

Measuring the Success of Information Systems: Case Study of a University Student Services System

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ABSTRACT

Measuring and monitoring the success of information systems is important for any administration or management. Many researchers indicate that user satisfaction, system use and performance are factors of information system success. Additionally, the measurement of success is more accurate through longitudinal studies. This paper describes an information system that was implemented in a real-world setting along with an information systems success survey incorporating the three suggested factors of information system success. Universities are not immune from budget problems. This paper presents the results of measuring and monitoring a university student services system. The study includes three parts: a student perception survey, statistics of system usage by students, and the estimated cost-benefits of implementing the system. It was found that the new system not only decreases overall operational costs, but also increases the service levels to students and increases overall student satisfaction. In addition to the cost-savings, increased service levels and student satisfaction, the implication of the study is that through student survey results, the university management and students are also realizing reliability, quality, and security when using the system.

INTRODUCTION

Many organizations are spending hundreds of millions of dollars every year on information technology (IT) hoping to become more efficient and effective. InformationWeek 500 companies report that on average they spent \$353M in 2004, which is about four percent of company revenues (Cueno, 2004). The top priority for IT expenditures is cutting costs (Cueno, 2004) increasing customer service (Cline and Guynes, 2001), increasing productivity and profitability (Pinsonneault and Rivard, 1998). “Yet, it is often claimed that the actual benefits of IT are disappointing at best, and that IT spending has failed to yield significant productivity gains--hence the productivity paradox.” (Pinsonneault and Rivard, 1998).

Measuring the success of information systems (IS) and understanding the return on investments in IT is the focus of a large and growing body of research (Dehning and Richardson, 2002). Success of IS cannot be attributed to a single factor. Based on the analysis of more than 100 empirical papers containing IS effectiveness and success measures between 1981 and 1987,

DeLone and McLean (1992) proposed an IS success model identifying six interrelated dimensions of success. These dimensions are system quality, information quality, use, user satisfaction, individual impact, and organizational impact. "Since its publication in 1992, nearly 300 articles in refereed journals have referred to, and made use of, the DeLone and McLean IS Success Model as the basis for measuring the dependent variable in IS research" (DeLone and McLean, 2004). Over time, a new dimension of quality, service quality, was added to the model. Seddon (1997) revised the model by changing the terms "impact" to "consequences" and "net benefits." DeLone and McLean (2004) recently updated their original model by adding service quality and collapsing "Individual impact" and "Organizational impact" into simply "Net benefits."

Along with the basic DeLone and McLean model, the results of several studies suggest that IS success is composed of a set of factors that apply to all systems, in addition to a set of factors specific to each type of system. Researchers identified several criteria of IS success: user satisfaction, system usage, and performance (Zviran and Ehrlich, 2003).

User satisfaction is the most prevalent measure of IS success due to its applicability and ease of use (Mahmood et al., 2000). Ives, et al (1983) defined user satisfaction as the degree to that IS fulfills user needs. In general, if the users are satisfied with the IS, they use it. Otherwise, they do not. Many studies imply user satisfaction as a measure of IS success, IS effectiveness, and IS acceptance (Bailey and Pearson, 1983; Baroudi, Olson and Ives, 1986; Igarria and Nachman, 1990; Rai, et al., 2002). A study by Geldman (1998) indicates that user satisfaction directly and significantly relates to IS performance. Improved IS performance could mean reduced costs and increased revenues or income. Furthermore, Mahmood et al., (2000) state that most IS user-satisfaction studies are based on one point in time, and suggest that there should be longitudinal studies. This paper presents the results of measuring and monitoring these IS success dimensions against a real world setting.

BACKGROUND

There are great fiscal demands on all universities; public scrutiny is one demand and legislative issues are critical if the state provides school funding (Dauphinais, 1998). Acquiring new systems at universities may be very expensive; however, depending on the system, there could be substantial savings over the life of the system (Dauphinais, 1998). IT acquisition failures may also occur; thus, it is invaluable to learn from the experiences of others. Two examples of IT implementation successes include Louisiana State University (LSU) and CSU-Fullerton (CSU). In 1997, LSU launched its version of a student information system called PAWS (Personal Access Web Services). PAWS offers access to the central university directory, electronic library reserves, and student grades. PAWS also allows access to current and potential degree program audits, and student financial aid status (Ethridge, 2001).

It is important to perform assessments of current systems, leverage legacy functionality, and work to develop a usable system, as was the case at CSU (Harris and Herring, 1999). Ninety percent of the student population at CSU works and commutes to school. CSU was searching for ways to distribute the functionality of its student information system software to external customers without having to modify existing mainframe applications or databases (Harris and

Herring, 1999). CSU wanted a system that touted connectivity from anywhere, was secure, and could provide cost savings to traditional approaches (Harris and Herring, 1999).

The University of Texas-Pan American (UTPA) has a work and school commuting student population. The UTPA computer-based system called ASSIST (Advanced Services for Student Information Supported by Technology) was implemented to take advantage of the advances in technology, provide students with ease of access for various functions, and relieve the congestion at various student service offices. The UTPA ASSIST program offers all the services that LSU and CSU offer and the ASSIST program hopes to expand its services in the near future to meet the changing needs of its student population. This case study explores the student services system at the University of Texas-Pan American and reports on user satisfaction and their preferences through a student survey, actual system usage over several years, and the estimation of cost-benefits of the system.

ASSIST AT UTPA

During the past ten years, UTPA invested approximately \$750,000 in Telephone, Kiosk, and Web Technologies called ASSIST at the University of Texas-Pan American (UTPA). The investment provided a comprehensive information system that enables high quality service and efficient operations. Investigating the realization of cost savings without decreasing the quality of student services is the purpose of this study.

The following are the research questions:

- (1) What is the preferred interface for students to access ASSIST (Voice, Kiosk or Web)?
- (2) Which ASSIST services do students prefer?
- (3) What are the cost savings of ASSIST to UTPA?
- (4) Does ASSIST enhance the quality of student services?

The University of Texas-Pan American, a member of The University of Texas System, served approximately 14,000 students in 2002. Currently, the student population is over 17,000. The main campus is located in Edinburg, Texas in the county seat of Hidalgo, part of the McAllen, Pharr, Edinburg MSA, with a population of over 600,000-the fourth fastest growing area in the country. About 85% of UTPA students are Hispanic, reflecting the demographic characteristics of the immediate region. The University enjoys the distinction of having one of the largest enrollments of Hispanic students in the United States.

UTPA's ASSIST (Advanced Services for Student Information Supported by Technology) initiative is a comprehensive plan to automate service delivery for the campus. This includes self-service initiatives such as web, telephone, and kiosk, in addition to automated services such as billing, admissions, records, and financial aid.

Student kiosks (ATM type machines) provide informational services and hard copy printouts of student and university information at a number of remote sites. This system allows student or public access to information without visiting the Office of Admissions and Records and Payment and Collections Office. The cost avoidance for this project includes reducing additional

personnel to serve current and prospective students, and improving parking and other support facilities. The system started with three kiosks in 1996 and grew to 16 by 2001.

UTPA has 16 TouchNet Kiosks around campus, providing a variety of student services including, account balance, activation of student e-mail accounts, admissions status/forms, campus calendar and events, campus maps. Additionally, students have the ability to change their Personal Identification Number (PIN), check class schedules, and course availability. They can make credit card and electronic check payments, view degree audits, locate contact information in departmental office and telephone directories, view financial aid awards, track financial aid documentation and check registration holds. The Kiosks provide students the ability to see available jobs, and review unofficial transcripts.

“Before implementing the TouchNet Kiosks, students who did not have access to the campus computer network were required to come to the Student Services Building during normal office hours to receive information and / or copies of their records. They often stood in long lines, especially at the beginning of a semester to receive their important information,” said William Morris, Director of Institutional Research at the University of Texas-Pan American.

Today, campuses dedicate resources to automating student and staff applications similarly to UTPA. “We are trying to adopt a model where 85% of the students service themselves while leaving us more staff time to service those 15% that have additional needs,” said Morris. “We are providing the students with a variety of methods to get to information.”

In addition to TouchNet Kiosks, UTPA provides a full suite of access devices-including SCT Web for Student, TouchNet Payment Gateway, and TouchNet Interactive Voice Portal-providing access to information and services anytime, anywhere. According to Morris, “Our TouchNet products have also reduced the number of students calling or coming to the Office of Admissions and Records and the Student Financial Aid office to obtain their information.” The telephone voice system started in fall of 1991 with 24 lines and grew to 48 lines by spring of 1999. Presently, there are 16 kiosks installed campus wide. Further, students access ASSIST through the Internet. What follows is the evaluation of the system since implementation.

EVALUATION OF THE UTPA SYSTEM

Student Survey on the Usage of and Satisfaction with ASSIST

Surveying IT users for satisfaction is important. Zviran and Erlich (2003) state that an “information system which met the needs of its users would reinforce satisfaction with the system.” Further, the users or customers of an IS system are the best judges of quality. Our student survey presents evidence of student satisfaction with the ASSSIT system.

The student services study presented here resulted from a survey of faculty and staff. Originally, a survey of faculty and staff determined how many people used the university Intranet, especially the employee web, what features they liked, and suggestions for changes. The results of the employee survey were dismal. Only 25% of faculty knew that the employee web existed.

Further, the dismal revelation of low employee site usage enlightened the campus computer center responsible for the computer systems on campus.

The employee survey helped formulate the next, logical question. If there was underutilization of the employee web, would students' usage of ASSIST be underutilized too? Additionally, of the students that used ASSIST, what features of ASSIST were preferred and used most? The university spent \$750,000 on the system hoping that students would go to the system instead of visiting student services offices requiring staff to spend their time with the students. That concern initiated this study. This study was conducted in two phases: The first phase focuses on the student survey, and the second phase focuses on system usage statistics and estimated cost savings and other benefits of the system.

As shown in the following Tables, the student survey led to the following results:

- (1) Even after implementation of ASSIST, a significant number of students were visiting the Student Services offices (Table 1).
- (2) Students knew about the existence of and the services provided by the ASSIST system: 95% knew that ASSIST was accessible by Web, 91% knew ASSIST was accessible at the Kiosks, and 87% knew ASSIST provided phone access.
- (3) Most students believe that ASSIST is easy to use: 83% agree or strongly agree that ASSIST by Web is easy to use, 75% agree or strongly agree that ASSIST by Kiosk is easy to use, and 69% agree or strongly agree that ASSIST by Phone is easy to use (Table 2).
- (4) Most (74%) respondents favor using ASSIST by Web, whereas only 16% favor ASSIST by Phone and 10% favor ASSIST by Kiosk.
- (5) Overall, 97% of the respondents are satisfied with the services offered by ASISST.

Table 1. Number of times respondents visited Student Service Offices for Information provided on ASSIST

	None	Once	Twice	Three Times	Four Times
Admissions Office	9%	31%	31%	18%	11%
Financial Aid Office	22%	18%	25%	14%	21%
Payments & Collections Office	19%	36%	26%	10%	8%

Table 2. Survey Respondent's Experience with ASSIST Web, Voice, & Kiosk

	Strongly Agree	Agree	Disagree	Strongly Disagree	Do Not Know
Kiosk Easy to Use?	34%	41%	7%	3%	15%
Web Easy to Use?	50%	43%	2%	1%	4%

Phone Easy to Use?	32%	37%	10%	3%	18%
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Student Usage Statistics.

This section addresses the usage of the UTPA system. Usage statistics include the two main portals of kiosks and web access. These sections provide overall and per capita usage.

Kiosks

The data suggest that the kiosk usage has been increasing over the years since first installation, despite some fluctuations at times. Kiosk usage started to drop recently (Figure 1) because of the popularity of the Web-based system. Students utilize the kiosks mostly for the following services: grades, student schedules, and course availability.

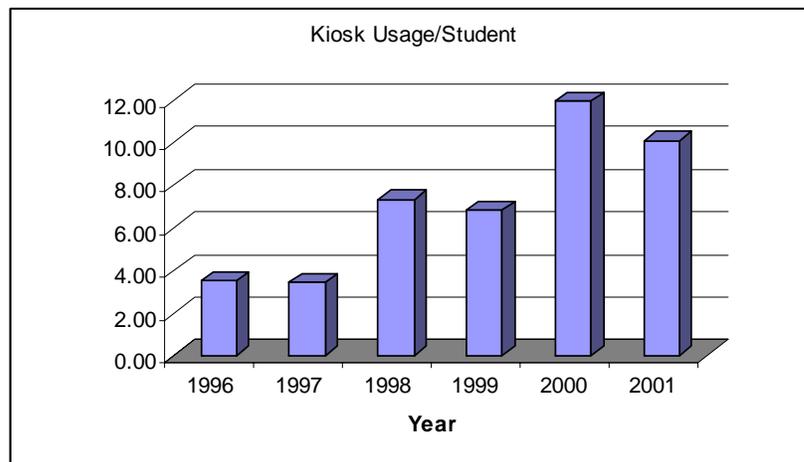


Figure 1. Overall Kiosk Usage per Student

Enrollment at UTPA has steadily increased; thus, the question of increased kiosk usage is considered. Is the positive trend in usage of kiosks simply because of the increasing number of students? Usage per student gives a better picture of the popularity of kiosks. Figure 1 shows that the kiosk usage per student increased steadily from 1996-2000. The decline in 2001 may be due to student preference for Web-based system.

WEB Access

The data on the usage of the web-based ASSIST system clearly reveal that the students have accepted web access widely as the preferred method for receiving various services. There is an upward trend in web access and this upward trend increases in significance since 2000 (Figure 2). Web access, heavily advertised to students, increased familiarity with the user-friendly web interface over the years. These factors have contributed to increased utilization of web access to ASSIST by students.

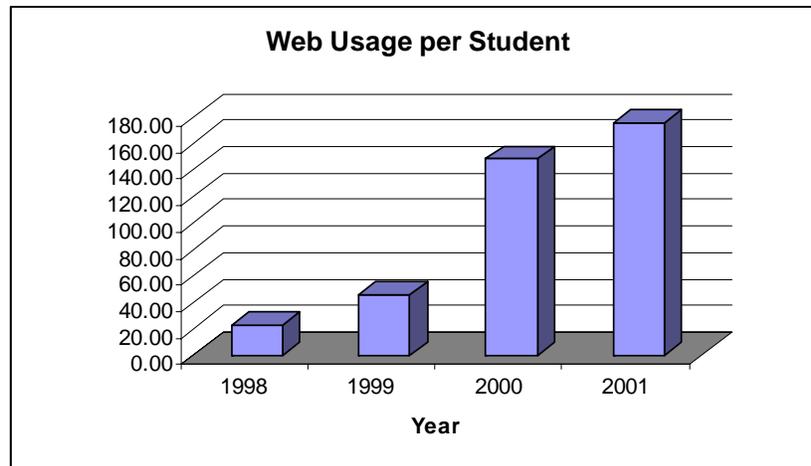


Figure 2. Overall Web-based ASSIST Usage

Arnold (1995) cites the DeLeon and McLean model devised in 1992 as useful to indicate that system quality (hardware / software), and information quality (the quality of the reports generated by the system) lead to usage as well as user satisfaction. Further, Robert Benson, dean of the School of Technology and Information Management in St. Louis, states that “99 percent of the value of IS to the enterprise is in performance.” The usage level of the system and student preferences present good evidence that the UTPA student services system performs well and meets the needs of students (Eskow, 1990).

COST SAVINGS THROUGH ASSIST

This section addresses the cost benefits and cost avoidance of the UTPA student services system.

- Credit Card Payment
- Parking Permit
- Payment and Collection Information Services
- Admissions Information Services
- Student Financial Aid Information
- Electronic Transcripts
- On Course (Electronic Degree Plan)
- Elimination of Arena Registration and Ballroom Drop and Add
- Transcript Fee

Cost Summary

Mahmood (1993) writes that there should be empirical validation of the “relationship between IT investment and organizational strategic and economic benefits.” We feel that the cost savings and benefits in our case study indicate evidence that the UTPA ASSIST system is providing cost savings / economic benefits providing an appropriate return on the IT investment in the system.

MANAGERIAL IMPLICATIONS AND CONCLUSIONS

Many anecdotes exist that describe IT implementation as horrific to sublimely useful; however, IT investments in general prove to be very beneficial to organizations. Research has concluded that managerial support of an IT system is imperative (Jarvenpaa and Ives, 1991). Having authorized, funded, and implemented IT; management generally requires feedback to ascertain whether their decisions were correct and fruitful. Measures of IS success also provide a link to insuring that management stays involved in the ongoing upgrade of the ASSIST system, and that linkage to IS success measures insures that there is ongoing owner or managerial enthusiasm (King and Teo, 1996).

This paper presented three different measures to review the success of an information system:

- (1) Surveying student users of the system for system usage helped determine which features are popular. The survey also highlighted potential problems that would require resolution. The student survey indicated that ASSIST by Web was the most popular. Additionally, the survey revealed problems with ASSIST by Phone.
- (2) By continuously collecting and monitoring actual data on system usage. ASSIST data was collected for several years revealing growing popularity of ASSIST by Web and a concurrent drop in kiosk usage in the last year.
- (3) The survey helped estimate cost-savings, and quality improvements for the institution and customers. This paper documented several ways the university saved money. It also listed several benefits that students enjoy because of ASSIST. Those benefits include instant information, transcripts, and not wasting time by standing in lines for registration, parking financial aid and similar services.

The benefits of the system imply that continuing IT investments are appropriate. Recent additions, without cost information, include making Web-Check available through ASSIST. Web-Check allows students to pay fees using their checking accounts via the Internet entering bank routing and checking account numbers along with the amount they want to pay. Students can make emergency loan applications. As kiosk usage and web access increased, voice access to the system decreased. The university is planning to use the excess capacity of voice response system to do outbound calls to notify students of cancelled classes, payment reminder calls and important deadlines, and so on.

This study answers to four specific research questions:

- (1) What interface is preferred (Voice, Kiosk, or Web)?
Web-based ASSIST was most popular. This would support Yen et al., (2004) that system usage is a reflection of system reliability and security for end-users
- (2) What are the most popular features?
Highest access was to check course availability and registration related features.
- (3) What are the cost savings?
Costs saved in several ways as discussed in the previous section.
- (4) Is there a quality dividend for the ASSIST system?
The use of technology to improve user satisfaction reflects directly in quality of services of an organization (Ling and Rubin, 2004). Our student survey indicates that students are receiving more convenient and timely service through ASSIST; they are receiving the information most needed; thus, implying that the ASSIST system provides quality for all users.

Overall, the UTPA system is a success in the eyes of both management and students.

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