

Using Enterprise Resource Planning Systems As The Core Of An Integrated Accounting Information Systems Course

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Abstract

Enterprise resource planning (ERP) systems integrate primary business applications. All the applications in an ERP suite share a common set of data that is stored in a central database. A typical ERP system provides applications for accounting and controlling, production and materials management, quality management, plant maintenance, sales and distribution, human resources, and project management. Industry analysts expect the worldwide ERP systems market to reach \$50 billion by 2002. The mainframe-based legacy systems of the past are being rapidly replaced with ERP software that runs on client/server technology. The author believes that a strong case exists to utilize a multi-semester ERP course as part of the accounting curriculum (offered in the junior and senior years) at four-year colleges and universities to provide a way to help students tie their accounting and business courses together. Such a course would address recent criticisms that suggest accounting programs are not preparing students to meet the challenges they will face upon graduation. This paper provides an approach related to the design and implementation of an Integrated Accounting Information Systems Course using Enterprise Resource Planning Systems as the core of the Integrated Accounting Information Systems Course. This paper presents research findings to support its approach to the design and implementation of an Integrated Accounting Information Systems Course.

Need for Integration and Technology

*A*ccounting education is perceived as having problems. These perceptions have most recently been researched and reported in *Accounting Education: Charting the Course Through a Perilous Future*.¹ Indeed, a need for change in accounting education has been argued for the last decade.²

Readers with comments or questions are encouraged to contact the author via e-mail.

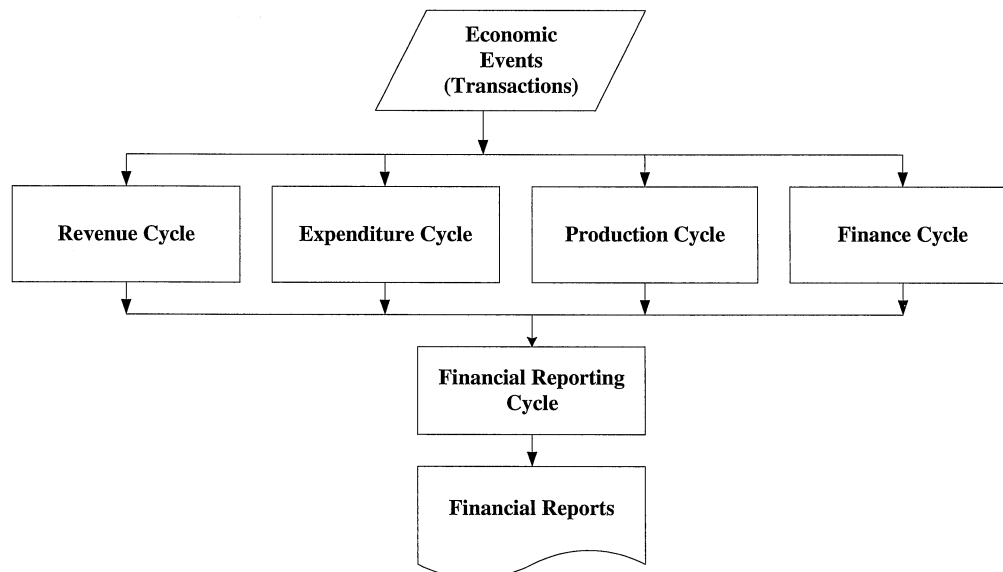
¹ W. Steve Albrecht, and Robert J. Sack, *Accounting Education: Charting the Course Through a Perilous Future*. Accounting Education Series, Volume No. 16. Sarasota, FL: American Accounting Association, 2000, 43.

² Albrecht and Sack, 44.

Two themes keep presenting themselves as a fundamental part of the solution to accounting education problems: integration and technology.³ This paper presents a plan of action in response to the criticisms that accounting education has faced for the last decade. Specifically, this paper proposes the utilization of an integrated accounting information systems course for the purpose of articulation using a technology base.

Integration

Most companies that accounting students will work for do not conduct their transactions in isolation. While most companies are organized along functional lines that do somewhat relate to majors offered by most business colleges, the transaction flows within each business cycle are extremely integrated. The fact that transaction cycles are integrated requires accounting students to understand the impact of an economic event from many different aspects. The following diagram depicts the transaction model that accounting students must master.



Most accounting programs do require students to take a course or series of courses that provides exposure to the transaction model. Some programs also utilize a capstone course that intends to help students bring their business and accounting courses together. However, despite the efforts of accounting education, some students are still entering the workforce without an acceptable understanding of how economic events are integrated. Thus, this paper proposes an approach that will allow students to gain an understanding of how economic events are integrated.

Technology

One of the problems accounting education is perceived to have is that "our students are not exposed enough to the impact of technology on business and ways in which technology can be leveraged to

³ Albright and Sack, 62. Accounting Education Change Commission (AECC), *Objectives of Education for Accountants: Position Statement No. One*. Torrance, CA: AECC, 1990, 2.

make business decisions.”⁴ This implies that students are not gaining a realistic exposure to how technology is used in the workplace.

The AICPA Core Competency Framework for Entry into the Accounting Profession lays a foundation for progressive curriculum change. The framework states that technology is pervasive in the accounting profession. Individuals entering the accounting profession must acquire the necessary skills to use technology tools effectively and efficiently. These technology tools can be used both to develop and apply other functional competencies.⁵

Colleges and universities must always evaluate the needs they are trying to meet in serving their constituents. Accordingly, it may be “out-of-scope” for some colleges and universities to consider utilizing more than a basic amount of technology in their programs. However, it would be appropriate for colleges and universities to make a conscious decision relative to the technology-related learning outcomes their students must achieve.

Given the demand for accounting graduates that understand how information technology impacts the transaction model and related business decisions, a case can be made that accounting education should include learning outcomes that allow students to meet this demand. Thus, this paper proposes an approach that will allow students to gain an understanding of how technology impacts the transaction model and related business decisions.

Obstacles

Any changes to accounting education must overcome obstacles. Three significant obstacles that must be considered in any significant accounting education change initiative include curriculum obstacles, teaching resource obstacles, and cost obstacles.

Curriculum Obstacles

The programs of study defined in the catalogs of colleges and universities do not always accommodate rapid change. For good reasons, the curriculum requires specific courses to be taken in a specific sequence. Efforts to add a course become difficult because there may not be hours available in the curriculum unless another course is dropped from the curriculum. Efforts to add a course that crosses disciplines (such as accounting and information technology) become difficult because students may lack some of the prerequisites normally required for a certain type of course. Thus, this paper proposes an approach that attempts to work within the constraint of current curriculum parameters.

Teaching Resource Obstacles

The teaching resources in many colleges and universities are fully allocated to cover existing courses. This makes it difficult to add a totally new area of instruction (such as technology) to an individual’s teaching responsibilities. Some colleges and universities do not, by design, accommodate team teaching or teaching outside of an individual’s discipline. This makes efforts to use existing teaching resources to integrate learning outcomes into a single classroom experience difficult. Thus, this paper proposes an approach that attempts to work within the constraint of teaching resource parameters.

⁴ Albrecht and Sack, 43.

⁵ AICPA , “AICPA Core Competency Framework for Entry into the Accounting Profession,” <http://www.aicpa.org/edu/func.htm>.

Cost Obstacles

The budget can be an obstacle to change in accounting education. The budget process for many colleges and universities is based on the actual expenses (and programs) from the prior year. Accordingly, program changes that require a different allocation of funds for teaching resources to a new program will sometimes require additional administrative efforts to justify the new program. In some cases, an exposure exists that funding for teaching resources may be lost if a prior program is reduced and a related program is not implemented. Basically, new line items for teaching resources in the budget present an obstacle for some colleges and universities.

The process of securing funds for new technology can be a significant obstacle to the implementation of a program that requires new computer hardware and/or software. Unlike teaching resources that usually do need to be present in the classroom, technology may be viewed as a luxury that just cannot be afforded. Accordingly, even well supported technology proposals sometimes have trouble surviving the budget process because they are not viewed as a need.

This paper does not provide a solution to the many cost obstacles colleges and universities may face when implementing a new program. However, this paper does propose an approach that attempts to work within the constraints of current cost parameters.

Question

In an attempt to respond to criticisms facing accounting education related to the lack of integration and technology, the following question is explored in this paper.

Does a case exist to utilize a multi-semester Enterprise Resource Planning (ERP) systems course as part of the accounting curriculum (offered in the junior and senior years) at four-year colleges and universities to provide a way to help students tie their accounting and business courses together?

This question was explored first by consulting current literature to determine if any colleges or universities are currently using such an approach. This question was further explored by sending a short questionnaire to the chairs identified in the Prentice Hall Accounting and Faculty Directory.⁶

ERP

Enterprise resource planning (ERP) systems integrate primary business applications. All the applications in an ERP suite share a common set of data that is stored in a central database. A typical ERP system provides applications for accounting and controlling, production and materials management, quality management, plant maintenance, sales and distribution, human resources, and project management. Industry analysts expect the worldwide ERP systems market to reach \$50 billion by 2002. The mainframe-based, legacy systems of the past are being rapidly replaced with ERP software, which runs on client/server technology.⁷ ERP systems exploit the advantages of process integration and single capture of information.⁸

⁶ James R. Hasselback, *Prentice Hall Accounting Faculty Directory 2000-2001* (N.J.: Prentice Hall, 2000).

⁷ AICPA Top Ten Technologies Task Force, *The AICPA Top Ten Technologies for 2000*, November 1, 2000, <http://www.toptentechs.com>.

⁸ Akhilesh Tuteja, "Enterprise Resource Planning: Can it be Risky", May 1, 2000, http://www.itaudit.org/index_search.htm.

ERP has been gaining attention in business and industry the last several years. An ERP system promises more and better information, which can lead to lower costs. It integrates and automates most business processes and shares information enterprise-wide in real time. Because the system tracks production by job, work center, person, and activity, there's evidence that it improves cost system quality. It's especially useful to companies pursuing a low-price/high-volume strategy - rather than a market niche strategy - such as manufacturers of mass merchandise items.⁹

The top five ERP vendors, SAP America, Oracle Corporation, PeopleSoft, Inc., JD Edwards & Company, and Baan International, account for 64 percent of total ERP market revenue. These vendors continue to play a major role in shaping the landscape of new target markets, with expanded product functionality, and higher penetration rates.

Industry analysts expect that every major manufacturing company will buy the software, which ranges in cost - with maintenance and training - from hundreds of thousands of dollars for a small company to millions for a large company. According to Gartner Research Group, the rapid evolution of ERP has already lead to a new corporate must-have, ERP II, which is supposed to help businesses gain more competitive edge in the future. The major difference is that ERP II involves collaborative commerce, which enables business partners from multiple companies to exchange information posted on E-Commerce exchanges.¹⁰

Some colleges and universities have also adopted ERP. For example, Texas Christian University installed PeopleSoft's student administration software and is running it without encountering problems. Some colleges have not had a great experience implementing ERP. For example, Cleveland State University had big problems getting PeopleSoft's student administration software to work properly.¹¹

Some colleges and universities have established ERP labs. For example, Syracuse University secured \$150,000 from the state of New York to establish and construct a laboratory that will lead to a strengthened local manufacturing environment and more efficient ways for Central New York businesses to compete globally, according to the lab's organizers. The lab will develop a certificate program in ERP and also will offer ERP training classes.¹²

Current Integration and Use of ERP by Colleges and Universities

A literature review revealed very little use by colleges and universities of ERP in the delivery of instruction. One example of using ERP to achieve integration did surface in the literature. The integration of ERP techniques by Florida International University's College of Business Administration (CBA) to deliver an integrated curriculum is discussed. Given the direct relationship between this article and the research question being explored, excerpts are produced below.¹³

⁹ Kip R. Krumwiede, CMA, CPA, and Win G. Jordan, CFPIM, "Reaping the Promise of Enterprise Resource Systems" *Strategic Finance*, October 2000, <http://www.mamag.com/strategicfinance/2000/10g.htm>

¹⁰ Josh Mills, edited by Tiffany Blaine for ITtoolbox Portal for ERP, "ERP Overview" <http://www.ittoolbox.com/>.

¹¹ Craig Stedman, "College ERP Success: May Take Custom Fit," *Computerworld* Vol. 33 (11/29/99): 12.

¹² Micahael Kaveney, "Syracuse University to Have New ERP Lab." *Business Journal* (Central New York) Vol. 14 (2/18/00): 27.

¹³ Irma Becerra-Fernandez, Kenneth E. Murphy and Steven J. Simon, "Integrating ERP in the Business School Curriculum," *Communications of the ACM*. Vol. 43 No. 4 (April 2000): 39-41.

Today, management curricula at most universities are generally delivered through courses associated with functional areas: accounting, finance, marketing, information systems, operations and management. Just as organizations are seeking to reengineer their business processes in part to move away from functional disintegration, management education has also begun to question its functional orientation. To better serve the needs of business, the CBA faculty sees ERP as a vehicle that will enable the change in educational delivery from functionally oriented to business-process oriented, with the ultimate goal of integration of the curriculum across functions.

The CBA applied for, and subsequently became a member of the SAP University Alliance in the spring of 1998. At that time, market leader SAP was the only ERP with a university partner program. As a member of the SAP University Alliance, the college received a complimentary copy of SAP's R/3 system, sponsored training, and software installation assistance.

To achieve the goal of integrated curriculum through ERP, an incremental approach was taken in order to gain requisite skills with the ERP system while developing new coursework. The first new course developed became part of the undergraduate Enterprise Resource Management Track (ERM), which places a strong focus on business processes. Students who choose the ERM track satisfy general undergraduate requirements during their first two years. The junior and senior years include the business core functional courses and specific ERM track courses. The specific ERM track courses focus on business processes and data management during the students' junior year, and on systems, technology infrastructure, project management and strategy their senior year.

Approximately twelve faculty members from information systems, operations, accounting, and marketing were part of the initial project team. Significant attrition caused by job changes, other interests, and lack of recognition of the work required to implement ERP in the classroom reduced this group to approximately five members. Lessons learned from this effort reveal that key project team members who will carry the project to completion must first be identified.

To reach our goal of integrated curriculum oriented education through ERP, faculty must develop coursework focusing on core business processes, rather than functional areas. Traditional departmental structure works against this objective, and there are few academics that have the intimate knowledge of the strengths and weaknesses of ERP technology. Moreover, there are few, if any, educational resources or guidelines for accomplishing this task.

An effort of this magnitude requires a sizable resource commitment to software and hardware. There is a \$7,500 annual fee for the CBA to be a member of the University Alliance. In addition to the ERP software, a database management system such as Oracle is required. Initially, a dedicated Dell PowerEdge 6100 server with four 250 MHz processors and a capacity of 90 GB to house the database and the ERP software was purchased at a cost of \$20,000. This server has since been upgraded to a Dell PowerEdge 6300 server with 550 MHz processors with 216 GBs of storage for an additional \$20,000. An ISDN line to allow SAP to monitor and support the system was installed at a cost of \$3,700 plus \$1,200 per year.

The future holds several possible scenarios for universities wishing to pursue an ERP initiative. An ERP vendor may selectively choose university partners to be application service providers who will develop, support and provide system and associated coursework to other university partners who will buy Web-based access. This capability will open the opportunity for universities with limited resources to become users of ERP services in the classroom, avoiding the expense of purchasing hardware, supporting the system, and gaining the required expertise. Institutions will be able to decide on their level of involvement with ERP vendors and systems, but at every level of participation the future promises to have

ERP in the curriculum.

Research Question Responses

To help answer the question explored in this paper, a short questionnaire was sent to the chairs identified in the Prentice Hall Accounting and Faculty Directory.¹⁴ The following open-ended questions were asked:

- What is your college currently doing to integrate accounting information systems into your curriculum?
- To what extent is your college utilizing ERP systems in your accounting curriculum?
- In your opinion, would an integrated accounting information systems course address some of the criticisms that are facing accounting programs today?

The questions were sent to 600 people (453 by e-mail and 147 by U.S. mail). A small percentage responded to the questions. Responses were received from 48 people (8% response rate). The results of this survey cannot be extrapolated to the entire base of colleges and universities represented in Hasselback. However, the results do provide some support to the question explored in this paper because the responses can be categorized into groups as follows.

| What is your college currently doing to integrate accounting information systems into your curriculum? | |
|---|-----|
| 1. Nothing | 25% |
| 2. AIS Course | 42% |
| 3. AIS Course with Application Software Used | 29% |
| 4. No Response | 4% |

| To what extent is your college utilizing ERP systems in your accounting curriculum? | |
|--|-----|
| 1. Not at All | 46% |
| 2. Some Discussion | 27% |
| 3. Some Application | 15% |
| 4. No Response | 12% |

| In your opinion, would an integrated accounting information systems course address some of the criticisms that are facing accounting programs today? | |
|---|-----|
| 1. Yes | 48% |
| 2. No | 6% |
| 3. Maybe | 25% |
| 4. No Response | 21% |

These responses indicate that for the people that responded to this survey, most colleges and universities limit their integration of accounting information systems to a dedicated AIS course, have some discussion of ERP, and believe that an integrated accounting information systems course would address some of the criticisms facing accounting programs today.

¹⁴ James R. Hasselback, *Prentice Hall Accounting Faculty Directory 2000-2001* (N.J.: Prentice Hall, 2000).

Proposed Course

The need for more integration and technology suggest that accounting educators should consider making changes to incorporate more real-world technology and integration of accounting and business topics. As discussed earlier, a desire to implement structural changes that will be necessary to address criticisms within the confines of university models that do not facilitate structural change will be a challenge. Accordingly, the course proposed in this paper attempts to work within existing parameters to avoid obstacles to change.

Course Concept

This paper proposes a six credit hour Integrated AIS Course spread over four semesters. To facilitate implementation and research, this course should be offered in a pilot (experimental) mode. Hopefully, the use of an experimental course will help avoid curriculum obstacles.

This course will require articulation with other courses. To avoid the obstacles related to teaching resources, this course should have one primary instructor from the accountancy program. During the pilot period, articulation with other disciplines will occur by inviting teaching resources from other business disciplines to be guest speakers in the course. Hopefully, this type of invitation would happen without this initiative or at least would not be an obstacle.

This course must initially be tailored to a college or university's existing technology base. Any new technology that will be required must be able to be gained via grant proposals and/or business partnerships to avoid cost obstacles.

This course would ideally include a business partner. In addition to potential funding, a business partner would provide a structured way to incorporate real-life experiences through the development of cases and field trips.

Integrated Course

The six credit hour Integrated AIS Course (course) spread over four semesters must include a requirement to take all four sections in sequence over a two-year period. This is crucial to the achievement of articulation goals. Assuming the college or university currently has a required AIS course and an accounting elective, the experimental course would replace these courses (and meet the AIS and elective course requirements). This also provides a research opportunity because two groups can be defined (those students that elect the experimental course and those that take the current courses).

The six credit hours would be spread over four semesters as depicted in the following table.

| | |
|-----------------------------|----------------|
| First Semester Junior Year | 2 Credit Hours |
| Second Semester Junior Year | 1 Credit Hour |
| First Semester Senior Year | 1 Credit Hour |
| Second Semester Senior Year | 2 Credit Hours |

Ideally, the course will be taught in a computer lab environment. The level of technology offered must be specifically tailored to cost parameters. While this paper proposes the utilization of ERP software in the lab to deliver specific learning modules, it would be possible to develop learning modules around a college or university's existing software base. For example, accounting information systems

such as Peachtree provide an opportunity to teach ERP concepts because they are designed around business processes.

The course should utilize continuous cases (ideally developed with a business partner) that reinforce learning outcomes using technology. The course should utilize learning modules that integrate concepts from a variety of business courses. For example, the following learning modules could be developed:

- Accounting and financial management
- Advanced reporting and analysis
- Budgeting
- Selling online
- Customer service
- Human resources management
- Inventory and stock levels
- Manufacturing planning and resource management
- Multiple currencies
- Payroll
- Project time and billing management
- Requisition, purchasing, and procurement
- Sales automation and customer relationship management
- Sales orders and fulfillment
- Supply chain management

Current ERP technology components directly relate to each module identified above. Furthermore, most colleges and universities have content experts in their business college that could serve as guest speakers related to each module. The actual sequencing of these learning modules should be tailored around the availability of guest speakers (teaching resources). The key is to design a plan that fits your environment and lives within your parameters.

Call for Research Participation

As accounting educators, we need to gain research results to determine if our change efforts achieve the desired goals. We cannot accept a conclusion that says research methods will not work in the area of student learning. The following excerpts from *Recommendations for the Design of Empirical Studies Examining Curricular Efforts to Develop Student Critical Thinking Skills Report of the Federation of Schools of Accountancy Educational Research Committee December 1999* are relevant to a call for research participation:¹⁵

The Federation of Schools of Accountancy's 1999 Educational Research Committee was charged with developing a research plan to guide accounting educators in identifying and implementing various curricular and instructional changes to develop the critical thinking competencies needed for success in public accounting. This charge followed closely the work of the 1997 and 1998 Educational Research Committees that identified a collective set of critical thinking competencies essential for success in public accounting.

¹⁵ The Federation of Schools of Accountancy's 1999 Educational Research Committee, "Recommendations for the Design of Empirical Studies Examining Curricular Efforts to Develop Student Critical Thinking Skills," <http://www.thefsa.org/publications/studies.htm>

There have been repeated calls for the improvement of critical thinking competencies in accounting students (e.g., American Accounting Association, 1986; Arthur Andersen, et al., 1989; Accounting Education Change Commission, 1990; and American Institute of Certified Public Accountants, 1999). These calls have prompted accounting researchers to develop and recommend ways to enhance students' critical thinking in the accounting curriculum (e.g., Rodgers, 1992; Gainen, 1992; Francis, et al., 1995; Kimmel, 1995; Cunningham, 1996; Wolcott and Lynch, 1997; and Wolcott, 1998). While ideas have been generated, accounting education research still has not demonstrated that the recommended curricular efforts are successful in enhancing students' critical thinking skills. This void in empirical support extends to higher education research in general.

Many accounting educators view further efforts toward education reform as unwarranted in the absence of empirical evidence that curricula can be designed to enhance students' critical thinking skills. One of the major reasons why little empirical research on this subject exists in accounting and elsewhere is that it is difficult to design and conduct powerful tests of critical thinking development.

This report provides guidance to accounting education researchers on ways to improve the design and thus the power of future empirical studies. The key recommendations of this report are as follows:

- Educational objectives in future studies should be defined narrowly to increase the likelihood that changes in student performance can be isolated (e.g., "ability to identify uncertainties in unstructured accounting problems" instead of "ability to identify and resolve unstructured accounting problems").
- Educational interventions should be specifically and directly linked the narrowly defined educational objective.
- Because critical thinking skills develop slowly, long-term educational objectives should be broken down into objectives that might more realistically be achievable over shorter periods of time.
- Researchers need to ensure that the critical thinking measures they use are valid for the specific learning objectives they wish to examine.
- In addition to nationally normed and well-validated measures of critical thinking, researchers should consider more naturalistic methods of evaluation such as rubrics as long as validity and reliability can be reasonably assured.
- Researchers should shift their focus away from descriptive and relational studies and toward experimental and quasi-experimental designs to study the impact of specific educational activities on critical thinking.
- The educational interventions to be tested must be deemed sufficiently powerful to expect improvements in student performance over the timeframe of the study, and the timeframe must be short enough to rule out uncontrollable critical thinking changes.

Accordingly, this paper includes a call for research participation. Accounting educators that are considering initiatives to expand articulation and technology are asked to consider additional steps to gain empirical data. For example, the course proposed in this paper is an experimental course that will provide a control group to help evaluate the effectiveness of the proposed course.

Conclusions

As accounting educators, we must listen to the criticisms of our constituents. We cannot fail to act because obstacles exist. Two themes keep presenting themselves as a fundamental part of the solution

to accounting education problems: integration and technology. An integrated accounting information systems course for the purpose of articulation using a technology base appears to be a possible way to implement a solution to some of the problems accounting education is perceived to have.

An integrated accounting information systems course using ERP as a base will not be easy to implement. However, if colleges and universities recognize that change can happen within current parameters and cooperation with our colleagues in other disciplines is possible, our students will benefit.



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