

EDUCAUSE Center for Applied Research

Research Bulletin

Volume 2002, Issue 22

November 12, 2002

Enterprise Resource Planning Systems in Higher Education

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Overview

Higher education's collective investment in vendor-supplied enterprise administrative systems, often referred to as enterprise resource planning (ERP) systems, may exceed \$5 billion to date, placing it among the academy's most significant information technology (IT) investments of any kind. Many colleges and universities are investing in enterprise-wide implementations of course management systems; others are preparing for a second round of investment in administrative and other enterprise-wide systems. An assessment of the successes and challenges of recent ERP implementations should help guide future efforts.

As articulated by Christopher Koch, the key word in enterprise resource planning is "enterprise."¹ ERP integrates functions across the enterprise into a single system that supports the institution's financial, human resources (HR), and student service transactions and processes. The Gartner Group highlights several important characteristics of ERP systems in higher education:

- Multiple in scope, tracking activities including HR, student, and financial systems
- Integrated such that when data are added in one area, information also changes in all related areas and functions
- Modular in structure
- Key business processes enhanced by standard systems and redesigned according to best practices

In February 2002 the EDUCAUSE Center for Applied Research (ECAR), along with Cap Gemini Ernst & Young, began a qualitative and quantitative study of completed ERP implementations begun after 1995. The study included a literature review, a Web-based survey, a series of qualitative interviews and case studies, a "summit," consultation with administrative systems leaders, and interviews with vendors and consulting firms. Four hundred eighty institutions, across all Carnegie classifications, participated in the Web-based survey.

This Research Bulletin examines the state of recent ERP implementations in higher education, with a focus on implementation experiences involving budget, timeline, and customization; outcomes of those implementations; and future plans.

Highlights of ERP Implementations

A large number of colleges and universities have implemented—or are planning to implement—an ERP system. To guide current and future implementations, it is important to understand why institutions chose to invest in ERP, the rationale for selecting specific systems, critical decisions in the implementation process, the outcomes achieved, and what institutions plan to do next.

Status of ERP Implementations

Of the 480 institutions that responded to the ECAR survey, 256 had implemented at least one vendor-supplied ERP module since 1995. The choice of a particular vendor was based on a variety of criteria (see Table 1). Although price was among the six most common factors that influenced vendor selection, it ranked fifth overall. A larger number of institutions cited features/functions, fit with the IT architecture, and vendor qualifications as important factors. Respondents were asked to “select all that apply.”

Table 1. Factors Influencing Vendor Selection

Reason for Vendor Selection	Frequency	Percent
Feature/functionality best fit requirements	193	20%
Architecture best fit with IT strategy/goals	127	13%
Vendor’s reputation	126	13%
Vendor’s ability to provide a complete solution	124	13%
Price	110	12%
Vendor product/vision	99	10%

The survey focused on the financial, HR, and student modules. Of the implementers, only 33 percent had implemented all three modules. An almost equal proportion had installed the student model (24 percent) as had installed both the financial and HR modules (25 percent) (see Table 2). Of the 69 institutions that had not yet installed all three modules but planned to do so in the future, 56 percent said they were following a phased implementation plan but had not yet completed it at the time of the survey.

Table 2. Modules Installed by Implementers

Module Combinations	Number of Institutions	Percent of Institutions
Financial, HR, and student	100	33%
Financial and HR	73	25%
Student only	70	24%
Financial and student	30	10%
Financial only	18	6%
HR and student	8	2%
HR only	5	1%

Not all institutions have moved to ERP systems. Existing systems (defined as pre-1995 system implementations) are used at 44 percent of the institutions in this sample. Existing system installations include custom-developed software solutions and vendor-packaged systems. The vendor-packaged systems may (or may not) be modified by the institution; if modified, they are not necessarily up-to-date with current vendor releases. Two-thirds of those implementing new ERP systems continue to use existing systems as well. Among those not implementing ERP, reasons cited include that the existing system works (32 percent), other priorities have taken precedence (18 percent), or the institution is not ready for the activity or investment (16 percent).

Of those institutions that have not implemented an ERP module in the past seven years, many are in the process of installing a module, are planning an implementation, or are considering doing so in the near future. Approximately 10 percent of respondents indicated they are currently implementing or will implement an ERP module within the year, and an additional 25 percent expect to do so within the next three years.

Rationale for Implementing ERP

Survey respondents cited the perceived need to replace aging legacy systems as the single most important driver behind ERP implementations (see Table 3). The least important single motivation was dealing with Year 2000 (Y2K) issues. Even though Y2K was not the most commonly cited rationale behind ERP implementations, this may be due to the fact that Y2K has ceased to be an issue. For example, doctoral institutions that were completing implementations during the 1998–2000 time frame were most likely to emphasize the Y2K problem. Improving services and the operations of the institution were cited as motivations by many respondents.

Table 3. Reason for Implementing ERP Systems

Factor	Number	Percent
Replace aging legacy system	105	41%
Improve service to customers	42	16%
Transform how institution operates	33	13%
Year 2000 problem	23	9%
Modernize campus IT environment	14	5%
Provide better management tools	9	4%
Keep institution competitive	9	4%
Increase efficiency	7	3%
Accountability/regulatory compliance	5	2%

Implementation

Several interesting findings emerged from studying ERP implementations. First, most respondents indicated that their projects were completed on schedule and on budget. The major obstacles encountered during implementation related to organizational and process change, not technical issues. The most significant finding was that the degree of customization had a major impact on cost as well as ultimate satisfaction with the ERP implementation.

Project Budget and Timeline

Although it is widely believed that ERP implementations routinely exceed the planned budget and time allowed, respondents did not confirm this. In fact, more than two-thirds of institutions in this survey reported finishing on or under the original project budget (see Table 4).

Table 4. Degree to Which Implementations Stayed Within Budget

Budget	Module Implemented		
	Financial	HR	Student
Under budget	7%	5%	5%
On budget	61%	69%	63%
Over budget by up to 50%	28%	24%	27%
Over budget by more than 50%	4%	2%	5%

In addition, most respondents reported their implementations were completed on schedule (see Table 5). For example, 73 percent of institutions reported completing their financial system on schedule. Sixty-six percent reported finishing on schedule for the HR module and 63 percent for the student module. Not surprisingly, the larger the institution, the less likely it was to finish on time, regardless of the vendor or the institution's Carnegie classification.

Table 5. Adherence to Original Implementation Timeline

Timeline	Module Implemented		
	Financial	HR	Student
Early	2%	4%	3%
On schedule	73%	66%	63%
Over schedule by up to 50%	20%	22%	26%
Over schedule by more than 50%	5%	8%	8%

Sixty percent of institutions reported going live within one to two years of purchasing the software. However, nearly 20 percent reported taking four or more years to complete their implementation. For those institutions that exceeded their planned implementation timeline, the top reasons given were organizational issues and data issues.

Difficulty

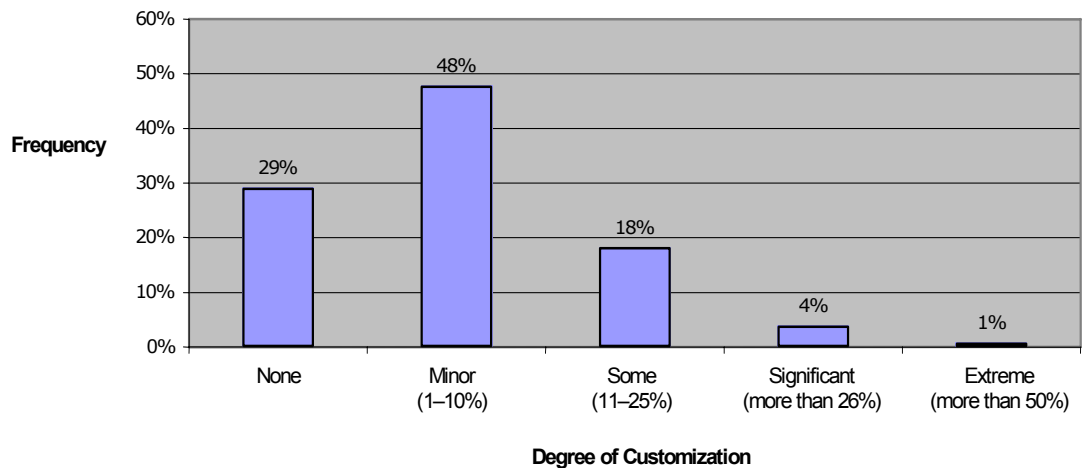
Respondents were asked to rate the difficulty of installing ERP systems compared to other large technology projects. On a scale of 1 to 5 (5 being “very difficult” and 3 being “about the same”), the mean was 3.52 for financial, 3.53 for HR, and 3.80 for student. Although the technical difficulty was judged to be greater than for other IT projects, managing process and organizational change were rated as more difficult than the technology.

When asked to evaluate the obstacles to completing implementation, the responses were similar across all three modules: process and organizational change were perceived to be the most challenging. Resistance to change and internal expertise—whether reflected in a lack of understanding of the software’s capabilities or the alignment of software to business practices—were rated among the top barriers. Issues with software, technology, or external consultants were rated much lower. The larger the institution, the more difficult the project, regardless of vendor chosen, whether the institution is public or private, or the institution’s Carnegie class.

Customization

For most institutions, the goal was to customize as little as possible. Eighty-seven percent of respondents either agreed (24 percent) or strongly agreed (63 percent) that their institution’s strategy was to implement software with as little customization as possible. In practice, 29 percent indicated that no modifications had been made to their systems, 48 percent had modified up to 10 percent of code, and 18 percent had modified more than 11 percent of code (see Figure 1). Only nine institutions (4 percent) had modified more than 25 percent of code. For those that did modify the code, reasons included improved reporting, look/usability of screens, gaps in functionality, integration of product with other systems, and ensuring the product conformed to existing processes.

Figure 1. Degree of Customization



Customization was the most influential variable on project outcomes. For example, an increase in customization extended the timeline for implementation and increased the likelihood of budget overruns. However, satisfaction with systems having little or no customization was perceived to be lower than with customized systems.

Achieving Objectives

Most respondents felt they had achieved their goals for the ERP project. Fifty-one percent indicated they had achieved their objectives, 46 percent had partially achieved them, and only 3 percent felt their objectives had not been met.

Many institutions reported losing functionality and momentum in the early stages of implementation, only to recover old functions and gain new ones as they mastered new technologies and business practices. For example, 54 percent of the respondents said productivity declined immediately after the implementation, yet 70 percent believe that productivity is improved today. In particular, there appears to be a steep learning curve for using the new systems and screens, in part because they do not always align with past practice. Other reasons for short-term productivity losses include lack of experience, failure to change business practices and accept the new system, and increased data entry and monitoring at the source.

Workload and costs are widely perceived to have increased as a result of ERP implementations (see Table 6). While the costs of inputs rose, 87 percent of respondents reported significant benefits for staff. Seventy-eight percent reported that students received significant benefits as a result of the ERP implementation, as well.

Table 6. Impact of ERP Implementation on Support Costs

Support Cost	Mean	Decreased or Stayed the Same	Increased up to 25%	Increased more than 26%
Packaged software	3.25	25%	26%	49%
Database	3.44	31%	29%	40%
Training	3.72	27%	25%	48%
Staff/personnel	3.84	35%	33%	32%
Hardware and infrastructure	3.97	38%	26%	36%
Desktop products and services	4.13	52%	24%	24%
Help desk and user support	4.17	46%	33%	21%
Systems operations and management	4.24	46%	29%	25%
Consulting	4.28	57%	23%	20%
Internal applications and code	4.95	66%	23%	11%

(1–7 scale: 1=increased significantly, 5=did not change, 7=decreased significantly)

When asked if they would build or buy if they were to implement ERP again, 88 percent of respondents would purchase enterprise solutions, 7 percent would build their own, and 5 percent expressed no opinion. Two-thirds would use a similar approach if they were to do an ERP project again. In fact, 85 percent indicated that implementing ERP was worth the effort expended.

Outcomes

Institutions of all types and sizes found benefits from their ERP implementations. Institutions felt that service levels were improved and accountability enhanced due to better and more easily accessible information (see Table 7). Overall, institutions were largely able to realize the benefits that ERP systems promised.

Table 7. Outcomes from ERP Implementations

Outcome	Mean
Added new services for students, faculty, and staff	3.29
Improved services to students, faculty, and staff	3.25
Made it easier to take advantage of new technologies	3.22
Made management information more accurate and accessible	3.12
Enhanced regulatory compliance	3.11
Improved institutional processes	3.04
Increased institutional accountability	3.03
Enhanced institution's business performance	3.02
Reduced business risk	2.97
Enhanced support of academic mission	2.92

(1–4 scale: 1=strongly disagree, 4=strongly agree)

Next Steps

The majority of institutions surveyed plan to continue building or adding to their ERP systems. In the short term (within the next 12 months), 70 percent will have implemented new modules (see Table 8). Colleges and universities are also devoting significant effort to follow-on projects, such as e-commerce/e-procurement, portals, and data warehousing.

Table 8. Next Steps for ERP Implementation

New Additions to ERP System	Implemented or Implementing	Within 1 Year	In 1–3 Years	In 3–5 Years, or Not under Consideration
New modules of core applications	47%	23%	16%	14%
Add/substitute best-of-breed applications	19%	7%	9%	65%
Archiving/imaging	26%	13%	28%	33%
Customer relationship management	18%	6%	15%	61%
Data warehouse	39%	10%	27%	23%
E-commerce/e-procurement	35%	20%	24%	21%
Portal	40%	14%	30%	15%
Workflow	25%	16%	23%	36%

What It Means to Higher Education

Although ERP has been the largest system implementation for higher education, it is not likely to be the final one. Colleges and universities are planning to expand existing ERP systems as well as implement other enterprise-wide projects, such as portals.

This study counters the belief that ERP implementations are always over budget and behind schedule. In the majority of cases, institutions reported that they spent time and dollars as planned. The major exception involves customization of systems. The more an institution customizes an enterprise system, the longer and more costly it becomes. Institutions will need to find an appropriate balance between “plain vanilla” implementations and those that are highly customized, particularly because there is a correlation between degree of customization and customer satisfaction. Some institutions (Stanford University, the University of Minnesota) have developed techniques for adjudicating the tradeoffs among dollars, time, and customization. Others have adopted alternate methods, such as the use of “bolt-on” applications and third-party data analysis tools to supplement their ERP systems, thereby avoiding customization of the base code.

Institutions should not count on reducing overall costs as a result of an ERP implementation. In fact, most institutions find they are spending more for support, training, and software. In addition, planned enhancements require ongoing investments.

The assumption that institutions will gain value from an ERP implementation as soon as the system is installed is misleading. Most systems don’t reveal their value for several

years. Not only must the institution go through a transition period, but many times business processes must be changed in order to reap the full benefits of the new systems.

Another common assumption is that the project will be over as soon as the ERP system is installed. ERP implementations may never really be complete because institutions continue to modify processes, find new uses for the system, and add functions, such as e-commerce. In fact, a concern mentioned frequently is that the institution will stop investing in training and reengineering after the new system has gone live. Post-implementation investment appears to be quite important to realizing the potential of the overall ERP investment.

Colleges and universities considering an ERP system should consider it a “people project” more than a technology project. The changes required in organizations, processes, training, support, and collaboration make ERP implementations highly people-intensive. Institutions that manage ERP implementations as technology projects, without sufficient focus on people, may encounter a number of very significant challenges.

One of the greatest implications of ERP implementations is enterprise-wide integration. ERP systems require that data be consolidated, offices coordinate activities, upgrades to systems occur in a synchronized fashion, stakeholders work together, and so on. Although one of the goals of ERP systems is to integrate systems, such integration requires significant behavioral changes on the part of organizations that have often operated autonomously.

Key Questions to Ask

- What is our rationale for implementing an ERP system?
- Do criteria exist for selecting a specific product?
- What degree of customization do we need? What amount of customization can we afford?
- Do we have sufficient expertise to handle the people, processes, and organizational changes that will be required?
- Are our expectations for post-implementation changes realistic? Have we factored in sufficient time for people and processes to adapt?
- What metrics will we use to measure success?

Where to Learn More

- EDUCAUSE Information Resources on Enterprise Resource Planning, <http://www.educause.edu/asp/doclib/subject_docs.asp?Term_ID=350>

- Enterprise Resource Planning Research Center, <<http://www.cio.com/research/erp/>>
- ERP Central, <<http://erpcentral.com/>>
- ERP Assist, <<http://www.erpassist.com/nav/t.asp?t=404&p=404&h1=404>>

Endnote

1. Koch, Christopher, "The ABC's of ERP," *CIO ERP Research Center* (February 2002), <<http://www.cio.com/research/erp/edit/erpbasics.html>>.

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