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ABSTRACT

Data from a student satisfaction survey were analyzed to determine those variables that best predict student satisfaction and to build a discriminant model of student satisfaction/dissatisfaction. The survey was administered to 2,634 undergraduate students enrolled in a regional university during the spring semester, 1993. Based on the findings of an exploratory factor analysis, the components of the educational experience for this student sample were determined as: (1) major; (2) personal development; (3) satisfaction; (4) academic involvement; (5) analytical problem solving; and (6) cultural awareness. Using multiple regression analysis, a significant predictive relationship was found between the dependent variable (overall student satisfaction) and four independent factors (major, personal development, analytical problem solving, and satisfaction). The same four factors were used to build a discriminant function of student satisfaction/dissatisfaction In both the regression model and the discriminant function, the satisfaction factor had the largest magnitude of strength, followed by major, analytical problem solving, and personal development. Study implications for the university are discussed. (Contains 5 tables and 13 references.) (SLD)

Running head: ANALYSIS OF A STUDENT SATISFACTION SURVEY

Multivariate Correlation Analysis of a Student Satisfaction Survey

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Abstract

The purpose of this study was to analyze the data from a student satisfaction survey to determine those variables that best predict student satisfaction and to build a discriminant model of student satisfaction/dissatisfaction. The survey was administered to 2634 undergraduate students currently enrolled in a regional university during the spring semester, 1993.

Based on the findings of an exploratory factor analysis, the components of the educational experience for this student sample were determined as: Major, Personal Development, Satisfaction, Academic Involvement, Analytical Problem Solving, and Cultural Awareness. Using multiple regression analysis, a significant predictive relationship ($p < .001$) was found between the dependent variable (overall student satisfaction) and four independent factors (Major, Personal Development, Analytical Problem Solving, and Satisfaction). Furthermore, the same four factors were used to build a discriminant function of student satisfaction/dissatisfaction ($p < .001$). In both the regression model and the discriminant function, the Satisfaction factor had the largest magnitude of strength, followed by the Major, Analytical Problem Solving, and Personal Development.

Implications were given to the administration of the regional university in the areas of program effectiveness and student retention. Further implications were provided to the general study of program effectiveness, student retention, and student satisfaction.

Multivariate Correlation Analysis of a Student Satisfaction Survey

The measurement of student satisfaction with the educational experience in higher education has become increasingly important to academic governance. In the 1960s, when institutions of higher education enjoyed the largess of expanding student enrollments, increasing financial resources, and the good-faith of external stakeholders, student satisfaction surveys were the domain of student affairs administrators. The primary purpose of these early student surveys was to measure student involvement in and satisfaction with campus activities (Astin, Korn, & Green, 1987). During the 60s and 70s, education administrators at the core of academic governance were secure in allowing student satisfaction to remain the property of student affairs personnel. However by the end of the 70s, when the environment of higher education was characterized by decreasing resources and diminishing trust of external stakeholders, the concern for the assessment of student satisfaction moved from the periphery of decision-making into the upper-echelons of higher education governance.

Today, the assessment of student satisfaction has become an integral component in the accountability of higher education. There are two primary reasons for the continued interest in student satisfaction: program effectiveness and student retention. According to Ewell (1989), "assessing and improving the effectiveness of colleges and universities has ... taken on a new urgency in public dialogue" (p. 113). This "urgency" has propelled the benign interest in student satisfaction of the 60s and 70s toward a formula in the 90s that equates satisfaction with education effectiveness. It has been theorized in past literature that the investigation into student satisfaction can be a vehicle in assessing institution effectiveness (Ewell, 1989; Astin, Korn, & Green, 1987), understanding the congruency between the student and faculty (Morstain, 1977), determining the importance of the university environment to the development of the student (Witt, & Handal, 1984), and providing an important criterion for effectively serving students (Johnson, 1988).

Therefore, based on past research, the measurement of student satisfaction is the first step in developing the educational standards that are the foundation of an effective higher education program.

Of increasing interest in a time of declining enrollments is the relationship between student satisfaction and student persistence toward graduation. According to Astin (1984), the primary determinant of student persistence is student involvement with the educational process. Astin, Korn, and Green (1987) defined involvement as the level in which the student becomes "involved" with their academic experience. Nettles and Johnson (1987) found that student socialization in the college environment is highly correlated with student retention. Student socialization, as defined by Nettles and Johnson, is the student's satisfaction with their institution, peer group relations and academic integration. Okun, Ruehlman, and Karoly (1991), utilized investment theory to develop an understanding of student persistence in college. The investment theory postulates that student persistence is related to the student's perception of the value of their input into the education process compared with the value of the output of education. The student will persist to graduation as long as the value of the input is exceeded by the value of the output.

All these theories of student persistence have one common element: the need to assess student satisfaction. Regardless of the preferred theory of student persistence, the assessment of student satisfaction is the primary mechanism by which the determinants of each theory can best be measured. There is no better method for determining student involvement, socialization, and perceived investment than to directly measure the satisfaction level of the student. Therefore, because student satisfaction is the best measure of each determinant of student retention, and these theories of student retention can be used to explain student persistence, then the assessment of student satisfaction is a rudimentary step in developing an understanding of the ability and motivation of a student population to persist toward graduation.

In the spring semester of 1993, East Tennessee State University administered a student satisfaction survey to enrolled undergraduate students. The administration of this Enrolled Student

Survey (ESS) was in compliance with the 1992-93 Tennessee Performance Funding program. Performance funding is an accountability formula for participating institutions of higher education in Tennessee that measures institution effectiveness and provides incentive funding for education program improvements (Banta, 1988). The purpose of this study was to analyze the data from the 1993 ESS, to determine those variables that best predict student satisfaction and to build a discriminant model of student satisfaction/dissatisfaction. The goal of this research was to provide ETSU administrators with an insight into student satisfaction that could be used to understand student perceptions of institutional effectiveness, and to explain the persistence of the ETSU student toward graduation.

Method

East Tennessee State University (ETSU) is a regional university located in the upper northeast corner of Tennessee. As a regional university, a majority of the students that attend ETSU come from the counties immediately surrounding the ETSU campus in Johnson City, Tennessee. According to the 1992 Undergraduate Catalog, ETSU is a diversified educational institution that offers students a wide variety of educational opportunities within nine colleges and schools. There are more than 100 fields of study offered to the approximately 12,000 students enrolled at ETSU. Students can plan a course of study that culminates in an associate degree, baccalaureate degree, or graduate degree including the master's degree, educational specialist degree and doctorate. The average entering ACT score of freshmen in the fall 1992, was 20.6. Likewise, approximately 47% of first-time freshman were enrolled in developmental and remedial courses during the fall semester, 1992, as compared with the state average of 33.9% (Roaden, 1994).

The ESS, a 77 question measurement of student satisfaction, was designed by the Tennessee Higher Education Commission (THEC) to measure six dimensions of the student's education experience: overall satisfaction, involvement, personal development, learning, major instruction and advising, and major curriculum. Sixty-nine of the questions were scaled using a 3

to 5 point Likert-type scale ('1' indicating a negative response), with each question measuring a student attitude specific to one of the six dimensions. The instrument also contained eight questions about the demographic characteristics of the respondent.

The target population for the ESS administered at ETSU were all undergraduate students enrolled at ETSU during the spring semester, 1993. The student sample was drawn using the cluster sampling method. According to the Office of Outcomes Assessment at ETSU:

> A random sample was drawn of 25 percent of the 1000 and 2000 level classes in the General Education Core and 25 percent of the 3000 and 4000 level classes from each college. The sample was drawn from a stratified population of on-campus day classes, all evening classes and classes conducted at off-campus sites. ETSU was required to survey at least 15 percent of all undergraduate students. To compensate for attrition and students enrolled in more than one surveyed class, 25 percent of all classes were surveyed. Courses which could not be surveyed in a class setting, such as student teaching/internship/co-op courses were excluded. The surveys were administered by each department in the sample. A total of 28.6 percent (2634) of the undergraduate students completed the survey (Burnley, 1993, pg. 6).

In comparison with the target population (Table 1), a higher percentage of the student sample were male, younger, more ethnically diverse, and enrolled full-time. A Chi-Square Test was performed to determine the statistical significance of the difference between the ESS student sample and the ETSU target population. A statistically significant difference was found ($p < .05$) for all the demographic variables; gender, X^2 (1, N = 2588) = 6.06; current age, X^2 (1, N = 2594) = 8.76; ethnic group, X^2 (4, N = 2533) = 90.68; and part-time vs. full-time enrollment status, X^2 (1, N = 2561) = 153.3. Furthermore, a higher number of the students within the sample (46) indicated they were Native American, as compared with the number of students, in the target population (31) who were Native American. This discrepancy was attributed to a possible

misunderstanding by respondents who interpreted the Native American category to indicate place of birth and not ethnic group.

Insert Table 1 here

Results

In analyzing the data from the ESS, a series of multivariate techniques were employed to explain student satisfaction/dissatisfaction with ETSU. First, an exploratory factor analysis was used to combine highly correlated variables. The purpose of using factor analysis was twofold; to reduce the number of independent variables and to develop an understanding of the commonality of variables as measured by the ESS instrument. Second, multiple regression analysis was employed to determine the independent factor(s) that best predicted overall student satisfaction. Finally, discriminant analysis was used to determine which independent factor(s) best discriminate between the satisfied and the dissatisfied student at ETSU.

As previously mentioned, there were 69 questions on the ESS that measured six dimensions of the student's attitude toward their educational experience. The majority of these questions measured attitude toward a specific education component. However, four of the questions assessed general overall satisfaction with the student's experience. These general questions, question 1, 3, 7 and 66, are shown in Table 2 along with the corresponding frequency distribution. Because of the general nature of question #1 to overall satisfaction, this question was used as the dependent variable in the multiple regression and discriminant analysis. Furthermore, question #1 was removed from the factor analysis to avoid redundancy.

A majority of the student sample (Table 2) indicated that they were satisfied with their educational experience at ETSU (86%), whereas a lower percentage of students would return to ETSU if given a second chance (70%). In rating their overall satisfaction with the ETSU

experience, a majority of the student sample (70%) indicated that their overall experience at ETSU was good/excellent. However, 28% of the student sample indicated that their overall experience at ETSU was fair. Finally, if given a second chance, 82% of the student sample would choose their major again.

Insert Table 2 here

Using exploratory factor analysis with principle axis rotation and an orthogonal solution, the data for the student sample formed six factors: Major, Personal Development, Satisfaction, Academic Involvement, Analytical Problem Solving and Cultural Awareness. Because THEC had designed the ESS to measure six dimensions of the education experience, the factor analysis of the sample data was externally constrained to six factors in an attempt to replicate the THEC dimensions. As shown in Table 3, the six factors of the ESS described 48% of the total variance, with the Major factor explaining 26% of the total variance.

The definition of each of the six factors for the student sample were:

Major: All of the questions within this factor related to the student's satisfaction with aspects of their experience in their major, such as; availability of the major advisor, clarity of degree requirements, quality of the courses and quality of instruction.

Personal Development: The focus of this factor was questions that measured the student's attitude toward their ability to lead others, ability to grow and learn as a person, ability to adjust to new job demands, planning and carrying out projects, self directed learning and working within a group.

Satisfaction: All of the questions in this factor related to the student's overall satisfaction with ETSU. Included in this factor are the questions presented in Table 2.

Academic Involvement: Questions that measured this factor are related to the involvement of the student in their academic experience, such as; the experience of writing a bibliography, performing library research, writing a rough draft for a paper and explaining a method or theory to another person.

Analytical Problem Solving: This factor included questions that measured a student's attitude toward their problem solving skills, and their mastery of mathematical and scientific concepts.

Cultural Awareness: Questions in this factor measured the ability to get along with different cultures, appreciation of different cultures, understanding global concerns, and understanding different philosophies.

Insert Table 3 here

A multiple regression analysis was performed to determine the predictive value of the six factors to overall student satisfaction. The purpose of this analysis was to develop an understanding of the independent variables that best predict student satisfaction with ETSU. A stepwise multiple regression analysis was performed to build a correlation between the six independent factors (Major, Personal Development, Satisfaction, Academic Involvement, Analytical Problem Solving and Cultural Awareness), and the dependent variable (**Question #1:** How satisfied are you with the educational experience you have had at ETSU?)

The relationship between the independent factors and satisfaction with the educational experience at ETSU (Table 4) was significant ($p < .001$). A linear relationship was evident between overall satisfaction of the student with their educational experience at ETSU and four of the independent factors. Even though the relationship was significant, the independent factors had only moderate strength in predicting the level of overall satisfaction of a student with ETSU. Based on the coefficient of determination (R^2), approximately 31% of the observed variability in

overall student satisfaction with the educational experience could be explained by the Satisfaction, Major, Analytical Problem Solving and Personal Development factors.

Insert Table 4 here

While the regression formula had only moderate predictive strength, the magnitude ranking of each component was important in understanding the satisfaction attitude of the ETSU student. The factor with the highest magnitude of predictability was the Satisfaction factor (ß =.44). Therefore, the strongest predictor of overall student satisfaction with ETSU was student satisfaction with the various components of the educational experience, i.e. satisfaction with the academic experience, satisfaction with the social experience, and satisfaction with the cultural experience. Even though this finding may appear to be redundant (Satisfaction was the strongest predictor of student satisfaction), it did provide valuable insight into the consistency of the satisfaction attitude by the student sample. Students, as measured by the ESS, had the ability to correlate the satisfaction attitude with each part of the educational experience into a satisfaction attitude about the whole experience.

The Satisfaction predictor of overall student satisfaction included variables that were general assessments of satisfaction ("How would you rate your satisfaction with your educational experience?" and "Would you choose your major if given a second chance?"). However, the remaining factors in the regression formula, Major, Analytical Problem Solving and Personal Development, included specific assessments of overall student satisfaction. Of these three factors, the Major factor had the strongest magnitude (ß =.28) of predictability.

The final multivariate analysis conducted on the data from the ESS was a discriminant analysis. The purpose of running a discriminant analysis was to predict the probability of an ETSU student belonging to one of the two mutually exclusive groups, satisfied student or dissatisfied student, based on the six factors. Discriminant analysis was used to build a correlation

model that would best 'discriminate' between the satisfied and the dissatisfied student at ETSU.

As shown in Table 5, the discriminant function includes four of the six factors; Major, Personal Development, Satisfaction and Analytical Problem Solving. Therefore, these are the factors that best discriminate between the satisfied and the dissatisfied student at ETSU. Likewise, the two remaining data based constructs, Academic Involvement and Cultural Awareness, do not discriminate between the satisfied and dissatisfied student. Eighty percent of the "grouped" cases were correctly classified by this discriminant function. As with the regression formula, the factor with the highest magnitude of discrimination was the Satisfaction factor (.82). Once again, this was a strong indication that the ETSU student could successfully correlate satisfaction with each part of the education experience to satisfaction with the overall education experience in order to discriminate between overall satisfaction and overall dissatisfaction. The remaining three factors of the discriminant function, Major (.56), Analytical Problem Solving (.37), and Personal Development (.25), had moderate magnitude in discriminating satisfaction.

Insert Table 5 here

Discussion

The Satisfaction factor had the highest magnitude of prediction and discrimination of overall student satisfaction for the student sample surveyed during the spring semester, 1993 at ETSU. This finding indicates that for the ETSU student the best predictor of satisfaction and the best discriminator between satisfaction and dissatisfaction with the overall education experience was the satisfaction with each component of the experience. While the Satisfaction factor was a general assessment of student satisfaction, the remaining factors in the regression formula and the discriminant function were related to student satisfaction with a specific component of the overall

education experience. Student satisfaction at ETSU was positively related to satisfaction with the major field of study, development of analytical problem solving skills and personal development.

There are three primary implications for ETSU that can be drawn from the findings of this study. First, is the knowledge that the ETSU student can correlate satisfaction with the overall experience to satisfaction with each education component. This information is evidence of the importance of encouraging all constituents who provide a service to the student, to work together to ensure student satisfaction. A negative experience with any component of the education process can have a direct negative impact on overall satisfaction.

Second, because a majority of ETSU students (86%) indicated that they were satisfied with their educational experience at ETSU and overall satisfaction was a function of satisfaction, specifically, with the major, analytical problem solving skills and personal development, it is concluded that in those areas the education program at ETSU is effective in serving student needs. Not only does this finding provide ETSU administrators with a gauge to measure program effectiveness in those areas, but it also provides them with a focus for the allocation of future resources. Equally important to ETSU administration is the exclusion of the Cultural Awareness and the Academic Involvement factors in the regression formula and the discriminant function of the ETSU sample. This could be an indication that, either, these factors are not of primary importance to the ETSU student or that the education program in these areas are not effective, and therefore, students did not correlate these factors with satisfaction/dissatisfaction. Neither scenario would be an ideal situation for the holistic education of the ETSU student and should be addressed by administration and faculty.

The final implication of these findings to ETSU is the information that this survey provides to the topic of student retention. Because the Major, Analytical Problem Solving, and Personal Development are important to the satisfaction of the ETSU student, these are the areas that should have an impact on the future decision of the ETSU student to persist toward graduation. If these relationships continue to hold throughout the academic tenure of the student, then the student who

is happy with their major, their ability to solve problems and their personal development, should be the student who will successfully persist to graduation. Again, this finding has an important implication to the future development of academic programs, curriculum, and education services.

The implications of this study can provide ETSU administrators with a focus for resources and a guide for future planning. However, the integration of these implications into future decision-making should be taken with caution. Because there were statistically significant differences between the student sample and the target population, it can be argued that the generalizability of this study to the target population is in doubt. The ESS student sample had a higher percentage of male students and was more ethnically diverse than the target population. According to Nettles and Johnson (1987), significant differences exist in student socialization within the collegiate environment based on ethnic group and gender. One of the three components of socialization in which their empirical evidence found a difference because of ethnic group and gender was student satisfaction with the institution. Therefore, it is possible that the gender and ethnic group differences between the target population and the ESS sample had a significant impact on the results of the survey. During the spring semester, 1995, ETSU will administer a second ESS in compliance with Performance Funding. It is imperative that a sampling technique is employed that will provide ETSU with a representative sample. A replication of this data analysis should be performed with the 1995 ESS. At that point, a comparison can then be made of the findings and implications from both surveys in an attempt to validate this study.

Finally, this research provides important information to the general topic of student satisfaction. Up to this point, the primary focus on student satisfaction has been through the relationship between satisfaction, student involvement (Astin, 1984), and student socialization (Nettles & Johnson, 1987). However, the results of this survey may indicate that the focus on student satisfaction should include the relationship of satisfaction with major field of study, analytical problem solving, and personal development. In particular, satisfaction with the major had the highest magnitude of prediction and discrimination of the three satisfaction-specific factors.

It may be that in this age of competitive economies and declining job opportunities, that the satisfaction of students attending regional universities such as ETSU, is more a function of career preparation than student involvement or socialization. If that is the case, the investment theory of student retention proposed by Okun, Ruehlman, and Karoly (1991) would be more appropriate to the experience of these students. Additional research is needed to determine if these relationships are important in explaining a student's decision to remain in college.

Equally important, to the student satisfaction literature is the finding that the ETSU student did not include Cultural Awareness nor Academic Involvement in their prediction or discriminant models. Is this indicative of only the ETSU student, or only the regional university student, or is this a nationwide phenomena? It is interes ng that students place a high value on satisfaction with a major study, and the subsequent career preparation, but do not want to become academically involved to achieve that career. Furthermore, in an age of multiculturalism, college students do not perceive satisfaction with the education of cultural awareness as a significant component of their satisfaction with the overall educational experience. Again, additional research is warranted on this topic to investigate the importance of this trend to future planning in higher education.

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Table 1 Demographics of the Student Sample Compared with the ETSU Population

Value	Sample N	Sample %	*ETSU Population N	*ETSU Population %
Gender				
Female	1458	56.3	5857	59.0
Male	1130	43.7	4066	41.0
Current Age				
< 22	1334	51.4	4724	48.2
> 22	1260	48.6	5083	51.8
Ethnic Group				
Oriental/Pacific	30	1.2	49	.52
Native American	46	1.8	31	.33
Black	83	3.3	362	3.81
Hispanic	17	.7	35	.37
Caucasian	2377	93.1	9022	94.98
Part-time or Full-time Student				
Part-time	288	11.2	2206	22.2
Full-time	2273	88.8	7717	77.8
Do you work?				
No	770	30.0	--	---
Yes, on campus	394	15.3	---	---
Yes, off campus	1406	54.7	---	---

Table 1 (cont.) Demographics of the Student Sample Compared with the ETSU Population

Value	Sample *N*	Sample %	*ETSU Population *N*	*ETSU Population %
If you work, how many hours per week?				
< 10	270	11.9	---	---
10 to 19	511	22.5	---	---
20 to 35	926	40.7	---	---
35 or more	132	5.8	---	---
I do not work	435	19.1	---	---
Earned Credit Hours (excluding spring, 1993 term)				
< 12	219	8.5	---	---
12 to 24	551	21.3	---	---
25 to 48	425	16.4	---	---
> 49	1393	53.8	---	---

*Note. Adapted from "The East Tennessee Fact Book," by The Office of Institutional Research, East Tennessee State University, 1993.

Table 2 Frequency Distribution for Questions on the Enrolled Student Survey that Directly Address Overall Student Satisfaction

Value	*N*	%
Question #1:		
How satisfied are you with the educational experience you have had at ETSU?		
Dissatisfied	364	13.9
Satisfied	2257	85.7
Question #3: If you could start college again, would you enroll at ETSU?		
No	774	30.3
Yes	1786	69.8
Question #7: How do you rate your overall experience at ETSU?		
Poor	55	2.1
Fair	729	27.8
Good	1651	63.0
Excellent	185	7.1
Question #66: If you could choose your major again, would you choose the same major?		
No	427	17.8
Yes	1967	82.1

Table 3 Six Factors of the Enrolled Student Survey

Factor	Questions that Relate to each Factor	Percent of Variance
THEC Dimensions		
Satisfaction	1, 3, 4, 5, 6, 7	---
Involvement	8, 9, 10, 11, 12, 13, 14, 15, 16	---
Personal Development	33, 34, 35, 36, 37, 38, 40, 45, 47	
Learning	39, 41, 42, 43, 44, 46, 48, 49, 50, 51, 52, 53	---
Major Instruction and Advising	54, 55, 58, 59, 60, 62, 65	---
Major Curriculum	56, 57, 61, 63, 64, 66, 67, 68, 69	---
Data-Based Factors		
Major	54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65	25.5
Personal Development	35, 36, 37, 38, 40, 41, 42, 43, 45, 47	7.1
*Satisfaction	3, 4, 5, 6, 7	5.3
Academic Involvement	8, 9, 10, 11, 15	3.8
Analytical Problem Solving	44, 46, 48, 51, 53	3.4
Cultural Awareness	34, 39, 49, 50, 52	3.1
		48.1

* Note. Question #1 would have loaded on the Satisfaction factor, however, it was artificially removed to avoid redundancy in the multiple regression and the discriminant analysis.

Table 4 Multiple Regression Analysis

Factor	B	Beta	t
Satisfaction	.223	.437	18.93*
Major	.144	.282	12.08*
Analytical Problem Solving	.094	.184	7.87*
Personal Development	.045	.089	3.80*

$R^2 = .312$, $F = 143.43$*

* $p < .001$

Table 5 Discriminant Analysis

Factor	Canonical *R*	Discriminant Function Coefficients[a]	Classification Results % of "grouped" cases correctly classified
	.50*		.80
Major		.56	
Personal Development		.25	
Satisfaction		.82	
Analytical Problem Solving		.37	

[a] Coefficients in this column are standardized.
* $p < .001$

Author's Note

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