Student Satisfaction in STEM: An Exploratory Study

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Abstract   This research presents the findings of a survey conducted to measure students' satisfaction with the Information Systems programs of a public college. The survey consisted of 29 questions. An invitation email was sent to 1244 students (361 Associate degree students, and 883 Bachelor's degree students). For ease of access to the survey, a web link was embedded in the invitation email. In addition, the students were assured that they will remain anonymous and that their responses can not be distinguished from those of others. The survey was available for 1.5 weeks from Dec 10th to Dec 19th 2012, and students could only take it once. In addition, department faculty were asked to encourage students to take the survey and to dedicate 10 minutes at the beginning of their classes for the students to take the survey online if they wished to do so. By the end of the period, 593 students (47.7%) took the survey. Because the survey responses were anonymous, it is fair to say that the responses reflect the students' true feelings and perceptions. In this research, the author showed that satisfaction with teaching, skills acquired, program, effectiveness, the availability of an internship program, technological resources, as well as the number of credit acquired, all had positive impact on students' overall satisfaction with the program. Gender and having English as a first language were not found to have a direct impact on satisfaction though.

Keywords: *STEM, student satisfaction, internship, gender*

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1. Introduction

Reference [1] defines student satisfaction as "a student's perception of an institution's effectiveness", and it is directly related to whether students' expectations have been met [2]. Higher education institutions must achieve student satisfaction in order to gain competitive advantage, and with pressure on institutions to increase student enrolments and retention, the emphasis placed on a positive student experience has become much greater [3]. In addition, studies have indicated that university satisfaction is positively associated with student retention, institutional reputation, and institutional vitality ([4,5,6]).

Today though, it is universally accepted that student satisfaction results from the total student experience and not just from quality in teaching and learning [7]. The campus environment is a web of interconnected experiences that overlap and influence students' overall satisfaction; thus what happens in the classroom is not independent of all other experiences relating to campus life [8]. Accordingly, to study student satisfaction one needs to consider not only the teaching and classroom experience, but also other factors like the use of technology, resources available, etc.

Reference [9] explained that in order to establish long-term relationships with their students, higher education institutions need above all to satisfy them. They then attempted to develop a satisfaction construct using seven variables: 1) program effectiveness; 2) quality of lecturers and teaching; 3) student learning; 4), assessment and feedback; 5) learning resources; 6) use of technology; and 7) facilities/quality of social life. They then proved that when this construct is measured through the variables used it presents a reliability coefficient of 93%.

To elicit student satisfaction levels across a UK university's service offerings, reference [10] designed a quantitative survey that consisted of 60 questions. The survey was informed by previous research studies and subdivided into the various categories of the service-product bundle including: 1) lecture and tutorial facilities, 2) ancillary facilities, 3) the facilitating goods, 4) the explicit service and 5) the implicit service. At the end students were asked for their overall satisfaction rating and whether they would recommend the University to a prospective student or not. The results of that study showed that with regards to student satisfaction, many of the physical aspects of the University services are not important which is consistent with the findings of [11], and [12] who found that the most important aspects of a university's service offerings were associated with the core service, i.e. the lecture, including the attainment of knowledge, class notes and materials and classroom delivery.

Similarly, [13] researched student views on five dimensions of Australian transnational education programs in South East Asia: 1) evaluation and assessment, 2) lecturers and teaching, 3) use of technology, 4) curriculum and instruction design, 5) program management and organizational support. The findings were intended to help higher education institution managers in reviewing existing transnational provision and planning new transnational ventures and programs

Reference [14] used seven dimensions (adapted from [9,10,13]) to study student perceptions of their experience

of study at an international branch campus 1) student learning; 2) quality of lecturers and teaching; 3) program effectiveness; 4), assessment and feedback; 5) learning resources; 6) use of technology; and 7) facilities/quality of social life.

Using a 4-year longitudinal sample of 3,098 undergraduates at 28 institutions, [2] examined the extent to which university satisfaction varies as a function of students' religious affiliation (or lack thereof). The authors reported that group disparities in satisfaction are also observed for race/ethnicity, gender, parental education, and academic preparation. The students' race/ethnicity, gender, pre-university achievement, and parental education were also significantly related to university satisfaction. Black and lower-achieving students are less satisfied with university, whereas women and students with higher parental education are more satisfied.

2. Survey Composition

In this research, the author used a survey that consisted of questions that addressed a number of areas:
- Program effectiveness
- Overall satisfaction with the programs: the likelihood of re-choosing the programs, as well as the likelihood of recommending the programs to a friend.
- Satisfaction with and use of resources available for students (ex: computers, labs, library, tutor, etc.)
- Satisfaction with faculty and course material
- Assessment and feedback
- Internship and research
- Student learning (skills acquired)
- Technology resources
- Demographic factors (ex: English as a first language, Gender, Program, Credits achieved)

3. Data

3.1. Student Satisfaction

Two items were used to assess overall student satisfaction and the results are shown in Table 1. These items were added to create a Satisfaction factor for each student.

Table 1. Student Satisfaction

	Agree	Disagree
I would recommend my major to others	70%	8.80%
If you could start college over, would you choose to pursue degree in this department?	82.10%	17.90%

3.2. Student Learning

Student learning is measured by the skills acquired by students during their tenure in the program. Nine items (as shown in following table) were used to assess the skills acquired by the students in Information Systems. These items were added and then an average was calculated that represents an overall Skills factor for each student.

Table 2. Skills Acquired

	Agree	Disagree
My program has helped me develop skills in Desktop Maintenance and Support	48%	10.20%
My program has helped me develop skills in Communications Skills	56.30%	8.60%
My program has helped me develop skills in Web Technologies	57.40%	5.50%
My program has helped me develop skills in Introduction to Computer Systems	76.10%	4.20%
My program has helped me develop skills in Information Security	50.20%	8.20%
My program has helped me develop skills in Networking	62.30%	5.70%
My program has helped me develop skills in Database Systems	63.30%	5.90%
My program has helped me develop skills in Programming	64.20%	6.60%
My program has helped me develop skills in Problem Solving	71.50%	5.10%

3.3. Assessment and Feedback

Two items were used to assess the quality of assessment and feedback.

Table 3. Student Satisfaction

	Agree	Disagree
Frequency of feedback from faculty about your course performance	55.90%	13.30%
Quality of feedback from faculty about your course performance	54.90%	13.30%

3.4. Quality of Lectures and Teaching

Two items were used to assess the quality of and teaching and material.

Satisfaction with teaching: About 60% of respondents are satisfied with how instructors teach the classes. 25.7% neither agreed nor disagreed, and 14.3% disagreed.

Table 4. Satisfaction with Faculty

	Agree	Disagree
I am satisfied with how the instructors teach the classes	58.40%	14.30%

Satisfaction with material: With regards to course material, the satisfaction was slightly higher than satisfaction with how instructors taught the course (60.8%), and the disapproval was slightly lower (12.5%). The percentage of respondents who indicated that they neither approved nor disapproved was almost the same (25.1%).

Table 5. Satisfaction with Course Material

	Agree	Disagree
I am satisfied with the course material	60.8	12.5

3.5. Demographics

Three items were used to measure demographics: 1) English as a first language, 2) Gender, 3) Program (Associate/Bachelor), and 4) Number of credits taken

Table 6. English as First Language

	Yes	No
Is English your first language?	58.6%	41.4%

Table 7. Gender

	Agree	Disagree
What is your gender?	86.5%	13.5%

Out of 593 respondents, there were 80 females (13.5%), and 513 males. This is an accurate representation of male to female ratio in the department which also reflects the clear male dominance of computer Systems field.

Table 8. Students' Program

	Associate's	Bachelor's
What is your Program?	24.8%	75.2%

Internships and Research

One item was used for Internships and another for Research:

Table 9. Internship and Research

	Agree	Disagree
I have taken/will participate in the internship program provided by the department	69.8%	9.7%
I have taken/will participate in the research activities or opportunities provided by the department	47.3%	16.7%

Technology Resources

Three items were used to assess the use of technology resources. These items were added to create a Technology Resources factor for each student.

Table 10. Technology Resources

	Agree	Disagree
The computers are available for my use.	83.5%	3.9%
You have utilized the following resources: Department Computer Lab	50.5%	21.2%
You have utilized the following resources: Equipment in the Classrooms	78.2%	5.6%

Other Resources

4 items were used to assess the use of the other resources offered by the college. These items were then added to create a measure of resources_other.

Table 11. Other Resources

Indicate how often you have utilized the following resources:	Very Often	Never
Tutoring Service	6.9%	46%
Library	22.6%	10.8%
Department advisor	8.6%	32.4%
Counseling center	4.4%	61.7%

4. Data Analysis

As shown previously, the 29 questions in the survey were combined to form 13 variables:
- Satisfaction with teaching (Satisfied_teaching)
- Satisfaction with course material Satisfied_material
- Skills acquired (Skills)
- Perception of program effectiveness (Effectiveness)
- Quality of Assessment and feedback (Assessment)
- Participation in the internship program (Internship)
- Participation in research activities (Research)
- Satisfaction with the technology resources (Resources_technology)
- Satisfaction with all other resources (Resources_other)

- English as a first language (Language)
- Student's gender (Gender)
- Number of Credits (Credits)
- Bachelors or Associate level student (Program)

By running the following regression using EViews:

$$\text{Satisfaction} = \beta_0 + \beta_1 * \text{Satisfied\_Teaching}$$
$$+ \beta_2 * \text{Satisfied\_Material} + \beta_3 * \text{Skills}$$
$$+ \beta_4 * \text{Effectiveness} + \beta_5 * \text{Assessment}$$
$$+ \beta_6 * \text{Internship} + \beta_7 * \text{Research} \qquad (1)$$
$$+ \beta_8 * \text{Resouces Technology} + \beta_9 * \text{Resources Other}$$
$$+ \beta_{10} * \text{Gender} + \beta_{11} * \text{English} + \beta_{12} * \text{Program} + \varepsilon$$

Table 12. Regression Results

Variable	Coefficient	Prob.
SATISFIED_TEACHING	0.2294	0.0023
SATISFIED_MATERIAL	-0.0381	0.6361
SKILLS	0.3748	0.0035
EFFECTIVENESS	0.161	0
ASSESSMENT	-0.0117	0.6925
INTERNSHIP	0.2581	0.0006
RESEARCH	0.0435	0.5266
RESOURCES_TECHNOLOGY	0.1352	0.0836
RESOURCES_OTHER	-0.0676	0.3456
ENGLISH	0.0009	0.9925
GENDER	0.1024	0.4394
PROGRAM	0.2038	0.054
C	0.1723	0.6204

The results imply that the following equation holds:

$$\text{Satisfaction} = .23 * \text{Satisfied\_Teaching}$$
$$+ .375 * \text{Skills} + .161 * \text{Effectiveness} + .258 * \text{Internship} \qquad (2)$$
$$+ .135 * \text{Resources\_Technology} + .204 * \text{Program}$$

From the above, it is clear that that students' satisfaction with the program depends on their perception of the quality of teaching, the skills they acquire, their perception of the effectiveness of the program, the availability of an internship program, and the availability of technology resources. It is also evident that with all the other factors constant, bachelor level students seem to be more satisfied that associate level ones.

By replacing the program variable with the number of credits, we get almost the same results again:

Table 13. Regression Results after Replacing the Program Variable with Number of Credits

Variable	Coefficient	Prob.
SATISFIED_TEACHING	0.2306	0.0022
SATISFIED_MATERIAL	-0.0498	0.534
SKILLS	0.3803	0.003
EFFECTIVENESS	0.1642	0
ASSESSMENT	-0.0105	0.7213
INTERNSHIP	0.2384	0.0015
RESEARCH	0.0485	0.4792
RESOURCES_TECHNOLOGY	0.1375	0.0783
RESOURCES_OTHER	-0.0651	0.3635
ENGLISH	0.0014	0.9879
GENDER	0.0986	0.4564
CREDITS	0.0779	0.0315
C	0.1943	0.5737

The results imply that the following equation holds:

$$Satisfaction = .231*Satisfied\_Teaching$$
$$+.38*Skills + .164*Effectiveness + .238*Internship$$
$$+.138*Resources\_Technology + .078*Credits$$

Both results show that the longer the student stays in college (in the Bachelors versus the Associates program, or having acquired more credits), the more satisfied that student is.

5. Discussion

The results confirm previous findings [10,11,12] that many of the physical aspects of the University services have no direct impact on student satisfaction and that the most important aspects of a university's service offerings are associated with the core service, i.e. the lecture, including the attainment of knowledge, class notes and materials and classroom delivery. This research though was not able to find relationship between overall satisfaction and satisfaction with class material.

Career focus

The findings seem to suggest that students' satisfaction with the program seems to be highly influenced by career prospects. Students were satisfied when they perceived that they learned specific skills, and that those skills will help them find suitable jobs. The availability of internships influenced student satisfaction because they seemed to believe that taking an internship would positively impact their careers. The same can not be said about engaging in research opportunities which seem to have had no influence on students satisfaction, because of their lack of understanding of how will such an engagement positively affect their careers.

The effect of demographics on student satisfaction:

One of the key findings of this research was that gender does not play a role in the determination of student satisfaction. In other words, there were no differences in the determinants of satisfaction based on the student's gender. My findings confirm the findings of [15] with regards to finding no relationship between gender and satisfaction. Reference [15] studied student satisfaction in online learning settings and showed that learner-instructor interaction, learner-content interaction, and Internet self-efficacy were good predictors of student satisfaction while interactions among students and self-regulated learning did not contribute to student satisfaction. They also found that gender, class level, and time spent online per week seemed to have influence on learner-learner interaction, Internet self-efficacy, and self-regulation. My findings on the other hand contradict those of [16] who found that female students are more satisfied than male students with the e-learning subjects and that they tend to assign more importance to the planning of learning, as well as to being able to contact the teacher in various ways. The findings also contradict those of Bowman and Smedley [2] who found that women and students with higher parental education are more satisfied with their universities.

The same was true with being a native English speaker. In other words, there were no differences in the determinants of satisfaction based on the student's native language. Although one would expect that non-native English speakers would find it more difficult to succeed in college and accordingly would be overall less satisfied with their experience, the findings did not seem to support this hypothesis. This finding though can not speak to the differences based on race, it is interesting to note that [2] provided multiple examples from the literature: Black and Asian students report lower overall satisfaction with their university experience than White and Latino students [17,18,19]. Black students are less satisfied than White, Asian, and Latino students with the structural diversity of their institution [20] as well as with their social interactions [21]. They also seem to be less satisfied with the (un)equal treatment that they receive from students and faculty [22]. Reference [2] also reports that according to [21], Latino and Native American students reported being thankful for the opportunity to attend the particular institution, and they expected less social support than did Black students.

Student Maturity

An interesting finding of this research is that bachelor students seem to be more satisfied than associate students. Also the more credits a student has, the more satisfied he/she is. At the beginning of their studies, students might not be able to understand how will the knowledge and skills they acquired help them in their careers. What this finding implies is that as students take more courses, they develop a better understanding of the field and gain appreciation for their education.

References

[1] Juillerat, S., & Schreiner, L. A., "The role of student satisfaction in the assessment of institutional effectiveness," *Assessment Update*, 8(1). 8-9. 1996.

[2] Bowman, Nicholas A., and Smedley, C.T, "The forgotten minority: examining religious affiliation and university satisfaction," *Higher Education,* 65 (6). 745-760. 2012.

[3] Arambewela, R, *Student experience in the globalized higher education market: Challenges and research imperatives. Globalization and internationalization in higher education: Theoretical, strategic and management perspectives*, Continuum, London, 2010.

[4] Bryant, J., *Assessing expectations and perceptions of the campus experience: The Noel–Levitz student satisfaction inventory. In S. M. Flores (Eds.), Benchmarking: An essential tool for assessment, improvement, and accountability (New Directions for Community Colleges,* no. 134, Jossey-Bass, San Francisco, 2006, pp. 25-35.

[5] Miller, R. "Student satisfaction and institutional success." In *rd annual AIR Forum, Tampa, FL.* 2003.

[6] Schreiner, L. A., *Linking student satisfaction and retention*, Noel-Levitz, Coralville, IA, 2009.

[7] Wright, C., & O'Neill, M. (2002). Service quality evaluation in the higher education sector: An empirical investigation of students' perceptions. Higher Education Research & Development, 21(1), 23-39.

[8] Elliott, K.M., & Shin, D., "Student satisfaction: An alternative approach to assessing this important concept," *Journal of Higher Education Policy and Management*, 24(2), 197–209, 2002.

[9] Alves, H., & Raposo, M., "The measurement of the construct satisfaction in higher education," *Service Industries Journal*, 29(2), 203-218, 2009.

[10] Douglas, J., Douglas, A., & Barnes, B., "Measuring student satisfaction at a UK university," *Quality assurance in education*, 14(3), 251-267, 2006.

[11] Banwet, D.K. and Datta, B., "A study of the effect of perceived lecture quality on post-lecture intentions", *Work Study*, 52 (5), pp. 234-43, 2003.

[12] Hill, Y., Lomas, L. and MacGregor, J., "Students' perceptions of quality in higher education," *Quality Assurance in Education*, 11 (1), pp. 15-20, 2003.

[13] Miliszewska, I., Sztendur, E., *Australian TNE programmes in Southeast Asia: The student perspective*, The Observatory on Borderless Higher Education London, UK, 2010.

[14] Wilkins, S., Balakrishnan, M.S., and Huisman, J., "Student satisfaction and student perceptions of quality at international branch campuses in the United Arab Emirates," *Journal of Higher Education Policy and Management*, 34 (5), 543-556, 2012.

[15] Kuo, Y., Walker, A., and Belland, B., Schroder K., "A predictive study of student satisfaction in online education programs," *The International Review of Research in Open and Distance Learning*, 14 (1), 16-39, 2013.

[16] Gonzalez-Gomez, F., Guardiola, J., Rodríguez, O.M., Montero Alonso, M.A., "Gender differences in e-learning satisfaction," *Computers & Education*, 58 (1), 283-290, 2012.

[17] Noel-Levitz., *National student satisfaction and priorities report*, *Coralville, IA*, 2009

[18] Fischer, M. J., "Settling into campus life: Differences by race/ethnicity in college involvement and outcomes," *Journal of Higher Education*, 78, 125-161, 2007.

[19] National Survey of Student Engagement, *Student engagement: Exploring different dimensions of student engagement*, Indiana University Center for Postsecondary Research, Bloomington, IN, 2005.

[20] Park, J. J., "Are we satisfied? A look at student satisfaction with diversity at traditionally White institutions," *Review of Higher Education*, 32, 291-320. 2009.

[21] Harper, S. R., and Hurtado, S., *Nine themes in campus racial climates and implications for institutional transformation. In S. R. Harper & L. D. Patton (Eds.), Responding to the realities of race on campus, New Directions for Student Services*," Jossey-Bass, San Francisco, no. 120, pp. 7–24, 2007.

[22] Suarez-Balcazar, Y., Orellana-Damacela, L., Portillo, N., Rowan, J. M., and Andrews-Guillen, C., "Experiences of differential treatment among college students of color," *Journal of Higher Education*, 74, 428-444. 2003.