdles and constraints faced by these students, which could inform interventions to reduce the non-returner rate. The ensuing follow-up actions were proposed:

1. Focus on removing barriers in those areas identified by most students as "major reasons" for not returning, including assisting students in applying and staying eligible for financial aid, helping students experiencing lack of academic progress, and improving nonacademic services.

2. Improve internal communication and customer service to make the college more "responsive" to student issues and concerns.
3. Reach out to students before they leave. The Non-Returner Survey focuses on students who have already stopped attending the College, at least temporarily. As a complement, an "intervention survey" should be conducted in the Spring to identify those students who are considering not returning, connect them with College services, and remove barriers to their continued enrollment and success.

Title: Testing Differences: Contrasts in group perceptions of mission and identity

Presented: North East Association for Institutional Research (NEAIR) Annual Conference, Bethesda, Maryland, November 3-6, 2012.

Authors: Ellen Boylan, Ph.D., Marywood University, Scranton, PA and Kim Pavlick, Ph.D., The University of Scranton

Introduction

Effective assessment of perceptions of stakeholders about college mission and identity provides insight into whether an institution's vision and purpose are being realized. Perceptions of staff, students, and faculty of their university can influence how fully each group engages in their community (Ferrari and Velcoff, 2004). This research addresses the need to go beyond the frequently-studied student population and measure faculty and staff groups on their perceptions of an institution's effectiveness in achieving overarching goals. This is especially important since it is those individuals who realize the seemingly esoteric goals of the institution in the practical contexts of their work on campus.

The purpose of this research is to measure the perceptions of institutional mission of two groups, staff and faculty, at two universities and assess performance based on individual results and by a comparison of outcomes by institution and by demographic characteristics. The research is described in two phases. The first covers the research design and administration of the instrument, data collection, and preliminary analysis of results. That work was previously presented in a Workshare session at the North East Association of Institutional Research (NEAIR) Conference 2011. The second phase consists of additional analysis of data and a discussion of results and implications.

The research is in part framed by the theory of the two-step flow of communication (Katz & Lazarsfeld, 1955). It examines whether the mission and identity of the institution is being communicated adequately by leadership to constituents by virtue of the goals and programs the institution pursues and whether that is discernible in data obtained on relevant perceptions of staff and faculty. Results reported here help to illuminate how opinion leaders influence reception of the message of mission and identity by audiences of staff of faculty and what existing or proposed programming is perceived as supporting mission and identity.

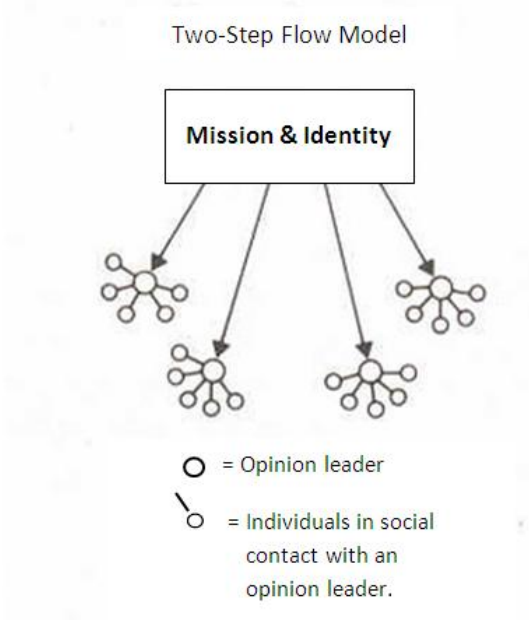


Figure 1: Reimagined *Two-Step Flow Model* for the purposes of the current research

This research is also informed by Engagement Theory (Kuh, G.D., Pace, C.R. & Vesper, N, 1997). Findings from research on student engagement suggest that what an institution *is*, its profile, matters less than what it *does*, for example, in instruction, programming and campus interactions. Engagement theory holds true for faculty and staff, as well, in that their perceptions of mission and identity are influenced not just by static words or published

assertions, but by the active commitment and initiative they observe in the surrounding university environment.

Mission statements of institutions often include similar purposes and constructs, but the interpretation and practical applications by campus are unique and affect groups differently. Therefore, it can be expected that not all campus constituencies will share the same perceptions of purpose and identity, so this research intends to elucidate whether and to what extent differences by group do exist. There has been previous research using the DMV Inventory with a student sample at a single institution (Ferrari et al., 2009), but this is the first study to conduct a quantitative assessment of faculty and staff perceptions of mission at two different religiously-affiliated universities in eastern United States.

This quantitative research involved data collection on perceptions of mission and identity of staff and faculty at two private, religiously-affiliated postsecondary institutions and subsequent analysis of results by institution and between institutions. Data was obtained by administering the DePaul Mission and Values Inventory (DMV) to the two groups. Analysis of results lends perspective to understanding current perceptions within institutions and the extent and nature of differences between groups and institutions. The discussion sheds light on the impact of institutional initiatives around mission and identity on perceptions of constituents and aids our understanding of how community cohesiveness on campus relative to goals might be enriched.

Background

Content analysis of mission statements by Abelman & Dalessandro (2009) reveals similar themes across many institutions, as well as the consistent use of what the researchers call

"visionary" terminology. Despite similarities, a variety of approaches, both strategic and programmatic, are taken by institutions to carry out mission imperatives. In the same way, even though many characteristics and goal statements of identity and mission at the institutions in this study are similar, this research investigates whether differences exist in perceptions of their separate constituencies. Consider the finding of Borne et al. (2000) that institutions that clearly articulate their missions are more effective at strategic planning. If so, the appearance in this research of differences in perceptions between the institutions may perhaps be accounted for by programs and activities related to strategic plans, which are essentially derived from institutional mission statements.

Research suggests that maintaining identity can be positive for an institution of higher education (Estanek, James & Norton, 2006). A longitudinal study of 824 private colleges from 1975 to the present found that religious colleges are more likely to survive than secular institutions (Porter and Ramirez, 2009). Administrators are taking notice. For example, at the 2009 conference of the Association of Catholic Colleges and Universities (ACCU), the focus of presidents gathered there was on two issues they believe most important to their institutions today: the United States economy and its impact on students and the Catholic identities of their institutions (Ziegler, 2009). Thus, administrators of Catholic institutions understand the importance of communicating and sustaining the mission and identities of the institutions they serve.

Morphew and Hartley (2006) point out that mission, regardless of an institution's affiliation, helps distinguish institutional imperatives and has the capacity to inspire and

motivate those within to communicate its characteristics, values and history to key external constituents. “Ultimately, the life force of any institution is its mission” (Scott, 2006).

Estanek, James, and Norton (2006) said the optimum way to assess mission and identity in higher education is “best grounded in the mission of the individual institutions” (p. 205). Mission statements from a host of colleges across the nation were examined using content analysis. It was concluded that, since mission statements firmly convey the goals and objectives of a postsecondary institution, they could appropriately be employed as bases for assessing the presence of mission and identity within the community and programs of institutions. Prior research recommends that institutions communicate mission via administrative operations, student services, academic programs and student services (Ferrari and Cowman, 2004).

One instrument being used to study mission and identity is the Mission and Values Inventory, which was developed by researchers at DePaul University in Chicago. Initially, Ferrari and Velcoff (2006) surveyed more than five hundred staff members there and found the majority of those surveyed understood DePaul’s mission, Catholic values, and mission-driven activities. Results also indicated that the majority of staff members surveyed believed that institutional mission is conveyed throughout the institution via the administration, academics, policies, and student services (Ferrari and Velcoff, 2006).

Assumptions and Limitations

It is assumed that the DMV Inventory is an effective tool for obtaining reliable data on faculty and staff perceptions of mission and identity at postsecondary institutions. It is further assumed that employing a subset of mission and identity-focused questions from the DMV and not the entire inventory will nonetheless generate sound results adequate to the purposes of

this research. It should be noted that a limitation of the DMV is that some items pose two questions in one statement. Despite many similarities in the institutional characteristics and mission statements of the colleges involved in the study, it is assumed that some differences in group perceptions do exist and are discernible using the methodology proposed.

This research is limited to a sample of two postsecondary institutions. Each institution is religiously-affiliated, although with different orders of religious. Survey participants were limited to faculty and staff at the institutions, so no comparative student data was obtained. Additionally, the medium of communication to prospective respondents was limited at one university to a single email message distribution to faculty and staff and did not allow for distribution of any follow-up or reminder message. The survey administration was electronic, only, limiting the survey distribution to only those with ready access to a computer.

Importance

This research contributes to scholarship in the areas of institutional mission effectiveness, strategic planning, program assessment and engagement. Assessing perceptions of mission and identity by these groups can give evidence to affirm or discount the assertions by Borne et.al (2000) that institutions clearly articulating their missions are more effective at strategic planning and at planning for growth and enhancement of the institution (Amis et.al, 2000, Detomasi, 1995).

The study yields data on staff and faculty groups from institutions in the eastern region of the nation. Previously, only institutions in the Midwest had been investigated using portions of this instrument. Additionally, results of this research are able to inform accreditation and strategic planning reporting needs of the institutions in the study in new ways by providing

institution-level data of a kind not previously available on mission effectiveness in postsecondary education. The procedure for this study can be imitated by other institutions for accreditation purposes, as well. Lastly, findings of this study provide insight on the potential local and regional impact of university staff and faculty who carrying forward in their lives at work and in the greater community the positive behaviors and attitudes embodied in the missions of their institutions.

Methodology

The methodology for this research is quantitative and the instrument used to gather data is the DePaul Mission and Values Inventory (DMV) developed by Ferrari and Velcoff, (2006). Sixteen question items (Appendix A) were drawn from the 39-item DMV Inventory and administered to the sample. Demographic items were added by the researchers (Appendix B).

The instrument was administered online in spring 2011 to faculty and staff groups using the Survey Monkey online survey platform. The invitation to participate was delivered to employees at both campuses via campus email that contained the link to the online Survey Monkey site. At the conclusion of the administration, data were obtained from the password-protected Survey Monkey account of the researchers and loaded into SPSS for later analysis.

Procedure

- Select two "like" institutions for the study
  - populations
  - mission statements
- Target employee samples (by position)
  - Faculty
  - Staff
- Customize the DePaul Mission and Values Inventory (DMV)
  - Use a Likert response mode 1-7
  - Select only mission and identity items (16) for use from all DMV items (39)
- Distribute invitation via employee email
- Administer online using *Survey Monkey* https://www.surveymonkey.com/s/DGNJ3BF
- Analyze results using SPSS

All part-time and full-time members of the staff and faculty (*n*=2,021) at both institutions were invited to participate in the study via an email invitation containing a web link to the survey, available on the Survey Monkey platform. The survey requested that respondents rank the 16 mission and identity-related items according to a 7-point Likert scale ranging from *strongly agree* to *strongly disagree*. Mean scores were produced by item. Artificial constructs were created on an a priori basis to allow comparison of construct means by institutions and groups using more robust factor scores.

Participants

The survey population consisted of all full-time and part-time employees of University A (n = 870) and University B (n = 1,151). There were 364 respondents to the survey, signifying an 18 percent response rate overall. The distribution of the 364 respondents by institution is University A, *n* = 206 (24 percent) and University B, *n* = 158 (14 percent).

Data

Prior to performing frequency analysis, data were reverse coded on responses according to the DMV Inventory scale of 1=strongly agree, 7=strongly disagree to 1=strongly disagree to 7=strongly agree. This would parallel our cultural inclination to perceive higher scores as "strong" and lower ones, "weak." Therefore, results showing higher means by item would indicate better performance relative to lower means. Frequency analysis indicated that the distribution of respondents by position at both institutions was 54 percent staff and 44 percent faculty, with 2 percent unknown. Employment status of respondents is 86 percent full-time and 14 percent part-time. By gender, 69 percent of respondents are female and 31 percent are male. Just 3 percent of respondents are non-Caucasian

Table 1: Demographic characteristics by institution

Characteristic	A (N = 206) %	B (N = 158) %
Position		
Faculty	44	44
Staff	54	54
Other/Unknown	2	2
Employment Status		
Full-time	88	83
Part-time	12	17
Gender		
Female	73	63
Male	27	37
Race/Ethnicity		
Hispanic	1.9	1.3
Asian	1.9	0.6
Black	0.5	0.6
Native Hawaiian or other Pacific Islander	0.0	1.3
White	94.7	96.2
Two or more	0.5	0.0
Unknown	0.5	0.0

Analysis and Results

In the first phase of analysis for this research, tests were conducted to explore differences between mean scores by item. Also, factor analysis was performed on the data and no resulting constructs were observed. However, artificial “theme constructs” were created on an a priori basis by the researchers by assembling questions into three theme areas: Mission Perception, Identity Perception and Programs. The intent was to allow for more robust analysis by using “theme construct” means that had been created from the aggregated results from the several items comprising each of the Mission Perception (Table 1), Identity Perception, and Programs theme areas. Mean scores for theme constructs by institution and position were also produced (Table 1b).

Table 1: “Mission perception” means by position and institution

Item	Faculty		Staff		All	
	A	**B**	**A**	**B**	**A**	**B**
I believe that *(institution)*…						
-is innovative.	5.14	4.97	5.30	5.11	5.23	5.04
- is inclusive.	5.81	5.24	6.10	5.22	5.96	5.23
- takes risks that are consistent with its mission and values	5.17	4.63	5.41	4.85	5.32	4.75
- is pragmatic, grounding education in the realities of everyday life.	5.67	5.43	5.68	5.40	5.69	5.44
-mission and values are visible to all.	5.90	5.47	5.84	5.45	5.89	5.48
I support…						
-our current approach to fostering leadership potential of individuals.	5.51	5.21	6.00	5.16	5.80	5.19

Table 1b: Comparison of “Mission Perception” means by institution

A (n=187)	**B** (n=145)	**All** (n=332)
5.66	5.19	5.45*

**p<.01*

In a second phase of analysis for this research, tests were performed to investigate differences between subject groups using an ANOVA statistic. According to Ploutz-Snyder (2005), “one can apply the ANOVA statistic to answer fairly complex questions about differences between and within groups, over time and across multiple conditions.”

Mean scores were determined for each DMV item for all responses, as well as by institution (Table 2), institution by gender, and institution by gender and position (faculty versus staff). The ANOVA test was performed using DMV item mean scores as dependent variables and “institution,” “gender” and “position” as independent variables. The data indicate that faculty and staff share strong agreement that their institutions are inclusive and foster leadership potential. Additionally, faculty and staff *strongly agree* that the heritage of their institutions is evident and that a variety of services from campus ministries are offered.

Significant differences are seen in male and female perceptions of mission and identity, and there are significant differences between part-time and full-time employees on perceptions of inclusiveness.

Table 2: Item means by institution

	DMV Inventory Item	A (N=208)	B (N=162)	
7	Atmosphere that fosters mutual understanding and respect	5.89	5.30	***
8	Care for each community member	6.03	5.55	***
9	Innovation and pursuit of new and effective approaches	5.23	5.01	
10	Inclusive: provide access for all	5.96	5.21	***
11	Risks consistent with mission and values	5.32	4.71	***
12	Pragmatic: grounded in realities of everyday life	5.69	5.42	
13	Mission and values are visible to all	5.89	5.46	**
14	Religious heritage remains relevent	6.03	5.82	
15	Support institution's approach to expressing identity	5.83	5.38	***
16	Fostering leadership potential of individuals	5.80	5.17	***
17	Freely examine religious and secular value systems	5.58	5.28	*
18	Curricula express Catholic identity	5.76	5.35	***
19	Support approach to expressing Catholic identity	5.70	5.51	
20	Campus Ministry provides a variety of services and programs	6.32	5.90	***
21	Demonstrates connectedness to the global community	6.20	5.76	***

*p<.05 **p<.01 ***p<.001; DMV response mode 7= Strongly Agree 1=Strongly Disagree

The data show agreement between female and male respondents on perceptions of an atmosphere of respect, fostering leadership, and promoting connectedness to a global community. However, females perceive greater inclusiveness, caring, and availability of campus ministry services, while males perceive risk-taking is consistent with the mission and agree more strongly that the mission is visible to all. Not surprisingly, results indicate that part-time staff members are significantly different in their perception of inclusiveness of the community.

Table 3: Means by institution and gender

	DMV Inventory Item	A		B		
		Female (N=152)	Male (N=55)	Female (N=100)	Male (N=59)	
7	Atmosphere that fosters mutual understanding and respect	5.88	5.91	5.24	5.38	***
8	Care for each community member	6.08	5.87	5.51	5.63	**
9	Innovation and pursuit of new and effective approaches	5.34	4.91	5.25	4.59	*
10	Inclusive: provide access for all	6.04	5.70	5.26	5.09	***
11	Risks consistent with mission and values	5.36	5.21	4.96	4.26	***
12	Pragmatic: grounded in realities of everyday life	5.73	5.57	5.62	5.09	*
13	Mission and values are visible to all	5.90	5.85	5.56	5.27	*
14	Religious heritage remains relevent	6.17	5.62	5.98	5.55	**
15	Support institution's approach to expressing identity	5.92	5.57	5.59	5.00	***
16	Fostering leadership potential of individuals	5.86	5.63	5.33	4.89	***
17	Freely examine religious and secular value systems	5.70	5.24	5.38	5.09	*
18	Curricula express Catholic identity	5.90	5.35	5.60	4.93	***
19	Support approach to expressing Catholic identity	5.88	5.19	5.76	5.09	***
20	Campus Ministry provides a variety of services and programs	6.45	5.96	6.11	5.54	***
21	Demonstrates connectedness to the global community	6.29	5.94	5.93	5.45	***

*p<.05 **p<.01 ***p<.001; DMV response mode 7= Strongly Agree 1=Strongly Disagree

The results indicate that mean responses to DMV items differ, despite similar institutional characteristics, by institution and by "theme constructs." Mean differences observed between institutions by "theme constructs" are significant for Mission Perception (p<.01), Identity Perception (p<.01), and Programs (p<.00).

There are also differences in mean perception scores by respondent position (staff versus faculty) for institutions overall. Gender differences are observed on mean scores within and between institutions (Table 3). Finally, mean scores for DMV items differ by institution by gender and position (Table 4).

Discussion

These results conform to the principles of the two-step flow model of communication. Based on the reimagined construction of the two-step flow model of communication (Figure 1) showing institution "mission and identity" as the medium of communication, it is observed in these results that the institution, or "opinion leader," influences perceptions of mission and

identity by the research subjects, here the faculty and staff, in distinct ways that result in observed differences between institutions, in some cases, to significant levels.

Table 4: Item means by institution by gender and position

	DMV Inventory Item	A				B				
		Female		Male		Female		Male		
		Faculty (N=54)	Staff (N=96)	Faculty (N=36)	Staff (N=16)	Faculty (N=39)	Staff (N=59)	Faculty (N=32)	Staff (N=25)	
7	Atmosphere that fosters mutual understanding and respect	5.92	5.84	5.81	6.08	5.34	5.16	5.50	5.21	*
8	Care for each community member	6.20	6.00	5.97	5.77	5.31	5.60	5.77	5.46	*
9	Innovation and pursuit of new and effective approaches	5.36	5.31	4.77	5.23	5.06	5.40	4.70	4.42	
10	Inclusive: provide access for all	5.90	6.11	5.68	6.00	4.91	5.46	5.50	4.58	***
11	Risks consistent with mission and values	5.20	5.43	5.13	5.31	4.86	5.02	4.20	4.32	**
12	Pragmatic: grounded in realities of everyday life	5.80	5.68	5.45	5.69	5.77	5.49	4.97	5.13	*
13	Mission and values are visible to all	5.92	5.87	5.87	5.62	5.53	5.56	5.30	5.17	
14	Religious heritage remains relevent	6.10	6.21	5.45	6.00	5.74	6.11	5.57	5.50	*
15	Support institution's approach to expressing identity	5.74	6.01	5.48	5.85	5.24	5.78	4.77	5.26	***
16	Fostering leadership potential of individuals	5.59	5.99	5.37	6.08	5.39	5.27	4.93	4.83	***
17	Freely examine religious and secular value systems	5.48	5.80	5.03	5.85	5.21	5.47	4.87	5.38	*
18	Curricula express Catholic identity	5.74	5.98	5.23	5.62	5.41	5.69	4.79	5.04	***
19	Support approach to expressing Catholic identity	5.72	5.95	5.06	5.69	5.50	5.89	4.80	5.42	***
20	Campus Ministry provides a variety of services and programs	6.40	6.47	5.68	6.38	5.82	6.28	5.50	5.58	***
21	Demonstrates connectedness to the global community	6.36	6.24	5.71	6.38	5.71	6.05	5.47	5.42	***

*p<.05 **p<.01 ***p<.001; DMV response mode 7= Strongly Agree 1=Strongly Disagree

With regard to Engagement Theory (Kuh et al., 1997), differences observed in the results of this research by institution on the Programs theme construct concur with findings from many years of research using the National Survey of Student Engagement (NSSE, http://nsse.iub.edu/html/reports.cfm). This research suggests that campus programs, as described in the language of the DMV items, do have an effect on respondent perceptions of institutional initiatives and that they can differ by institution; however, caution is advised is interpreting the results due to the research having been limited to two institutions.

Further research in the domain of qualitative methodology is suggested as a means to investigate the cause of disparity in results by gender. Also, content analysis can be utilized to

explore the relative differences in emphasis on individual constructs in the texts of the institutions' mission statements and linked conceptually to the quantitative results obtained here so deeper understanding of the dynamics at work at each place can be understood. The quantitative results can be used to assess how strongly faculty and staff perceive the communication of mission on campus and which areas need to be strengthened. Comparison of these results can also be made with available data on student perceptions from engagement studies like the National Survey of Student Engagement (NSSE) and the Higher Education Research Cooperative (HERI) College Student Beliefs and Values study conducted in 2004, to observe how employees groups compared to student groups on their perception of constructs. Another compelling investigation would be a comparison of results by institutions in different regions of the country, since data from both eastern and mid-western schools is available. Results can also inform policy and programming recommendations made to leaders of member schools by the Catholic Higher Education Research Cooperative (CHERC) and the Association of Catholic Colleges and Universities (ACCU).

A worthy endeavor of the leadership of any college or university is to affirm in context and programs the presence of a strong and current mission statement and sense of identity. Responding actively to outcomes of research on campus perceptions of the environment will foster stronger affiliation with mission and identity and bring together the campus community in fruitful action that creates a rich and positive place of work and learning for all.

Author Biography: Ellen Boylan, Ph.D., is Director of Planning and Institutional Research at Marywood University, Scranton, Pennsylvania. Kim Pavlick, Ph.D., is Assistant Professor of Communication at the University of Scranton, Scranton, Pennsylvania.

References

Amis, J., Slack, T., Hinings, C.R. (2002). Values and organizational change. *The Journal of Applied Behavioral Science,*38,436-465. Doi:10.1177/002188602237791.

Bourne, B., Gates, L., Cofer, J. (2000). Setting strategic directions using critical success factors. *Planning for Higher Education,* 28, 10-18.

Detomasi, D. (1995). Mission statements: One more time. *Planning for Higher Education, 24,* 31-35.

Dwyer, J. & Zech, C. (1998). American Catholic higher education: An ACCU study on mission and identity, faculty development, and curricular revision. *Current Issues in Higher Education, 19* (1), 3-32.

Estanek, S. James, M. & Norton, D. (2006). Assessing Catholic Identity: A study of mission statements of Catholic colleges and universities. *Catholic Education: A Journal of Inquiry and Practice, 10* (2), 199-216.

Feldner, S. N (2006). Living our mission: A study of university mission building. *Communication Studies, 57* (1), 67-85. doi:1199313561

Ferrari, J.R., Cowman, S., Milner, L., Gutierrez, R., & Drake, P. (2009). Impact of school sense of Community within a faith-based university: Administrative and academic staff perceptions on institutional mission and values. *Social Psychology of Education,12,* 515-528. doi: 10.1007/s11218-009-9093-3

Ferrari, J.R. & Guitierrez, R. E. (2010). Passing the torch: Maintaining faith-based traditions during transition of leadership. *Education, 131,* 64-72.

Ferrari, J.R., McCarthy, B.J., & Milner, L.A.(2009). Involved and focused? Students' perceptions of the institutional identity, personal goal orientation, and levels of campus engagement. *College Student Journal, 44,* 886-896.

Ferrari, J. & Velcoff, J. (2006). Measuring staff perceptions of university identity and activities: The mission and values inventory. *Christian Higher Education.* Retrieved www.informaworld.com/index/759221666.pdf

Gallin, A. (2001). *Negotiating identity: Catholic higher education since 1960.* Notre Dame, IN: University of Notre Dame Press.

Hellwig, M.K. (2004). Evaluating the mission and identity of a Catholic college or university. *In Association of Governing Boards of Universities and Colleges, Association of Jesuit Colleges and Universities, and Association of Catholic Colleges and Universities, Mission and identity: A handbook for trustees of Catholic colleges and universities* (pp. 45-52). Washington, DC: Author.

Higher Education Research Institute (HERI). Spirituality in higher education: A national survey of college students' search for meaning and purpose. Retrieved http://spirituality.ucla.edu/

Inside Higher Education (2009). Spiritual accountability. Retrieved from http://www.insidehighered.com/layout/set/pri...assessment/01/02/2007/News

Katz, E. & Lazarsfeld, P. (1955). *Personal Influence*. New York: The Free Press.

Kuh, G.D., Pace, C.R. & Vesper, N. (1997). The development of process indicators to estimate student gains associated with good practices in higher education. *Research in Higher Education, 38*: 435-454.

Morphew, C. & Hartley, M. (2006). Mission statements: A thematic analysis of rhetoric across institutional type. *The Journal of Higher Education, 77* (3), 456-461. doi:10.1353/jhe.2006.0025

National Survey of Student Engagement. *NSSE Findings*. Retrieved http://nsse.iub.edu/html/reports.cfm.

Peck, K. & Stick, S. (2008). Catholic and Jesuit identity in higher education. *Christian Higher Education, 7* (3), 200-225. doi:10.1080/15363750701818394

Ploutz-Snyder (2005). Analysis of variance applications in institutional research. In Coughlin, M.A. (Ed.), *Applications of Intermediate/Advanced Statistics in Institutional Research*, The Association for Institutional Research (16), 51-88.

Porter, S. & Ramirez, T. (2009). Survival of the wealthiest. *Inside Higher Education.* Retrieved from http://www.insidehighered.com/layout/set/print/news/2009/04/17/closing.

Scott, J.C. (January/February 2006). *The Journal of Higher Education, 77* (1), 1-39. http://www.jstor.org/stable/pdfplus/3838730.pdf?acceptTC=true

Stripling, J. (November 17, 2010). The Catholicity Test. Retrieved from *Inside Higher Education*. http://www.insidehighered.com/layout/set/print/news/2010/11/17/catholic

Ziegler, J. (2009, February 27). Economic crisis, Catholic identity are top concerns of college presidents. *The National Catholic Register*. Retrieved from http://www.ncregister.com//site/print_article/17443.

APPENDIX A
DePaul Mission and Values (DMV) Inventory
Institution Identity Scale

Please rate the items below according to this scale: 1=strongly disagree to 7=strongly agree

1. I believe that at _____ our very diverse personal values and religious beliefs contribute to an atmosphere that fosters mutual understanding and respect.
2. I believe that we manifest personalism by our care for each member of the university community.
3. I believe that _____ University is innovative. We are never content with maintaining a "business as usual" approach. Our efforts are marked by innovation and single-minded pursuit of new and effective approaches to meet the needs of our students, society and the educational marketplace.
4. I believe that _____ University is inclusive. We provide access for all to higher education regardless of class, race, religion, sexual orientation, disability, ethnicity or economic barriers. The university community is welcoming and draws great strength from its diversities.
5. I believe that _____ University takes risks that are consistent with its mission and values. Historically the university has always stepped outside of tradition and beyond "status quo" approaches, encouraging and demonstrating an adventurous and entrepreneurial spirit. The measure of our success has always been the measure of our risks.
6. I believe that _____University is pragmatic grounding its education in the realities of everyday life. Through its curricula and through the delivery of its programs and services, the university offers students practical solutions to their needs for higher education, career advancement and personal growth.
7. I believe that _____ University's mission and values are visible to all. Its education and operations are grounded in values of service, respect, justice, holistic education and creating quality educational opportunities especially for the underserved and disadvantage in our society.
8. I believe that our religious heritage remains relevant to the university today.
9. I support our current approach to expressing its identity.
10. I support our current approach to expressing its fostering the leadership potential of individuals.
11. I believe that our university invites all inquirers to freely examine Catholicism, other faith traditions and other secular values systems in light of their respective contributions to the human enterprise.
12. I believe that the curricula at our schools and colleges have appropriate expressions of the university's Catholic identity.
13. I support my institution’s current approach to expressing its Catholic identity.
14. Campus Ministry provides a variety of services and programs designed to serve the University community and enhance the institution's Catholic identity.
15. The University sponsors a variety services and programs to demonstrate the connectedness to the global community.

APPENDIX B

Demographic Items

Faculty and Staff Perception of Institutional Mission and Identity

1. What is your status?

- ☐ Faculty
- ☐ Staff

2. What is your current employment status?

- ○ Full time
- ○ Part time

3. What is your gender?

- ○ Female
- ○ Male

4. Are you Hispanic or Latino?

- ○ Yes
- ○ No

5. Please indicate the racial/ethnic group with which you identify (select one or more).

- ☐ American Indian/Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or other Pacific Islander
- ☐ White

***6. Please identify the institution that employs you.**

- ○ Marywood University
- ○ The University of Scranton

USING INTERNAL MARKET RATIOS TO DETECT GENDER DIFFERENCES IN FACULTY SALARIES

Chunmei Yao, Ed. D.
Associate Director of Institutional Research
Office of Institutional Assessment & Effectiveness
SUNY College at Oneonta

Discipline and market are two related factors that are frequently used in the evaluation of faculty salary equity at colleges and universities (Balzer, et al., 1996; Haignere, 2002; Luna, 2007; Moore, 1992). Although it is assumed that the variation of market factors should be responsible for explaining differences in faculty salaries, this assumption has not been tested yet (Bellas, 1994). In general, salary differences across disciplines are considered as market neutral by AAUP and CUPA (Bellas, 1997; Haignere, 2002). The observed differences in faculty salaries at large are not considered a result of gender discrimination, but rather the effect of market factors; specifically, the supply of qualified faculty relative to the demand for their work and service by employers (Bellas, 1997; Semelroth, 1978; Waldauer, 1984).

For decades, market factors have had great impact on differentiation of faculty salaries across disciplines at colleges and universities. Since the 1980s, differences in faculty salaries across disciplines have increased, especially in disciplines related to Business/Economics and Engineering. According to *the Annual Report on the Economic Status of the Profession* published by AAUP (1980-2010), using assistant professors and the discipline of English as reference groups, the proportions of average salaries in Education, Fine Arts, Foreign Languages, Communications, and Philosophy have decreased since 1980-81 (Figure 1). However, the proportion of average salaries in Business and Economics related programs has increased from

124% in 1980-81 to 187% in 2009-10, representing a 51 percent increase over the time. As a result, faculty who have taught in fields with lower market values have suffered "pay penalty." These observed differences cannot be totally explained by variances in individual characteristics (e.g., gender, race, and highest degree), professional maturity (e.g., rank and years of experience), and performance.

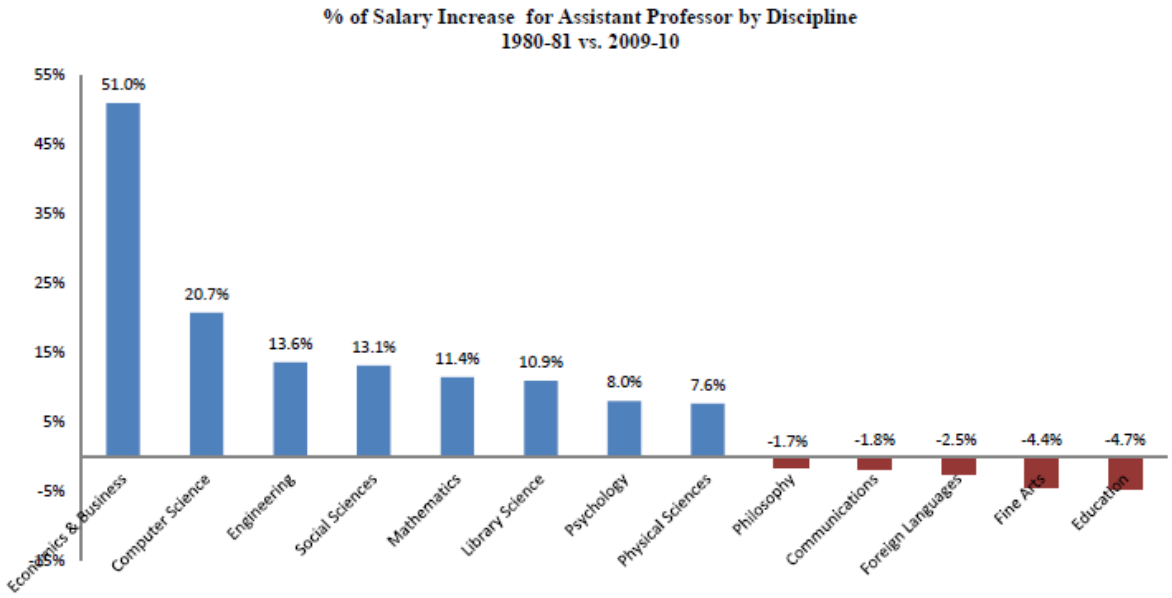


Figure 1: Percentage of Salary Change by Discipline (1980-81 vs. 2009-10)

Bellas (1994) points out that in higher education, the unequal job opportunities between male and female faculty at the entry-level position have continued, resulting in more female faculty concentrated in disciplines with relatively lower market values, such as English, Foreign Languages, Education, and Fine Arts (Barbezat, 1991; Braskmp, Muffo, & Langston, 1978; Howard, Snyder, & McLaughlin, 1993; Raymond, Sesnowitz & Williams, 1988; Semelroth, 1987). Consequently, the increase in differentiation of market values across disciplines has

further exaggerated salary differences between male and female faculty at colleges and universities.

In higher education, it has become increasingly more important to develop market factors to appropriately explain the variability of gender differences in the study of faculty salaries (Luna, 2007). Haignere (2002) stressed that at a particular institution, salary differences across disciplines should primarily reflect the result of internal salary policies, structure, and promotion aiming to reward faculty based on the quality and quantity of teaching, research, and service.

Many studies have used discipline/market factors to detect gender differences in faculty salaries. Some have used internal discipline/market factors to represent salary differences across disciplines (Braskamp & Johnson, 1978; Haignere, 2002; Reagan & Maynard, 1974). Others have contended that external market factors do affect departmental salary differences (Ballas, 1997; Bereman & Scott, 1991; Braskamp, Muffo & Langston, 1978; Raymond, Sesnowitz, & Williams, 1988). These studies have used the average salaries of newly hired assistant professors or disciplinary ratios obtained from national salary databases (e.g., AAUP or CUPA) to reflect pricing mechanism and competition at a specific discipline across institutions nationwide (Duncan, Krall, Maxcy, & Prus, 2004; Luna, 2007). However, the study conducted by Braskamp & Johnson concluded that the external market factors did affect salary differences across disciplines, but the relationship was not high when compared to the importance of internal market factors (1978).

In studying faculty salaries at a particular institution, it seems preferable to use internal market factors to represent salary differences across disciplines because only internal market factors can fully reflect the local salary structure within that institution (Haignere, 2002; Koch &

Chrizmar, 1996). The more accurate the market factors reflect the salary structure and practice at the institution, the more reliable is the measure of market influence on faculty salaries (Reagan & Maynard, 1974).

Regression Model

Many institutional researchers have used different approaches to code disciplinary variables in regression, which were used to determine whether gender differences in faculty salaries can be appropriately explained by market/disciplinary factors after controlling other predictor variables. However, there is still a debate in higher education on methods of coding market/disciplinary variables in regression analysis. Two commonly used approaches are the dummy model and the market model.

Dummy model. The dummy model is the most commonly used method, which creates a set of dummy disciplinary variables in order to explain salary differences across disciplines. The dummy model is represented by L. Haignere (2002) in *Paychecks: A Guide to Conducting Salary-Equity Studies for Higher Education Faculty* and strongly recommended by the American Association of University Professors (AAUP). In the dummy model, disciplinary variables are coded as dummy variables with one discipline serving as a default group. The goal is to minimize the number of disciplinary variables and maximize the statistical power in regression. Because faculty salaries at the entry level have fluctuated with changing market conditions and often resulted in a wide variation across disciplines, this approach may yield more reliable results (Baker, Gibbs, & Holmstrom, 1994; Reagan & Maynard, 1974).

The dummy model is the most conservative method to detect gender differences in faculty salaries (Yao, 2012). Haignere (2002) summarizes that this approach allows the

regression to assign an appropriate value for each discipline based on faculty salaries paid in that discipline. The results can truly reflect the institution's salary rewarding structure and promotion in practice. However, the dummy approach should be used with caution because it produces a large number of degrees of freedom which may limit the statistical power, particularly in a medium and small-size institution (Luna, 2007). More important, with a large number of dummy variables used in regression, it may become more complicated to explain the statistical results to administrators and faculty who have less knowledge and experience in multivariate statistics (Yao, 2012).

Furthermore, Moore (1992) indicates that the dummy approach may not be proper to test gender differences in pay when a department has a very small number of faculty, or faculty in a department are not evenly distributed by gender. In practice, if a department has less than five faculty members, those faculty need to be grouped with another related discipline (Haignere, 2002). Moreover, since different disciplines tend to have different reward structures, using the dummy approach may not truly reflect the internal salary rewarding structure (Howard, Snyder, & McLaughlin, 1993).

Market model. Instead of using categorical variables to represent salary differences across disciplines, some studies transform categorical discipline variables into continuous variables or numerical ratios to reflect market influence on differentiation in faculty salaries. This approach attempts to explain gender differences in pay by assigning a market value or market ratio to each discipline and compare them using regression analysis.

The market ratio is defined as a ratio of the average salary for a specific discipline (numerator) divided by the average salary of all disciplines combined (denominator). Luna (2007)

explains that the market ratio measures the relative strength of salaries between a particular discipline and disciplines as a whole. A market ratio below 1.0 indicates that the average salary in that discipline is being paid below the average salary of all disciplines combined. Conversely, a market ratio above 1.0 means that the average salary in that discipline is being paid above the average salary of all disciplines combined. In practice, market ratios that fluctuate from .95 to 1.05 are considered in the normal range.

The market approach has gained wide acceptance in higher education because of its flexibility and its convenience. Using market ratios generated from the CUPA national salary database in a study of faculty salaries, Luna (2007) concluded that the market ratio was the largest contributor to explain the variance of faculty salaries. This approach is more effective and efficient than the dummy model with less political and technical confusion (Luna, 2007). However, for a relatively small institution, using external market ratios to represent internal disciplines may produce a totally different salary rewarding structure, which would mask gender differences in pay. In addition, because gender is unevenly distributed across disciplines with more women are concentrated in fields with lower market values, the market ratio itself may be involved with gender discrimination in pay.

In summary, to select market ratios, some researchers prefer to use internal market values to replace dummy coded discipline variables in faculty salaries. They argue that salary differences should primarily reflect the result of internal salary policies, structure, and promotion. Others support using external market values to truly reflect the economic competition in a particular discipline across institutions of higher education. In this study, two different market ratios, including internal market ratios and external market ratios, were created to test which type of market ratios would be the better one to detect gender differences in faculty salaries.

Methods

Data were obtained from a unionized, four-year public institution in the northeastern region. The sample included 248 full-time faculty members. Among them, the distribution of faculty in current rank consisted of 13.7% full professors, 32.7% associate professors, 43.9% assistant professors, and 9.7% lecturers. The distribution of male and female faculty was 60.5% and 39.5%, respectively. Moreover, 18.1% were minority faculty.

In this study, three regression models (i.e., dummy model, external market model, and internal market model) were developed using three different types of disciplinary variables (dummy variables, internal market ratios, & external market ratios) in regression. The dummy model assigned a set of 19 disciplines as dummy variables, with one serving as the default group. The external market model converted 20 disciplinary variables into numerical ratios using the CUPA average salaries represented in each related discipline. The internal market model transformed 20 disciplinary variables into numerical ratios using the average salaries of each discipline at the given institution. Finally, multiple regression analyses were applied to test which model was the best one to properly explain gender differences in faculty salaries.

Variables used for assessing faculty salaries were selected based on strong determination on faculty salary rewards in the literature review and availability of data in the HR salary database at the given institution. Haignere (2002) warned that predictor variables should be carefully selected and evaluated. Some variables may be potentially tainted variables (e.g., rank & tenure status) which would mask gender difference in pay; some may produce redundant information (e.g., years in current rank and years of service at the institution) because the curvilinearity may occur and affect the time-related variable, particularly at unionized

institutions (Haignere, 2002). In this study, the categorical regression analysis was applied to test whether assignment of current rank was biased. In addition, the quadratic term was used for the variable of years of service in order to solve the curvilinear issue.

The dependent variable was 9-10 month base salaries reported in October 2010 at the given institution. The predictor variables include the total number of years of service at the given institution, gender, race/ethnicity, highest degree earned, current rank, discipline, and market ratio. Disciplinary variables are coded into three different types (i.e., *k*-1 dummy variable, external market ratio, and internal market ratio).

Total number of y*ears of service.* This variable measures the professional maturity of an individual faculty member who has worked toward her/his profession. It assumes that the longer an individual faculty member has worked in her/his professional field, the higher she/he should be paid. To solve the issue of curvilinearity, the quadratic term was created and used in regression. The result showed that the quadratic term of the total number of years of service did not significantly contribute to the regression model and its unstandardized coefficient was very small; thus, it was deleted from the final model.

Gender and race/ethnicity. It should be realized that many published studies include gender but exclude race/ethnicity because there are not a sufficient number of minority faculty to reliably estimate the salary differences using statistical techniques in regression analysis (Barbezat, 2002). But ignoring race/ethnicity may mask the gender differences in pay (Haignere, 2002). These two variables were coded as dummy variables, with male and white faculty serving as the reference groups.

*Current rank***.** Current rank is a strong determinant that reflects the institutional recognition of an individual faculty member's performance based on teaching, research, and

service. Current ranks were categorized into four subgroups: full professors, associate professors, assistant professors, and lecturers and further coded as dummy variables, with the group of assistant professors serving as the reference group.

Some researchers are concerned that gender may be potentially tainted in assigning the current rank (Allard, 1984; Barbezat, 1991; Becker & Toutkoushian, 2003; Haignere & Eisenberg, 2002; Scott, 1977; Smart, 1991). To test whether assignment in the current rank was significantly different between male and female faculty, a categorical modeling analysis (i.e., multinomial modeling) was conducted. The result indicated that there was a potential bias when assigning female faculty from assistant professors to associate professors, with the odds ratio of 1.95. Even though the odds ratio was not statistically significant, it should be realized that using the current rank as a predictor variable may underestimate gender differences in pay.

Highest degree earned. This variable represents an individual's career investment in her/his profession. One dummy variable was coded, with the group of Ph.D. serving as the default group. In addition, Master of Fine Arts (MFA) was considered a terminal degree.

Discipline. This variable is used to reflect the market influence on differences in faculty salaries. It assumes that pay differences should be associated with different market values in disciplines, but should not attribute to either gender or race bias (Haignere & Lin, 2002). In this study, twenty disciplines were transformed into three different types of disciplinary variables, such as *k*-1 dummy variables, internal market ratios, and external market ratios.

Market ratio. This variable measures how well faculty at a particular discipline should be paid compared to all disciplines combined. The purpose is to reduce a large number of degrees of freedom and increase the statistical power in regression analysis. The formula is listed below:

$$\text{Market ratio} = \frac{\text{Average salary at a particular discipline}}{\text{Average salary of all disciplines combined}}$$

Table 1

Disciplinary Ranking Based on Market Ratios

Internal Market Ratios			External Market Ratios		
Ratio	Ranking	Department	Department	Ranking	CUPA Ratio
1.42	1	Business & Economics	Business & Economics	1	1.34
1.07	2	Mathematics	Biology	2	1.05
1.05	3	Chemistry	Sociology	3	1.02
1.02	4	Philosophy	Geography	4	1.02
1.02	5	Psychology	Anthropology	5	1.02
1.01	6	Education	Political Science	6	1.02
1.00	7	Human Ecology	Chemistry	7	1.01
0.99	8	Sociology	Physics	8	1.01
0.99	9	Geography	Earth Science	9	1.01
0.98	10	Biology	Psychology	10	1.00
0.97	11	Anthropology	Philosophy	11	0.98
0.97	12	History	Education	12	0.98
0.97	13	English	Communication	13	0.98
0.96	14	Music	Mathematics	14	0.97
0.95	15	Communications	History	15	0.97
0.95	16	Fine Arts	Human Ecology	16	0.94
0.95	17	Physics	Music	17	0.93
0.93	18	Earth Science	Fine Arts	18	0.93
0.92	19	Political Science	English	19	0.90
0.87	20	Foreign Languages	Foreign Language	20	0.92

Note.

1. A disciplinary ratio was calculated by using the average salary of a specific discipline divided by the average salary of all discipline combined at the given institution.

2. CUPA ratios were generated based on data obtained from College and University Professional Association for Human Resources (CUPA-HR, 2010).

In this study, two types of market ratios were developed (i.e., internal market ratios and external market ratios). The internal market ratio was calculated based on the average salaries of each discipline generated within the local institution. It reflects the local salary rewarding policies, structure, and promotion. The external market ratio was calculated based on the national average salaries by discipline published by CUPA in 2010. It takes into account the national

comparability and competition of salaries at a particular discipline across institutions of higher education. Table 1 showed the discipline rankings based on market ratios generated from the local institution and the CUPA salary database.

Three research questions were proposed: (1) which model would be the best fit in terms of adjusted R^2 and *F*-ratio, (2) which type of disciplinary variables (i.e., *k*-1 dummy, internal market ratio, external market ratio) would be better than the other two to properly explain gender differences in faculty salaries based on examining the unstandardized coefficient (*B*) and *t*-value of the gender variable, and (3) which type of market ratios largely contribute to explain salary differences.

Limitations

Even though the variable of current rank is one of the most accessible proxies for measuring professional maturity and productivities, omission of variables related to measuring faculty performances in teaching and research would affect the strength of explanation in regression analysis (Moore, 1992; Webster, 1995). In addition, three disciplines were removed because the numbers of faculty in each discipline were less than five. For fulfilling statistical requirements, these faculty members were grouped into other related disciplines.

Results

Three multiple regression models (i.e., dummy model, internal market model, & external market model) were developed and compared. The purpose is to test which model is the best to appropriately explain the gender differences in faculty salaries at the given institution. First, the adjusted R^2 and *F*-value generated from the three models were used to examine which model would be the best fit. Second, the unstandardized coefficients (*B*) and *t*-values of female were

compared to see which model would be the best to properly detect gender differences in faculty salaries. In addition, to test which type of market ratios (i.e., internal market ratio vs. external market ratios) would be better to explain faculty salaries, standard errors, *t*-values and partial correlations generated from the three regression models were compared.

To avoid multicollinearity, values of variance inflation factors (VIFs), tolerance, and condition index produced by the three models were carefully examined. The issue of multicollinearity was not found.

Model Fit

The adjusted R^2 and *F*-value generated from the three models are used to compare which model would be the best than the other two to explain differences in faculty salaries. The percentage of adjusted R^2 is used to test the loss of predictive power. It measures how much variances in faculty salaries could be accounted for by the predictor variables. The *F*-ratio is used to assess the overall fit of the regression model (Field, 2009).

Table 2

Summary of the Three Regression Models (N = 248)

Model	R	R Square	Adjusted R Square	F	Sig. F
Internal Market Model	.845	.715	.705	74.83	.000
External Market Model	.817	.667	.656	59.79	.000
Dummy Model	.852	.727	.694	22.58	.000

Note. Significant Levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

As shown in Table 2, it is clear that the internal market model produced the largest adjusted R^2 and the highest *F*-ratio, with adjusted $R^2 = .705$ and $F(8, 239) = 74.83$ ($p < .001$). The

results provided strong evidence that the internal market model was better than the other two (i.e., dummy model and external market model) to explain the differences in faculty salaries.

Gender Differences in Faculty Salaries

To examine which model would be the best to properly detect gender differences in faculty salaries, the unstandardized coefficients (*B*) and *t*-values of female faculty were examined and compared among the three models.

Table 3

Unstandardized Coefficients and t-values of Female Faculty Generated from the Three Regression Models (N = 248)

	Unstandardized Coefficients	Standardized Coefficients		
	B	*β*	*t*	*Sig.*
Dummy Model	-470.0	-.023	-.59	.554
Internal Market Model	-364.9	-.015	-.41	.680
External Market Model	461.6	.018	.48	.631

Note. Significant Levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

As shown in Table 3, although *t*-values of female faculty generated from the three models were very small and not statistically significant, it was apparent that the unstandardized coefficients of female faculty produced by the three models largely varied, ranging from -$470 to $462. The results showed that the unstandardized coefficient of female faculty produced by the internal market model was much closer to the one generated from the dummy model.

Market Ratios

To test which type of market ratios was better to explain faculty salaries using internal and external market ratios, standard errors, *t*-values and partial correlations were compared. As

shown in Table 4, the internal market ratios obtained a higher *t*-value ($t = 16.14$, $p < .001$) but a lower standardized error ($3,514) compared to the external market ratios. In addition, the partial correlation for the internal market ratios (partial $r = .722$) was much higher than the one associated with the external market ratios (partial $r = .664$), indicating that 72.2% of accounted variances in faculty salaries could be explained by the internal market ratios. As a result, the internal market ratio was the better one to explain differences in faculty salaries at the given institution.

Table 4

Unstandardized Coefficients of Market Ratios Generated from Internal and External Market Models (N = 248)

	Unstandardized Coefficients				Correlation
Discipline/Market Variable	*B*	*Std. Error*	*t*	*Sig.*	Partial
Internal Market Ratios	56722.56	3514.00	16.14	.000	.722
External Market Ratios	61870.01	4502.68	13.74	.000	.664

Note. Significant levels: *** $p < .001$, ** $p < .01$, * $p < .05$.

Conclusions

Salary differences across disciplines have been growing for decades at colleges and universities. Along with the high percentage of female faculty concentrated in disciplines with lower market values, gender equity continues to be an important issue in the study of faculty salaries. Previous studies of salary-equity have often examined relatively large datasets; however, these results cannot directly address conditions at individual institutions (Toutkoushian, 2002). Ferber and Loeb (2002) argued that even if gender differences in pay exist in higher education, the pay gap may not happen at a particular institution. Therefore, there is a continued need for studies on the issue of gender-equity in faculty salaries at institutional levels.

This study supports the premise that a single, continuous variable can be used to replace categorical discipline variables to explain variances in faculty salaries at a small-size public institution. Many studies have examined salary equity using relatively large datasets which allow applying sufficient degrees of freedom in multiple regression analyses (Haignere, 2002; Luna, 2007). However, for those relatively small institutions with few women and minority faculty members, it is difficult to run multiple regression analysis incorporated with large numbers of dummy coded disciplinary variables (Ferber & Loeb, 2002; Toutkoushian, 2002). Using market ratios to replace dummy coded disciplinary variables can properly solve this issue.

Secondly, this study demonstrates that the internal market ratio may serve as a better indicator to represent disciplinary differences in testing gender differences in faculty salaries because it truly reflects the local institution's salary rewarding structure (Balzer et al., 1996; Braskamp, Muffo, & Langson, 1978; Reagan & Maynard, 1974; Raymond, Sesnowitz, & Williams, 1988).

Internal market ratios and external market ratios are highly related with each other but apparently reflect different salary rewarding structures. As shown in Table 1, it is clear that the salary structure developed based on the internal market ratios is ranked differently from the one created by the external market ratios. For example, the discipline of Mathematics ranks top second in salary rewarding structure at the given institution, with an internal market ratio of 1.07; while the national CUPA ratios showed that salary rewarding to faculty in Mathematics ranks 14 out of 20, with a market ratio as low as 0.97. Even the discipline of Business and Economics, which is ranked as the top paying discipline in both internal and external salary structures, the values of the market ratios appear to be different (1.42 vs. 1.34). Therefore, inclusion of external

market ratios in salary studies should be carefully examined before uploading into the regression model.

Thirdly, there are no universal guidelines that can be used to determine how to conduct salary-equity studies. Although the AAUP has provided primary guidelines in *Paychecks* (Haignere, 2002) based on twelve case studies in the SUNY system, the use of dummy coded disciplinary variables to represent salary differences across disciplines have been viewed with skepticism. This approach may result in larger measurements of salary inequity (Toutkoushian, 2002). In this study, the unstandardized coefficients of female faculty generated by the dummy model and external market model were largely different (-$470 vs. $ 462), resulting in $932 difference in an absolute value. The same issue also occurred in Luna's study using a large dataset collected from multiple institutions (2007, pp. 7-8). The results may lead to a controversial conclusion that the external market approach should be used with caution compared to using the internal market model at an individual institution.

In conclusion, market factors become major sources for testing gender differences in faculty salaries. Because female faculty tend to be concentrated in disciplines with lower market values, the market ratio itself may incorporate with gender discrimination (Bellas, 1997; Moore, 1992). Thus, inclusion of market ratios in examining faculty salaries may mask the potential gender discrimination in salary rewards. If a college is a leading institution with relatively competitive salaries paid to faculty, using the external market ratios may truly represent its mission and goals of recruiting and rewarding the best faculty. However, for most medium and small-size institutions with less competitive salaries rewarded to faculty, it is evident that the internal market ratios may be better than the external market ratios in predicting gender differences in faculty salaries.

References

Allard, C. A. (1984, Fall). Assessing faculty salary equity. *The Association for Institutional Research Professional File, 20*, 1-7.

American Association of University Professors (AAUP). (1990-2011, March-April). The Annual Report on the Economic Status of the Profession. *Academe.* Retrieved on January 31, 2012 from http://www.aaup.org/AAUP/pubsres/academe/

Baker, G., Gibbs, M., & Holmstrom, B. (1994, November). The wage policy of a firm. *Quarterly Journal of Economics, 109*(4), 921-55.

Balzer, W., Boudreau, N., Hutchinson, P., Ryan, A. M., Thorsteinson, T., Sullivan, J., Yonker, R., & Snavely, D. (1996, December). Critical modeling principles when testing for gender equity in faculty salary. *Research in Higher Education, 37*(6), 633-658.

Barbezat, D. A. (1991). Updating estimates of male-female salary differentials in the academic labor market. *Economic Letters, 36*, 191-195.

Barbezat, D. A. (2002, Fall). History of pay equity studies. In R. K. Toutkoushian (Eds.). (2002). Conducting salary-equity studies: Alternative approaches to research. *New Direction for Institutional Research*, No. 115. San Francisco: Jossey-Bass.

Becker, W. E. . & Toutkoushian, R. K. (2003). Measuring gender bias in the salaries of tenured faculty members. In R. K. Toutkoushian (Ed.). (2002). Unresolved issues in conducting salary-equity studies. *New Direction for Institutional Research*, No. 117, pp. 5-20. San Francisco: Jossey-Bass.

Bellas, M. L. (1994, December). Comparable worth in America: The effects on faculty salaries of the sex composition and labor-market conditions of academic disciplines. *American Sociological Review, 59*(6), 807-821.

Bellas, M. L. (1997, May-June). Disciplinary differences in faculty salaries: Does gender bias play a role? *Journal of Higher Education, 68*(3), 299-321.

Bereman, N. A. & Scott, J. A. (1991, September/October). Using the compa-ratio to detect gender bias in faculty salaries. *Journal of Higher Education, 62*(5), 566-569.

Braskamp, L. A. & Johnson, D. R. (1978). The use of a parity-equity model to evaluate faculty salary policies. *Research in Higher Education, 8*, 57-66.

Braskamp, L.A., Muffo, J.A., & Langston, I.W. (1978). Determining salary equity: Policies, procedures, and problems. *Journal of Higher Education, 49*(3), 231-246.

College and University Professional Association for Human Resources (CUPA-HR). (2010). *National faculty salary survey: by discipline and ranks in four-year colleges and univeristies*. Knoxville, TN: Author.

Duncan, K. C., Krall, L., Maxcy, J. G., & Prus, M. J. (2004, Spring). Faculty productivity, seniority, and salary compression. *Eastern Economic Journal, 30*(2), 293-310.

Ferber, M. A. & Loeb, J. W. (2002). Issues in conducting an institutional salary-equity study. In R. K. Toutkoushian (2002). Is there discrimination by sex, race, and discipline? Additional evidence. *American Economic Review, 66*(1), 196-198.

Field, A. (2009). *Discovering Statistics Using SPSS* (3rd Edition). Los Angeles: Sage.

Haignere, L. (2002). *Paychecks: A guide to conducting salary-equity studies for higher education faculty* (2nd ed.). Washington, DC: American Association of University Professors.

Haignere, L. & Eisenberg, B. (2002). Gender and race bias in current rank. In L. Haignere (2nd ed.), *Paychecks: A guide to conducting salary-equity studies for higher education faculty* (pp. 27-34). Washington, DC: American Association of University Professors.

Haignere, L. & Lin, Y. (2002). Database decisions and development. In L. Haignere (2nd ed.), *Paychecks: A guide to conducting salary-equity studies for higher education faculty* (pp. 17-24). Washington, DC: American Association of University Professors.

Howard., R. D., Snyder, J. K., & McLaughlin, G. W. (1993). Faculty salaries. In M. A. Whiteley, J. D. Porter, and R. H. Fenske (Eds.), *The Primer For Institutional Research* (No. II), (pp. 51-62). Tallahassee, FL: Association of Institutional Research.

Koch, J.V. & Chizmar, J. R. (1996). *The economic efforts of affirmative action*. Lexington, MA: Lexington Books.

Luna, A. L. (2007, Spring). Using a market ratio factor in faculty salary equity studies. *The Association for Institutional Research Professional File*, No. 103. Retrieved on March 10, 2011 from http://www.eric.ed.gov/PDFS/ED502286.pdf

McLaughlin, G. W. & Howard, R. D. (2003). Faculty salary analyses. In W. E. Knight (Ed.), *The Primer for Institutional Research*, No.14, 48-73. Tallahassee, FL: Association of Institutional Research.

Moore, N. (1992). Faculty Salary Equity: Issues in Regression Model Selection. *Research in Higher Education*, *34*(1), 107-126.

Raymond, R.D., Sesnowitz, M. L., & Williams, D. R. (1988, January). Does sex still matter? New evidence from the 1980s. *Economic Inquiry, 26,* 43-58.

Reagan, B. B. & Maynard, B. J. (1974). Sex discrimination in universities: An approach through internal labor market analysis. *AAUP Bulletin, 60*, 13-21.

Scott, E. L. (1977). *Higher education salary evaluation kit.* Washington, DC: American Association of University Professors.

Smart, J. C. (1991, Summer). Gender equity in academic rank and salary. The *Review of Higher Education*, *12*(4), 511-526.

Semelroth, J. (1987). Market differentials and salary negotiations. *Thoughts and Action, 3*(2), 65-72.

Toutkoushian, R. K. (Ed.). (2002). Conducting salary-equity studies: Alternative approaches to research. *New Direction for Institutional Research*, No. 115. San Francisco: Jossey-Bass.

Waldauer, C. (1984, June). The non-comparability of the "comparable worth" doctrine: An inappropriate standard for determining sex discrimination in pay. *Population Research and Policy Review, 3*, 141-166.

Webster, A. L. (1995, October). Demographic factors affecting faculty salary. *Educational and Psychological Measurement*, *55*(5), 728-735.

Yao, C (2012, June). *Using market factors to detect gender differences in faculty salaries*. The paper was presented in the 2012 Annual AIR Forum. LA: New Orleans.

Program-At-A-Glance **2012 NEAIR Conference -- Hyatt Regency, Bethesda, Maryland**

SATURDAY	November 3, 2012								
Noon - 6:30 pm	Conference Registration - Crystal Ballroom Coatroom								
2:00 pm - 7:00 pm	Your Third Place - Crystal Ballroom Level								
	Waterford	Haverford	Lalique						
1:00 pm - 4:00 pm	Newcomers to Institutional Research - Part I (Shedd, Schehr)	An Introduction to R and LaTeX for IR Part I (Laptop with R, LaTex and RStudio software required.) (Bryer)	How to Manage a Small (or One-person) Office (Laptop Required) (Hess)						
5:30 pm - 6:30 pm	Welcome Reception - Concours Terrace								
6:30 pm	Saturday Evening Dinner Groups (Meet at the Concours Terrace)								

SUNDAY	November 4, 2012								
8:00 am - 6:00 pm	Your Third Place - Conference Registration and Internet Café - Crystal Ballroom Level								
	Susquehanna/ Severn	Potomac/Patuxet	Diplomat	Ambassador	Cabinet	Judiciary	Congressional	Old Georgetown	Embassy
9:00 am - Noon	Taking the Next Step: Career Management in IR (Nesler)	An Introduction to R and LaTeX for IR Part II (Laptop with R, LaTex and RStudio software required.) (Bryer)	NCES's Other (non-IPEDS) Postsecondary Studies and Data Tools (Laptop Required) (Hunt-White, Crissey)	Facilitating the Strategic Planning Process: An Important Role for IR (Trainer)	Newcomers to Institutional Research - Part II (Shedd, Schehr)	Tips and Tricks for Supporting Enrollment Management from the Trenches: A Survival Guide (Laptops with Excel Reqd) (Fergerson)	Using Excel Pivot Tables for Strategic Data Management (Laptops with Excel 2010 Required)	Quick and (Not) Dirty Benchmarking with IPEDS (Laptop Required) (Abbey)	
Noon - 1:00 pm	Lunch Break - on your own								
Noon - 5:00 pm	Exhibitors and Posters on display for informal viewing - Crystal Ballroom Level								
	Susquehanna/ Severn	Potomac/Patuxet	Diplomat	Ambassador	Cabinet	Judiciary	Congressional	Old Georgetown	Embassy
1:00 pm - 4:00 pm	Course Embedded Assessments: Why, When, Where, and How (Danielson)	How Institutional Research Can Maximize its Impact on Improving Student Success (Hemenway)	NCES's Other (non-IPEDS) Postsecondary Studies and Data Tools (Laptop Required) (Hunt-White, Crissey)		Beyond Newcomers: Insights for Continued Professional Growth (Brodigan, Clune-Kneuer, Fink, Larson)	Experienced Practitioners' Colloquium: Practically True Confessions in IR (Dooris, Nesler, Hess)	Taking a Look at the Playbook for Student Learning Outcomes Assessment (Kelly)	Using the National Student Clearinghouse -How, When and Why? (Laptop Required)	
4:10 pm - 4:50 pm	Mentor Program & Newcomers Reception - Concours Terrace								
5:00 pm - 6:15 pm	OPENING PLENARY: Erick Brethenoux (IBM/SPSS) " The Power of Predictive Analytics in Higher Education " Crystal Ballroom Note: Exhibitor Lightning Talks to Follow Opening Plenary								
6:30 pm - 8:30 pm	Visualizing the Future Reception and Banquet Reception-Concours Terrace, Banquet-Crystal Ballroom								

Color Coding	New/Cutting Edge Tech Skills Workshop

MONDAY	November 5, 2012								
8:00 am - 7:00 pm	Your Third Place - Conference Registration, Exhibitors, Internet Café, and Posters on display for informal viewing - Crystal Ballroom Level								
7:30 am - 8:45 am	Continental Breakfast - Crystal Ballroom								
8:00 am - 8:45 am	Penn State's Graduate Certificate in Institutional Research (Loomis)	The Delaware Study and Out-of-Classroom Faculty Activity Study (Walters)	Greater Philadelphia Assoc. for Institutional Research (GPHLAIR) (May)	SUNY Association for Institutional Research and Planning Officers (AIRPO) (Karp, Szelest)	Meeting Federal Disclosure Requirements (Hammond, Finkle - U.S. Department of Education)		Higher Education Data Sharing (HEDS) Consortium (Blaich)	U.S. News Rankings & Update (Morse)	Using Tk20's Assessment System to Optimize Outcomes Assessment: Case Studies (Rogers, Carroll, Levy)
9:00 am - 10:15 am	KEYNOTE ADDRESS: David Bergeron (U.S. Department of Education) Lessons the Data Teach Us Crystal Ballroom								
10:15 am - 10:45 am	Coffee Break - Crystal Ballroom Level								
	Susquehanna/ Severn	Potomac/Patuxet	Diplomat	Ambassador	Cabinet	Judiciary	Congressional	Old Georgetown	Embassy
10:45 am - 11:30 am	Expanding the Role of IR – Practices in Financial Aid Reporting (Beads, Gillespie)	Creating a Longitudinal Data File to Study Faculty Careers (Deutsch, Iglesias, Finkelstein)	Case Study: Transfer Success from 2-Year to Regional Center (Muntz, Lang, Mund, Nadasen, Bell, Appel)	Creating a Campus Climate Survey that Fits Your Institution's Values (Turrentine)	An Examination of Tuition Discounting Before/During the Great Recession (Duggan, Mathews)	Into the Void: What Happens to Our Reports? (Sharkenss, Butler, Terkla)	Inventing a New Wheel: Assembling a Campus-Wide Doctoral Program Review (Filep, Blaustein)	Are Students Dropping Out or Dragging Out the College Experience? (Stratton, Wetzel)	Demonstration of Blue Software for the Automation of Surveys and Course Evaluations by eXplorance (Bedard)
11:45 am - 1:15 pm	Luncheon and Business Meeting - Crystal Ballroom								
1:30 pm - 2:15 pm	Persistence Puzzles' Missing Pieces: Non-Cognitive Data from ePortfolios (Easterling)	Using Internal Market Ratios to Detect Gender Differences in Faculty Salaries (Yao) Paper	Developing Community College Peer Institutions: Methods, Measures, & Issues (Musial-Demurat, Szelest) Paper	Using Sipina (Free Software) to Reduce the Number of Variables Considered (Welsh) Screenshots	IPEDS Update (Bell, Lenihan)	The Future of Student Learning Outcomes in the VSA (Keller, Hinds)	Developing an Internal Survey Protocol (Flanders)	How Less Selective, Four-year Institutions Responded to the Great Recession (Duggan, Piteros)	BINGO, Business Intelligence In Great Organizations, BI Speed Learning in 10 Minute Increments (Rouse)
2:30 pm - 3:15 pm	Visualizing the News: Bringing Environmental Scanning into the 21st Century (Ashton)	Maximizing the Utility of Alumni Feedback (Tammaro)	Finding Ways to Help Students Succeed in Calculus at a STEM Institution (Mahoney, Yang, Piper)	Putting Data First: Expanding IR Data Accessibility Using Online Tools (Butler)	The "Trial" of Triangulation: Measuring Curricular Change Effectiveness (Stassen)	Got Transfer Students? What About Them? (McDonnell, Kamal, King)	An Examination of the Students Who Left After First Year (Gao)	NCES Projection Methodology: Institutional Research Applications (Robles)	Four Years of Predictive Modeling and Lessons Learned (Johnson, Crawford)
3:15 pm - 3:45 pm	Dessert/Coffee Break - Crystal Ballroom								
3:45 pm - 4:30 pm	Mapping the Pipeline: Changing Demographics and Enrollment Impacts (Randall, Abbey)	Examining the Threat of Nonresponse Bias as a Follow-up to the NSSE (Allen, Coladarci) Paper	Application of Student Success Data to Decision Making and Resource Allocation (Doherty)	A Novice Approach to Report Creation using VBA and Excel Macros (Clements)	Measuring Student Engagement Through a Longitudinal Study (Brodigan)	Strategies for Improving Retention and Student Success (Laguilles, Coughlin, Uerling, Hamler, Fink)	Sharing Data on Campus: Creation of a University Factsheet (Sisco)	Engaging the Campus in Outcomes Assessment: Techniques and Best Practices (Rogers)	Discover a Comprehensive Approach to Institutional Effectiveness with Campus Labs (VanZile-Tamsen, Weisman)
4:45 pm - 5:30 pm	Data With a Twist Keynote: Catherine Plaisant (University of Maryland) Information Visualization: from Data to Insight Crystal Ballroom								
5:30 pm - 6:30 pm	Data With a Twist Reception - Includes Formal Poster Session - Crystal Ballroom Level (Presenters will be available from 5:30pm - 6:30 pm; Best Visual Display Award will be presented at 6:00 pm)								
6:30 pm	Monday Evening Dinner Groups (Sign-up at Conference Registration located in the Crystal Ballroom Foyer, Meet in Lobby/Concours Terrace)								

Color Coding	Contributed Paper	Workshare	Techshare	SIG	Focus Group - By Invitation Only	table topics	NEAIR Member & Exhibitor Presentation	2-year Institution Interest 2-Year

TUESDAY	November 6, 2012								
8:00 am - 11:00 am	Your Third Place - Conference Registration, Exhibitors, and Internet Café - Crystal Ballroom Level								
7:30 am - 8:45 am	Breakfast - Crystal Ballroom NOTE: SIGS will be held in the breakout rooms below, Table Topics will meet at designated tables in the Crystal Ballroom during breakfast. Please eat breakfast prior to joining a SIG.								
8:00 am - 8:45 am	Measuring the Effectiveness of Certificate Programs	IR Role in the Globalization of Higher Education Institutions	IR websites: Information Dissemination	Second-Year IR Professionals					Focus Group - By Invitation Only (Tiffany/Cartier)
	Susquehanna/Severn	Potomac/Patuxet	Diplomat	Ambassador	Cabinet	Judiciary	Congressional	Old Georgetown	Embassy
8:00 am - 8:45 am	Banner Users Group (Cohen)	Jenzabar Users Group (Junker)	Graduate Education (Snover)	Online Learning and Virtual Institutions (Daniels)	Catholic Higher Education Research Cooperative (CHERC) (Uerling)			U.S. News Rankings & Update (Morse)	Qualtrics: Sophisticated Research made Simple (Durrant)
9:00 am - 9:45 am	OPIR Data Service: Ad Hoc Reporting Made Easy (Egypt)	Creating a Culture of Assessment: Marketing Online Course Evaluations (Puhala) Paper	Non-Returner Survey to the Retention Survey Part I. Why Students Leave (Richman, Ariovich, Long)	Working Smarter - Lessons Learned from Software Development (Appel)	Understanding the Meaning of Community on Campus (Kaib, Yu-Chuan)	Is Student Life Assessment Different from Student Learning? (Brodigan)	Integrating IR, Registrar, and IT Requests (Clune-Kneuer, Heidrich)	IPEDS R&D: An Update on NPEC and TRPs (Bell, Lenihan)	Provide the President's Cabinet and Board of Trustees with Interactive Dashboards that They Can't Help But Pay Attention To! (Stevens)
10:00 am - 10:45 am	Streamlining External Reporting: A Supplement to the Common Data Set (Roscoe)	Testing Differences: Contrasts in Group Perceptions of Mission and Identity (Pavlick)	Non-Returner Survey to the Retention Survey Part II: Retaining Students (Richman, Ariovich, Long)	Supporting Assessment with an Electronic Assessment System (Carroll)	Where Did They Go and Why Did They Leave Before They Graduate? (Hser)	Understanding Why Students Fail: A Mixed-Methods Collaboration (Dooris, White)	Developing a Data Dictionary for a Heterogeneous Institution (Starling, Ng, Taimuty)	Integrating Learning Objectives Into Your Curriculum Management Process (Appel, Colson, La Voy, Clement)	Assessing your Research Analytics Needs (Nitecki, Skoczylas)
11:00 am - 11:15 am	Coffee Break - Crystal Ballroom								
11:15 am - 12:15pm	CLOSING PLENARY -Tina Leimer (Reshaping IR listserv, Ashford University) Visualizing the Future of Institutional Research Crystal Ballroom								
12:15 pm - 1:00 pm	Closing and Annual Raffle - Crystal Ballroom								

Color Coding	Contributed Paper	Workshare	Techshare	SIG	Focus Group - By Invitation Only	table topics	NEAIR Member & Exhibitor Presentation	2-year Institution Interest 2-Year