EVALUATING STUDENTS' SATISFACTION USING TWO SAP ERP USER INTERFACES

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ABSTRACT

Companies worldwide use Enterprise Resource Planning (ERP) systems to effectively manage business processes across organizational departments and information among global subsidiaries. Colleges have incorporated ERP systems into their business curricula to provide students with a better understanding of business process theory and information sharing concepts. In this paper, we discuss students' satisfaction with using two end-user interfaces for SAP's ERP software in an online/distance education classroom. The first interface was a front-end graphical user interface (GUI) with a client/server architecture using online transaction processing (OLTP) and an Oracle database management system. The second interface was completely simulated using a JAVA-based program running in a browser. From a computer science viewpoint, we were interested in better understanding the human-computer interaction of students with the two different interfaces. Specifically, we wanted to determine which interface best secured students' satisfaction as users, while learning business process theory and information sharing concepts. Reasons for students' dissatisfaction with using SAP's GUI, and benefits from using a completely simulated environment, are discussed. Other colleges considering implementing SAP's ERP software into their online/distance education curricula may benefit from "lessons learned" from this human-computer interaction experience.

INTRODUCTION

At a U.S. school of business, faculty realized the management information systems (MIS) course needed to be revamped in their online/distance education curriculum. At the same time, faculty became aware of an increasing global economy driving businesses to adopt enterprise resource planning (ERP) systems. They understood companies in their geographic area were requiring prospective employees to have an understanding of the various roles an ERP system could play in a company to streamline business processes, improve communication among departments, and facilitate sharing of information among global subsidiaries and corporate headquarters. SAP is the world's largest and most well-known vendor of ERP software. SAP created the University Alliances (UA) program to have their SAP R/3 system included in colleges curricula. The UA program provides member colleges access to a full suite of SAP R/3 application modules, "hands on" student training exercises, data center support, seminars and educational resource materials. With additional constructive feedback from students, business school faculty encouraged revision of their online/distance education MIS course to include SAP ERP, as many other business schools have done [1, 2, 3, 4, 6].

Recently, published guidelines for information systems curricula have also proposed an understanding of the theoretical and practical issues related to business process management and enterprise systems, with the inclusion of an ERP system [5].

FIRST IMPLEMENTATION – SAP R/3 & UA PROGRAM

When the first revised MIS classes started, students began installing a 600MB GUI on their PCs. The installations were most arduous as many unforeseen problems occurred. Not anticipated were all the different types of PCs and versions of systems software students used. The 600 MB GUI file was reduced to 164 MB – one-fourth the original size, after discovering a great deal of unnecessary information within the installation file. However, some students were still unable to get the GUI to work and were given a different Java version. Some students had Macintosh (Mac) computers. A Mac version of the GUI was provided for MAC users, as they could not access the Windows GUI. As described above, the installation of SAP R/3 GUI software failed miserably, partially because the SAP R/3 GUI required a major install on each student's PC. With a multitude of operating systems, patch levels, etc.; it just was not feasible to expect students to do this without a lot of hand-holding. Considering these factors, four different versions of the GUI were implemented on a central server within the school of business, and links to these were provided through the online/distance education classroom. Detailed installation instructions with screen snapshots were also developed and provided for each GUI version.

Using the GUI client installed on their PCs, students connected through the Internet to SAP R/3 software performing online transaction processing (OLTP). The SAP R/3 software, with an Oracle database for storage, resided on servers in UCC's datacenter in Milwaukee, Wisconsin. While access through the Internet was quite consistent, the UCC servers were not always available, which hindered students' attempts to complete their exercises before assignment deadlines (Sunday night due date, for example). Because the UA did not provide an SAP help desk, help for instructors was limited, which made supporting students a challenge. Putting an "SAP Help" link on the classroom's discussion board was found to be most fruitful. Students were told to use the link to post questions. Fellow students would assist with responses. This worked because many students experienced the same problems and were able to help other students. The school of business's Help Desk did agree to reset student passwords. This proved quite valuable. Not only did students forget their own passwords, but it seemed that some students would try logging into the wrong account and, after three failed attempts, lock another student's password. For example, a student was assigned to login as FSUSER-22 but accidently typed FSUSER-23. After three failed attempts, they locked out user FSUSER-23.

"Hands on" student training exercises were based on the fictitious Fitter Snackers (FS) Company, which was also described in the accompanying textbook [8]. Using the SAP GUI, students were required to complete the step-by-step instructions for FS exercises, often some 60+ pages long for an exercise. It was quite easy for a student to miss a step, or even key in the wrong data. Once a step was missed, or wrong data entered, the average user could not go back and make changes. Students knew what results they were

supposed to achieve (as provided in the step-by-step instructions). When they couldn't get these results, they became quite frustrated, and their emails became quite demanding. Students were willing to do the work, and to do it over and over, to get it right; however, datasets could not be reset. There really was no way to "fix" a mistake. Resetting datasets was a frequent request by frustrated students, and one way to accommodate this was to give a student an unused logon. This led to additional administrative work – keeping track of logons that had been switched.

The inability to keep students from contaminating another user's dataset was another issue with the SAP ERP system. For example, FSUSER-22 could login as the appropriate student and then use dataset 23, in addition to any other dataset from 00 to 99. There was no apparent way to prevent this from happening. Even though students were advised of the issue and the inappropriateness of using someone else's dataset, it did continue. Of course, this corrupted another student's dataset, leading only to more student frustration.

As a part of their final grade included FS exercise scores, students' complaints became the norm. They directed their complaints to the lead MIS faculty member, the Help Desk and others in the administrative section of the school of business. Some very frustrated students directly approached the Office of the Dean to complain about the SAP R/3 graphical user interface and FS exercises. With little support from the Help-Desk, the start of every subsequent semester was hectic.

SECOND IMPLEMENTATION – SAP SIMULATOR

Something had to be done to rectify all the frustrations and very verbal complaints from students. As a result, the business school opted to move away from using the OLTP SAP R/3 system and GUI, student training exercises, and the UA Program in general. Instead, we decided to use an SAP simulator created by Simha R. Magal and Jeffrey Word [7] in partnership with SAP.

The simulator is a Java-based program running in a browser. It is extremely easy to use. On every screen from the start of the simulator to the end, the student is led from field to field, and screen to screen. The simulator instructs the student on what to do and why, and even prompts with a red highlight on what fields or instruction set they need to click to work their way through the process flow. For students, the simulator Website is quite straightforward. Students self-register on the Website, and then perform the assigned fictitious company Super Skateboard Builders (SSB) exercises – once with the simulator performing all the steps, and then three times on their own with the simulator guiding them through the processes. A quiz measures students' comprehension of process flow and comprehension of other information in the accompanying SSB simulation exercise. A student's progress is recorded in their grade book. All of this grading information can easily be downloaded to an Excel spreadsheet to perform calculations for determining students' overall weighted grades for the simulations and quizzes.

The first step in getting started using the simulator was to contact WileyPLUS (the publisher of the accompanying textbook) and obtain instructor access to their Website to setup a simulator for each MIS class. Setup was straightforward and very intuitive. The

instructor creates a new class for each semester by assigning five SSB simulation exercises and five quizzes to specific weeks of the course. After setting up the simulator for a class, an instructor automatically has a URL to provide to students to access the simulator Website. If students purchased a new accompanying textbook [7], they were provided with an access code. However, if they purchased a used textbook, they had to purchase an access code during registration on the WileyPLUS Website, with a current cost of $8.00.

Once a student has access to the WileyPLUS Website, they self-register to class, which means there is no involvement by the instructor in the students' registration process. Throughout the course, students complete pre-defined SSB simulation exercises assigned on a week-by-week basis. The WileyPLUS Website has five SSB training exercises and five related quizzes – one for each simulation exercise. The SAP simulation exercises are automatically graded as a percentage of completion. That is, if a student starts a simulator exercise and completes 75% of it, then 75 is their grade. Most students complete the simulator exercises and end up with 100 on each of five exercises. The quizzes on the other hand can be a bit challenging. Some only have four questions, so if a student misses two, they drop their score to 50% for that quiz. Students were encouraged to run a simulator exercise over and over, and to take detail notes about the exercise until they became very familiar and comfortable with the process and information flow. That way, they better understand how SAP software can be used in a business to improve process flow and enhance communication of information among departments. They are also better prepared to answer quiz questions, which are designed to measure students learning during the simulation exercises.

DISCUSSION

There are many ways to obtain feedback from users. While we did not set out to solicit feedback, by default we found this statement to be true. Frustrated students sent on average over 100 negative emails per semester to instructors expressing their dissatisfaction with the SAP R/3 installation and accompanying instructions, log on procedures, using the GUI, or the FS exercises and instructions. In contrast, students sent less than 20 negative emails to instructors per semester about WileyPLUS registration, using the simulator, or completing SSB exercises and quizzes. The following discussion attempts to explain these differences in students' satisfaction levels.

To use the SAP R/3 GUI, students are required to understand an abstract language in which (1) master data, (2) organization structure, (3) business rules, and (4) actions of the system are represented with a language of symbols, signs and tokens. For example, master data requires knowing how to use purchasing and cost element groups; business rules use grammar associated with automatic postings and document numbering; actions of the system include converting a planned order to a production order, or checking stock status [4]. The complexity of the GUI's abstract language seemed to frustrate students. In contrast to the GUI, the simulator "held the hands" of students as it guided them through the use of the SAP system. Students appeared to be more comfortable using the simulator and seemed less frustrated using it to perform exercises on their own.

There were other differences in complexity between the two sets of exercises that may have caused students to be more dissatisfied with the FS exercises. The instructions for FS exercises (60+ pages for some) were more extensive than the SSB simulation exercises. The FS exercises included more transactions, and processing in other business functions, such as capital expenditure budgeting and human resources, than the SSB simulation exercises. The online/distance education MIS class was delivered through either WebCT or Blackboard classrooms, which meant problem solving took place through e-mails or postings on discussion boards. Delays in solving students' problems may have increased frustration and dissatisfaction with either of the two sets of exercises. Students were not in a lab with an instructor present to answer their questions right away. When online students encountered a problem and could not proceed in an exercise, they needed to wait for a response from their instructor or other classmates before they could continue with the exercise. The relative difference in numbers of problems reported from students ranged from exorbitant with the Fitter Snackers (FS) exercises to minimal with the SSB simulation exercises. The delay in solving students' problems in an e-learning environment could have partially contributed to the increased dissatisfaction from students using the GUI in SAP R/3.

The similarity between the Fitter Snackers (FS) exercises and the SSB simulation exercises was primarily with the two accompanying textbooks [7, 8]. The authors explained how the two fictitious companies (FA and SSB) accomplished basic business functions manually prior to adopting ERP systems. By describing how ERP systems were used in the exercises, the authors explained how processing was improved by capturing data once at the source in a central database, and how the SAP ERP system allowed departments to share data to improve communication among departments. By reading the accompanying textbooks, students performing either set of exercises should have had sufficient background information to understand the bigger picture of processing in the fictitious companies; that is, before and after using an ERP system. Neither of the textbooks' descriptions should have caused students to be anxious while performing the exercises. If anything, the textbooks' descriptions should have increased students' understanding of what the exercises were trying to accomplish and reduced anxiety levels.

CONCLUSION AND RECOMMENDATIONS

We described how two different interfaces for SAP's ERP system were incorporated into the business school's MIS course in an online/distance education curriculum. In reviewing the objectives for the course, we asked: "With which user interface were students most satisfied and learned best? Using a client-based GUI to access an SAP R/3 OLTP system with accompanying database, or a JAVA-based simulation of SAP running in a Web browser?" We found students became most agitated when problems occurred logging in through the GUI, accessing the correct dataset, or performing strict OLTP instructions to complete the FS exercises. During the FS exercises, students became easily frustrated with OLTP, using "live" application modules, and detailed step-by-step instructions to complete transactions. Their focus was on obtaining the correct results at the end of the step-by-step exercises, with little learning of processes and flow of information. On the other hand, we found students who used the SAP simulator, and

performed the SSB exercises, were less frustrated and more receptive to learning how communication, processing, and information can successfully flow though a business organization. An important lesson learned about interfaces is simulation software takes away the need for a student to know all the details about how to perform a process transaction. Instead, the simulator takes students through processing steps with a concentration on explaining how ERP systems allow processing to flow across organizational functions, insuring communications take place between involved departments, and allowing processing to be completed efficiently, timely and with fewer errors, as compared to manual processing. Using an SAP simulator allows students the opportunity to understand the process flows, and appreciate the benefits that occur, when using ERP systems in businesses.

Based on our experiences in an online classroom environment, we do not recommend students use an ERP system with a complex GUI, such as in SAP R/3. The complexities associated with the SAP R/3 GUI appeared to dampen students' enthusiasm for learning and caused dissatisfaction, not only with the GUI but with an online/distance education environment as well. Instead, we recommend students in an online/distance education environment use a simpler, more straightforward SAP simulator interface, such as found on the WileyPLUS Website, where students appeared to be more satisfied with using the interface and concentrated more on learning about processing flows and communication between business functions. We also recommend additional quantitative studies of end-user satisfaction and learning using an SAP simulator interface, such as found on the WileyPLUS Website.

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