

Using Factor Analysis to Organize Student Services

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Exploratory factor analysis was used to provide an organizational framework for data collected from an entering class of students at a large eastern university. Results from the EFA on responses of 1,912 students indicated that items on surveys, based on various interests of administrators, can be grouped into dimensions that can be used to plan student services. Factors that emerged were Religion/Spirituality, Help Seeking, Interracial Relationships, Academic Self-Concept, Cultural Tolerance, Academic Preparedness, Shy/Lonely, and Cult Approval.

The needs of students represent an ever-changing concern for college and university student affairs professionals. Data about students are often gathered from many administrative units in a piecemeal fashion (Posner & Rosengerger, 1997; Twale, 1989). Each agency has its own particular use for the information, and often the data that are gathered will focus on different student characteristics, wants, and needs. Two problems with the multi-department, multi-survey methods are that the same data are redundantly collected, and it is difficult to identify underlying areas of student concerns. This study presents factor analysis as a method of identifying the underlying constructs of information that were gathered on an incoming class of freshmen using a single survey developed with input from multiple departments.

The different agencies that form student services continuously strive to develop new ways of understanding and organizing service delivery. The identification of factors or dimensions that underlie the information from entering freshmen provides an organizing framework for student concerns. Because the dimensions that emerge

from factor analysis are groupings of the responses supplied by students, those dimensions are potentially meaningful representations of student issues and characteristics. An evaluation of how the dimensions are distributed across different student characteristics can inform administrators as to what students require what services.

Higher education is a potentially ever-changing environment attended by an ever-changing student population. Komives (1999) has called for more responsive programs of research that would evaluate all areas of student experience and campus environment. Factor analysis is proposed in this study as a method of evaluating student experiences and expectations.

METHODS

Participants

Participants were 1912 (51% female) incoming freshmen from a large eastern university who were attending a summer orientation program. Their mean age was 17.6; 9% were African American, 14% were Asian American, 64% were White, 4% were Latino(a), and 9% were other or unreported.

Instrument

The University New Student Census (UNSC) contains 110-items concerning demographics, perceptions, attitudes, expectations, and interests (see Appendix A). It was administered on-line to incoming freshmen attending summer orientation in computer labs of less than 30 persons each throughout the summer. Over 90% of all new students attend orientation as part of their registration procedure to complete the instru-

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ment. Items were generated from offices, committees, researchers, and individuals on campus interested in knowing certain information about freshmen in order to serve them better. Test-retest reliability was estimated at .84 based on a pilot study. Thirty items (UNSC items 13-42) that measured a variety of areas using a 5-point Likert-type scale from 1 (*strongly agree*) to 5 (*strongly disagree*) were used in the study.

Factor analysis

In order to identify underlying constructs or dimensions, responses from participants were analyzed using principal axis factor analysis, with squared multiple correlations as the diagonal elements of the correlation matrix. Preliminary examination of the emerging factors indicated low interfactor correlations. Therefore, the factors were considered unrelated and an orthogonal (varimax) rotation was employed. Examinations of the scree plot of the variance associated with each factor and changes in eigenvalues across factors were used to determine the number of factors to retain.

Results

Examination of the scree plot and eigenvalues indicated that an eight-factor solution was reasonable. All factor loadings above .30 are presented in Table 1. Factor one (Religion/Spirituality) contains four items relating to expressions of the strength, importance, and certainty of student religious or spiritual beliefs. Factor two (Help Seeking) consisted of four items that indicate openness to seeking help or counseling for challenges and issues that arise while at college. The third factor (Interracial Relationships) contains two items that concern cross-racial friendships. Factor four (Academic Self-concept) contains three items that measure student beliefs and desires about their academic goals and a sense of belonging. The fifth factor (Cultural Tolerance) contains four items that focus on understanding and tolerance of culturally different individuals. Factor six (Academic Preparedness) is formed from four items that concern preparation for academic work. The seventh factor (Shy/Lonely) contains two items that represent an expression of expectations and

beliefs about “aleness” and perceived level of shyness. The eighth factor (Cult Approval) is comprised of two items that indicate degree of comfort with cult or cult-like religious groups.

DISCUSSION

Johnson (1999) outlined the need for research in higher education that can identify trends, inform the operations of administrative personnel, and result in an improvement in student college experience. The use of factor analysis to organize student survey data may have important utility for college administrators in meeting those research goals. An examination of the eight factors that emerged in this study reveals that the items have been organized into meaningful groups. The factors provide information about student concerns and needs that extends beyond responses on individual items. The technique discussed in this article emphasizes reaching conclusions from the data, so relevant literature will be cited in the discussion.

The emergence of Religion/Spirituality as the first factor reveals that issues involving existential beliefs are a very important concern for entering students. Producing a scale based on this factor would allow administrators to examine how the importance of religion is distributed across differing demographic groups. Research has indicated that religiosity can be associated with differing attitudes toward cultural experiences (Wells & Daly, 1992; Jensen & Jensen, 1993). Departments or services that attempt to aid students in developing understanding and sensitivity toward various culturally diverse groups can benefit by recognizing the need to create programs that take into consideration the breadth of Religion/Spiritual beliefs of students.

The eighth factor, Cult Approval, focuses on a narrower, yet important aspect of student religious life. That this factor is independent from the Religion/Spirituality factor suggests that separate student service programs might be developed in this area. An important administration question would concern how this factor is distributed across the population and what effect approval or disapproval of cults has on

TABLE 1.
Rotated Factor Matrix

Factors	1	2	3	4	5	6	7	8	*Com
19 RELIGION IMPORTANT	.79	—	—	—	—	—	—	—	.53
42 MINE IS TRUE RELIGION	.63	—	—	—	—	—	—	—	.51
40 RELIGIOUS NOT SPIRITUAL	.45	—	—	—	—	—	—	—	.39
41 LUCK NOT BIG TO MOST	.30	—	—	—	—	—	—	—	.26
36 SEEK EMOTIONAL COUNSELING	—	.78	—	—	—	—	—	—	.38
24 SEEK STRESS MGMT TR	—	.60	—	—	—	—	—	—	.49
28 SEEK DRUGS COUNSELING	—	.39	—	—	—	—	—	—	.24
32 SEEK CAREER COUNSELING	—	.36	—	—	—	—	—	—	.23
26 MY FRIENDS MY RACE	—	—	.92	—	—	—	—	—	.58
33 HAVE FRIEND MY RACE	—	—	.55	—	—	—	—	—	.33
23 WILL DROP OUT BEFORE BS	—	—	—	.62	—	—	—	—	.40
20 DONT EXPECT DEGREE	—	—	—	.50	—	—	—	—	.35
30 BETTER HS JOBS NO COLLEGE	—	—	—	.36	—	—	—	—	.28
39 DISCUSS CULT AWARENESS	—	—	—	—	.47	—	—	—	.41
29 AWARE OF OTHER'S RELIGION	—	—	—	—	.44	—	—	—	.33
16 TOLERANT OTHER RELIGION	—	—	—	—	.43	—	—	—	.30
35 LIKE TO MEET DIFF PEOPLE	—	—	—	—	.34	—	—	—	.30
27 EXPECT HARD ADJUST	—	—	—	—	—	.60	—	—	.44
22 SEEK STUDY SKILLS TRNG	—	—	—	—	—	.42	—	—	.32
18 DIFFICULTY IN MATH	—	—	—	—	—	.41	—	—	.34
34 HS DID NOT PREPARE ME	—	—	—	—	—	.39	—	—	.28
31 EXPECT TO BE LONELY	—	—	—	—	—	—	.71	—	.50
17 I AM SHY	—	—	—	—	—	—	.55	—	.33
13 COMFORT W/SMALL RELIG/GRP	—	—	—	—	—	—	—	.46	.42
38 CULTS NOT NECESSARILY BAD	—	—	—	—	—	—	—	.39	.25
Eigenvalues	4.91	4.01	3.45	3.05	2.98	2.92	2.02	2.00	

Note. Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

* Com = Communalities for each item

other student goals. As with the Religion/Spirituality factor, the Cult Approval dimension may suggest the need to implement cultural education programs in flexible ways.

Help Seeking (factor two) provides an opportunity for units involved with various counseling services to explore the distribution of different attitudes toward and needs for their services across student groups. Research has indicated variability in positive attitudes toward help seeking across gender, race, and ethnicity (Fischer & Farina, 1995; Tracey, Sherry, Bauer, Robins, Todaro, & Briggs, 1984; Leong, Wagner, & Tata, 1995). Individuals who are not comfortable with seeking help for challenges, and also express a tendency toward shyness and loneliness (factor seven, Shy/Lonely) could be at risk for being overwhelmed with educational experiences. That Help Seeking and Shy/Lonely were seen as separate dimensions for students indicates the need to provide programs and promote services in different ways. At the campus where the study was done, the counseling center is in a highly visible location in a building containing a classroom and much foot traffic. A shy person may not be likely to enter such an environment to seek services. One technique that has been useful in identifying student reactions to space and building locations is perceptual mapping (Sergent & Sedlacek, 1989; Mitchell, Sergent, & Sedlacek, 1997).

Perceptual mapping allows administrators to plan space allocation for student services based on the feelings of students about that space, expressed in map form. Thus, in the current situation if the feelings of shy and lonely students are mapped, potentially critical information about provision of services to them could be determined.

Factors three and five, Interracial Relationships and Cultural Tolerance, represent two dimensions that may be valuable in helping student affairs professionals to understand how culturally-relevant services can be delivered to the demographic groups of the highest need. Helm, Sedlacek, and Prieto (1998) pointed to the importance of assessing student interracial relationships. This information allows programs to be developed based on the current school

climate. Because openness and tolerance toward differing cultural beliefs continues to be one of the central goals of multicultural education (Stanley, 1996), both factors can help identify student attitudes and inform program development. For example, a university observing that few of their incoming white students report having friends of other races (low Interracial Relationships), yet feel that they are open to cultural differences (High Cultural Tolerance) may assume that the white students have had little previous contact with students from other racial/cultural groups. Those students are at the stage of developing an appreciation of racial differences (Helms, 1992; Sedlacek & Brooks, 1976). A clear understanding of which student populations may be challenged the most will allow administrators to produce effectively targeted programs and services. Hurtado, Milem, Clayton-Pedersen & Allen (1998) have called for proactive efforts on the part of administrative units to facilitate cross-racial interactions. Leaving the opportunities to learn about other racial groups to chance will not result in consistent positive change.

Two factors are directly related to student academic concerns: Academic Self-concept and Academic Preparedness (factors four and six). Academic Self-concept has been shown to be a significant predictor of academic success and withdrawal for both male and female students (House, 1992, 1993; Tracey & Sedlacek, 1985, 1987). Students with a low Academic Self-concept and low Academic Preparedness could be at high risk for dropping out. Given the current emphasis on retention of students in higher education, these two factors may provide insights into who should be the focus of early interventions. Combined with information from the Help Seeking factor, how the intervention would be implemented could be varied effectively to account for student reluctance to make use of existing services to avoid leaving college.

As suggested above, the interactions of the various factors themselves can provide valuable information for student services administrators. For example, the fact that Religion/Spirituality and Cult Approval emerged as separate factors may indicate a need for different units to address

these concerns. Often the university chaplains are seen as facilitating Religious/Spiritual involvement among students. Because students view Cult Approval as a different concern than the Religious/Spiritual factor, other service providers (e.g. counseling center, student activities) may be appropriate to respond to those issues. Knowing when the factor of Cult Approval varies across various demographic groups and other survey factors can be meaningful in both designing and implementing programs, that accurately target student groups. The factors that may indicate that academic concerns are present in conjunction with isolation (Shy/Lonely) and a reluctance to seek help (Help Seeking) could be a strong predictor of early withdrawal from school.

In sum, often services for students are based on a one-size-fits-all formula. The factor analysis of student survey data provides a potentially meaningful organization of survey items that can strengthen the utility of the survey in diverse

college populations. Further, the factor analysis provides ideas for how to deploy resources in providing student services specific for differing groups. Evaluating the emerging factors in conjunction with pertinent demographic and academic information allows for a clearer understanding of the students' reported needs, and a dynamic style of response to those needs.

With growing calls for accountability for student affairs departments in higher education, comes the need for development of methods of utilizing and gathering information. Research is at the heart of meeting the challenge to demonstrate meaningful contributions to educating students today and in the future (Blimling, 1999). This study presented one method of efficiently using existing collected data.

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APPENDIX A.

For the following questions, please use the following numbered scale.

- | | | | | |
|-------------------|-------|---------|----------|----------------------|
| 1 | 2 | 3 | 4 | 5 |
| Strongly
Agree | Agree | Neutral | Disagree | Strongly
Disagree |
13. I would be comfortable being part of a small non-traditional religious group.
 14. My family has always wanted me to go to college.
 15. If I run into problems concerning school, I have someone who would listen to me and help me.
 16. I am tolerant of other religions.
 17. I am a shy person.
 - *18. I expect difficulty with math courses.
 19. Religion is important in my life.
 20. I do *not* expect to get a degree from this university.
 21. I need to be alone sometimes.
 22. I would consider seeking study skills training while at this university.
 23. Chances are good that I will drop out temporarily before I complete a bachelor's degree.
 24. I would consider seeking stress management training while at this university.
 25. I will likely end up majoring in a different academic field from the one that now seems appropriate for me.
 26. *Most* of my friends are my own race.
 27. I expect to have a hard time adjusting to the academic work of college.
 28. I would consider seeking counseling for drugs and/or alcohol while at this university.
 29. I am aware of the beliefs of religions other than my own.
 30. If better jobs were available to high school graduates, I would *not* go to college.
 31. I expect to be lonely during my freshman year.
 32. I am would consider seeking counseling regarding my career plans.
 - *33. I have a close friend who is my race.
 - *34. My high school did *not* prepare me well for college.
 35. I am looking forward to meeting people different from me at this university
 36. I would consider seeking counseling for emotional or social concerns.
 37. I would *not* like to live in a same-sex residence hall
 38. Religious cults are *not* necessarily bad for all students.
 39. I discuss topics related to cultural awareness with friends.
 - *40. I consider myself religious but *not* spiritual.
 - *41. Luck does *not* play a big part in *most* people's lives.
 42. I believe that my religion is the one true religion.
 43. Regarding religious beliefs, I know basically what I believe and don't believe.

* Item polarity reversed for ease of interpretation.