Hands-on ERP Learning: Using OpenERP®, an Alternative to SAP®

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ABSTRACT

Recent struggles with ERP systems (Kanaracus, 2010) highlight that teaching ERP skills is still very relevant today. Previous research suggests that knowledge of ERP concepts is more important than skills with any particular ERP package (Strong et al., 2006). However, a review of published studies in JISE shows a bias towards commercial ERP solutions (like SAP®). This gives the impression of high entry barriers to teach hands-on ERP skills. We suggest the use of freely available open source solution – OpenERP®, as an alternative for teaching hands-on ERP concepts. This provides numerous schools an avenue to teach hands-on component without the need for significant resource commitment. Our experiences from a simple role-playing exercise and related hands-on component using OpenERP® are discussed. In conclusion, we make an important contribution by providing details and experiences with using a free ERP solution – OpenERP®.

Keywords: Enterprise resource planning (ERP), Experiential learning & education, Instructional pedagogy, Computer assisted education, Course development models, Team projects

1. INTRODUCTION

As organizations face increasing global competition, organizations have no choice but to become more effective. Enterprise Resource Planning (ERP) systems provide one solution by providing management a better understanding and transparency of their business operations and have become the mainstay of practically every organization (Watson and Stewart, 2004, Winkelmann and Leyh, 2010). Accordingly, it is important for IS programs to consider ERP course(s) in their offering.

Teaching hands-on ERP skills is important for several reasons. First, learning ERP is identified as an important IT skill (Kim, Hsu and Stern, 2006). Organizations need users who are savvy to utilize ERP systems in their daily tasks. Despite this requirement, most of the students in higher education rarely come across enterprise systems (Strong, Fedorowicz, Sager, Stewart and Watson, 2006). Recent failures of ERP projects indicate that imparting ERP knowledge and skills are still required and important (Kanaracus, 2010).

Second, advances in pedagogical approaches place emphasis on active learning or learning-by-doing. Pedagogical approaches based solely on lectures are criticized as these approaches make students passive learners (Bok, 1986). Not only has the active learning gained prominence among educators and researchers, it is also argued that students seek opportunities where they can apply their knowledge to simulate realistic situations (Auster and Wylie, 2006).

Given the focus on active learning, initial growth and access to technology is viewed as an aid in enabling educators to achieve this objective. For example, the use of computer-mediated learning is known to be superior to traditional instructional modes (Alavi, 1994). We argue that IS courses are uniquely poised to utilize technology to actively teach the interaction between business and technology domains. This is amplified in the case of ERP as undergraduate students rarely have overall picture of the business operations. Most of them are focused on their area of concentration (be it Finance, Marketing, Accounting etc.). Given this academic background, the concepts of ERP are hard to grasp as the curriculum is still based on functional learning, but the ERP focuses on integration across the departments.

Educators can alleviate this problem by actually showing the students the cross-functional processes. For example, the students can easily relate to sales or purchase processes. In these processes, the students can be made aware of different units that play a role – from warehouse, sales & marketing, accounting etc. It would be most beneficial if the students can 'see' how events created in one unit initiate events for other units.

To achieve this objective of actually using ERP requires collaboration with industry. Several big firms (for example, SAP®, Microsoft® etc.) provide academic or university alliance programs that are described as win-win solutions for both the firms and universities (Corbitt and Matthews, 2009).

However, participation in these programs comes with a caveat – it requires significant commitment, especially in the case of SAP®[1]. SAP® university alliance requires development of an ERP program. This requires tremendous commitment from universities with respect to faculty allocation and also monetarily. This puts universities that want to teach ERP concepts at a disadvantage. Also universities may want to teach just a course in ERP rather than develop a program or specialization on ERP. For these instances, it would be beneficial to utilize alternate solutions to SAP® that require fewer resource commitments.

However, to an uninformed educator, the first impressions to embark on such a hands-on ERP course are daunting, as there is high visibility for ERP programs that use SAP® in their curriculum (as discussed in next section). This article provides guidance by providing information and implementation experiences on a freely available ERP solution - OpenERP®. In our experience, the solution utilized allowed students to get a feel for ERP software and appreciate the integrated solutions to business operations. The rest of the article is organized as follows. The next section provides review of pedagogical ERP studies. Next, we discuss the role-playing exercise we used and the OpenERP® solution to reinforce the concepts of ERP. Finally, we provide conclusions based on our experience teaching ERP course with OpenERP®.

2. LITERATURE REVIEW

Journal of Information Systems Education (JISE) is a premier publication that is geared towards IS education. Therefore, we limited our search for pedagogical articles on ERP to JISE. We searched for keyword 'ERP' in title and abstract for all articles published in the last 11 years (2000-2010). We identified a total of 20 articles. Table 1 provides a review of studies published in JISE. It should be noted that out these 20 studies, majority use SAP® software.
The table identifies the studies, provides the main contributions of these studies, lists if the studies actually used hands-on ERP software, and if the ERP software is freely available, and finally identifies the audience (graduate or undergraduate students).

Broadly, two themes can be identified from the review of ERP studies in IS education.

• First theme focuses on providing advice on how to integrate and teach ERP courses in a business curriculum. Representative studies include teaching tips, cases and frameworks that authors have used and provide guidance for broader teaching community (e.g. Pellerin and Hadaya, 2008; Fedorowicz, Gelinas, Usoff and Hachey, 2004).

• Second theme focuses on the importance of teaching ERP concepts. These studies include evaluation of IT skills, especially identifying ERP skill as essential; and studies that report on important skills required of ERP graduates (e.g. Boyle and Strong, 2006; Sager, Mensching, Corbitt and Connolly, 2006).

The above review of published works on 'ERP' also reflects the bias towards use of commercial software (especially SAP® software). Educators looking for guidance on teaching ERP are lead to believe that access to commercial software is the only way to teach hands-on ERP

software. Given the disparity in the number of business schools vs. the number of business schools that have ERP academic alliance programs, we believe it is necessary to provide alternate approaches for hands-on ERP pedagogy.

Our above basic argument also finds support in academic discourse. For example, Boyle and Strong, 2006) suggest that future research should focus on ERP packages other than SAP®. Further, the experiences and challenges of integrating enterprise systems (ES) into the business curriculum were discussed in a panel at Americas Conference on Information Systems. The goal of this panel is to "… contribute to the ability of more universities to provide a stimulating ES-based educational environment for students" (Strong, et al., 2006, p.729). One of the discussion points for this panel is regarding which ES software to use. Regarding this issue, it is pointed out that "…recruiters have said that the particular package does not matter; it is the ES concepts learned by students that are valuable to companies and that knowledge is transferable" (Strong, et al., 2006, p. 747; emphasis added). Although the importance of teaching the ERP concepts is stated over the actual software used, this paper does not provide any guidance on the options educators have if they don't have access to commercial solutions like SAP®. We contribute by providing our experiences about using a free ERP solution - OpenERP®.

In sum, the review of existing studies places emphasis on commercial software giving an impression of high entry barriers to teaching hands-on ERP. In addition, there is support to indicate that it is actually the skills that are important rather than the actual software package utilized.

2. OpenERP® – AN ALTERNATIVE

This paper introduces readers to OpenERP® as an alternative for teaching hands-on ERP skills. OpenERP® is one of the leading open source enterprise software solutions. Community of developers work to develop and improve the software. The business model of OpenERP® is based on services rather than on license fees (OpenERP, 2011) – therefore, the software application is freely available for evaluation. The services provided include SaaS services, on-site bug fixing, and migration services, among others. Several companies have implemented OpenERP® for their needs (OpenERP®, 2011).

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OpenERP® is adopted for the hands-on[2] component of an undergraduate course on 'Enterprise Systems' in a unique 'Information Technology' program. The students in this program take courses from Management and Computer Science. The program is geared towards students who want to acquire both technical and business skills. The main

objectives of the 'Enterprise Systems' course[3] are to: (i) expose the students to the drawbacks of functional systems and (ii) appreciate the efficiencies enabled and provided by enterprise systems.

. Authors	Summary	ERP Used	ERP used freely available?	Primary Audience
Antonucci, Corbitt, Stewart and Harris, 2004	This article provides an overview of the special edition on Enterprise systems education. Relates enterprise systems curriculum to capability maturity model.	-	-	-
Boyle, 2007	Proposes a case study that tests the Advanced Business Application Programming (ABAP) and database programming skills. ABAP is the application programming language used in SAP®.	SAP®	No	Undergraduate
Boyle and Strong, 2006	Identify the skills required of ERP graduates to enable proper design of courses. Their work is limited to survey results from SAP® R/3 users.	None	-	-
Cowan and Eder, 2003	This article presents a real-world example of a large-scale ERP implementation. The case discusses the challenges faced to manage and control the project within the time and budget constraints.	None.	-	
Davis and Comeau, 2004	Provide details about the development and challenges faced in implementing a capstone course. The course dealt with enterprise integration issues using ERP and utilized SAP® for hands-on components.	SAP®	No	Undergraduate students
Draijer and Schenk, 2004	Provide details about the hands-on approach used to teach ERP concepts. Students manage one of the four ongoing simulation companies using SAP® tools.	SAP®	No	Undergraduate and Graduate students
Fedorowicz, et al., 2004	This article provides 12 tips on integrating ERP systems in business curriculum based on authors' experience.	SAP®	No	Undergraduate students
Grenci and Hull, 2004	This article presents an approach that applies System Development Life Cycle (SDLC) for teaching ERP and ERP implementation courses.	None	-	Undergraduate students
Hawking, McCarthy and Stein, 2004	This article provides a background on ERP evolution and university	None. However, the recommendations are based on SAP®.	-	-

	curriculum. It then provides experiences in integrating ERP education in business curriculum.			
Jarmoszko and Gendron, 2004	Presents a case that investigates the challenges involved in choosing an appropriate ERP system.	-	-	-
Johnson, Lorents, Morgan and Ozmun, 2004	This article discusses how ERP concepts are used to integrate core business courses. This was achieved by developing a common case that is used across the courses and implemented using SAP®.	SAP®	No	Undergraduate students
Joseph and George, 2002	Argues that designing ERP education is a good opportunity to reflect on business curriculum. ERP provides opportunities for integration across disciplines and could lead to more effective pedagogy.	-	-	-
Leger, 2006	Utilizes a simulation game based on SAP® to teach ERP concepts.	SAP®	No	Graduate and Undergraduate students
Pellerin and Hadaya, 2008	Proposes a new framework to teach ERP and Business Process Reengineering implementation concepts. The framework is tested using SAP® R/3 based on a multinational firm's reengineered process.	SAP® R/3	No	Graduate students
Peslak, 2005	This article discusses a multi-course approach to teaching ERP. Hands-on components of the teaching program are based on SAP®.	SAP®	No	Undergraduate students
Sager, et al., 2006	Analyzed the market power of ERP education. Findings support that students who had extensive ERP education earned more than students who didn't have ERP education. University is part of the SAP® academic alliance program.	SAP®	No	Undergraduate students
Venkatesh, 2008	Provides guidance on utilizing three Harvard business cases to teach ERP implementation strategies. Focus is on the importance of organizational environment on implementation outcomes.	None	-	Graduate students
Volkoff, 2003	This teaching case introduces the complexity of configuring an ERP system for business operations. It highlights the process of reaching a	None.	-	

	common ground between what the software can do as opposed to what the business requires.			
Winkelmann and Leyh, 2010	Provides details on a course which evaluated mid-size ERP solutions. Student groups from three different universities evaluated a case scenario using a ERP solution.	Seven different mid-side ERP solutions are used.	No	Undergraduate and Graduate students

Table 1: Review of ERP studies in JISE

These objectives are achieved by initially going over the conceptual part with the help of examples / case studies. The students also participated in a role-playing exercise early in the semester. The goal of this exercise is to illustrate the inefficiencies that could exist with functional systems. The main goal of this exercise is to understand the steps involved in a simple sales/purchase processes. In our experience, these processes are easiest for students to appreciate the power of enterprise systems, as almost all of the students are involved in buying (and selling processes). The class is divided into specific functional areas (sales, accounting & finance (A&F), warehouse, purchasing). Next, the group of 3 to 4 students brainstormed the reasonable performance metrics for each area (i.e. number of sales for sales department, the speed at which goods are moved in warehouse etc.). Typically, the students focus on narrow performance metrics rather than seeing the business as a whole. The only restriction placed on the different departments is that they can only communicate at the end of day. Next, the sales department is given a task of making a sale of 'Product A' for 'Customer A'. In our experience, the students in sales department normally go ahead with the sale and the send the appropriate paper work to warehouse and A&F. However, the A&F have additional information which indicates that 'Customer A' has outstanding balance and future sales should not be approved. In the meantime the warehouse is ready to ship the products (because of their performance metrics). An additional layer of complexity is also introduced by making the 'Product A' low on stock. This triggers a purchase request to the purchasing department. The students soon realize that due to lack of information flow, the overall business suffers (as in the above example, 'product A' is shipped and additional inventory is bought when in fact none of this should have happened). The result of this exercise points out the complex steps involved and also highlights the different departments involved in ensuring a successful trade. In our experience, this simple role-playing exercise turned out to be a powerful lesson that students come back to throughout the course. Once the students gained exposure and buy-in to 'enterprise' thinking, hands-on lab sessions were introduced as discussed below.

3.1 Purchasing and Sales process in OpenERP®
To gain understanding about the benefits of using ERP software and to gain proficiency with OpenERP®, the students are given a small case where the students are responsible for reselling a product - 'leather phone cover'. This exercise involves involvement with purchasing and sales processes and the related accounting entities. Students were first asked to create a Supplier [iCover Ltd.] and then a Customer [Cover Retail].

OpenERP® categorizes interactions with other entities into 'partners'. In other words, both the suppliers and customers are treated as 'partners'. When creating a new supplier (for example, iCover Ltd), a new partner is created and then put into 'supplier' category as shown below in Figure 1. Similarly, a new customer (for example, Cover Retail) is also created.

In the exercise, the students are required to buy 100 'leather phone covers' from 'iCover Ltd' at 3$ each, generate a purchase invoice and pay the supplier. At the next stage, 60 'leather phone covers' are sold to 'Retail Cover' at 6$ each, invoiced and then collect the payment from the customer.

To purchase the product, we use the 'Purchase Management' module available in OpenERP® to create a purchase order. The different stages of purchase order are shown in figures 2-4, moving from quotation phase to 'confirmed' state (i.e. receives the approval from appropriate entities in the focal organization) to 'approved' state (i.e. the supplier's acknowledgement).

Once the goods are received by warehouse/stock management, they are reflected as such in the product availability (Figure 5 shows the available stock as 100). Further, a supplier invoice is automatically created when the purchase order is confirmed as shown below in Figure 6.

Figures 7 and 8 show the 'Chart of Accounts' which records the impact of the purchase on accounting books before and after the supplier is paid.

The above examples show how the use of ERP enhances the information flow between different departments – for example, across purchase, warehouse, and accounting. Similar steps are taken for the sales processes i.e. from sales order, to shipping the products, generating invoice and collecting the payment. When a customer contact is selected (as shown in Figure 9), it is very easy to check if the customer has any outstanding payments (several other action items are available from the 'panel' on the right of Figure 9).

Figure 1: Creation of new supplier

Figure 2: Purchase Order: Request for Quotation

Figure 3: Confirmed Purchase Order

Figure 4: Purchase Order Approved by Supplier
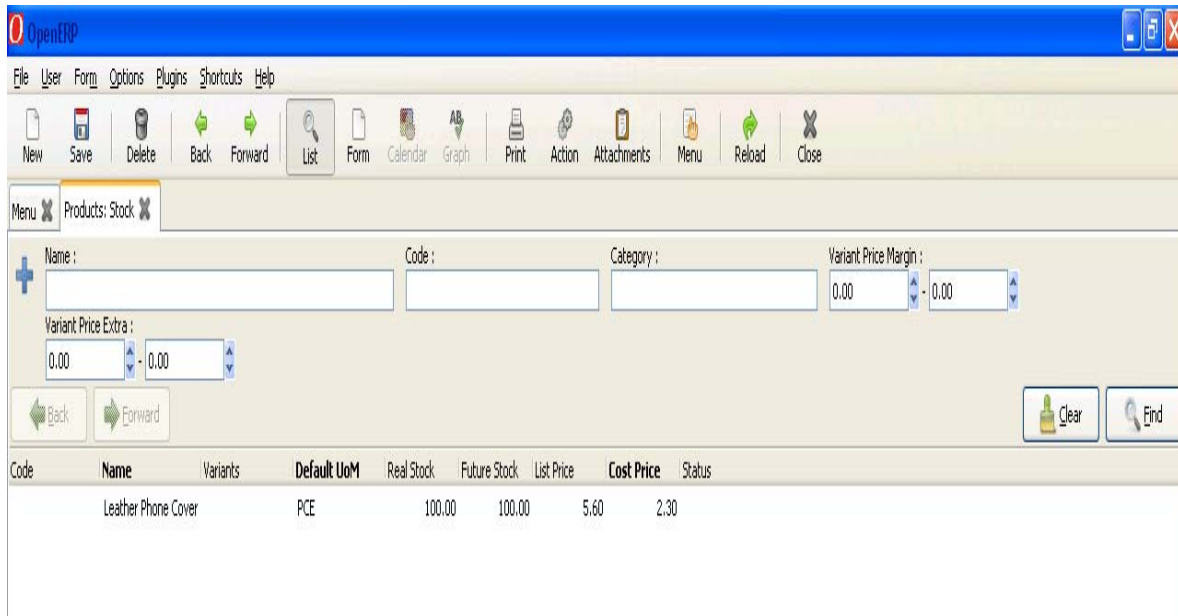
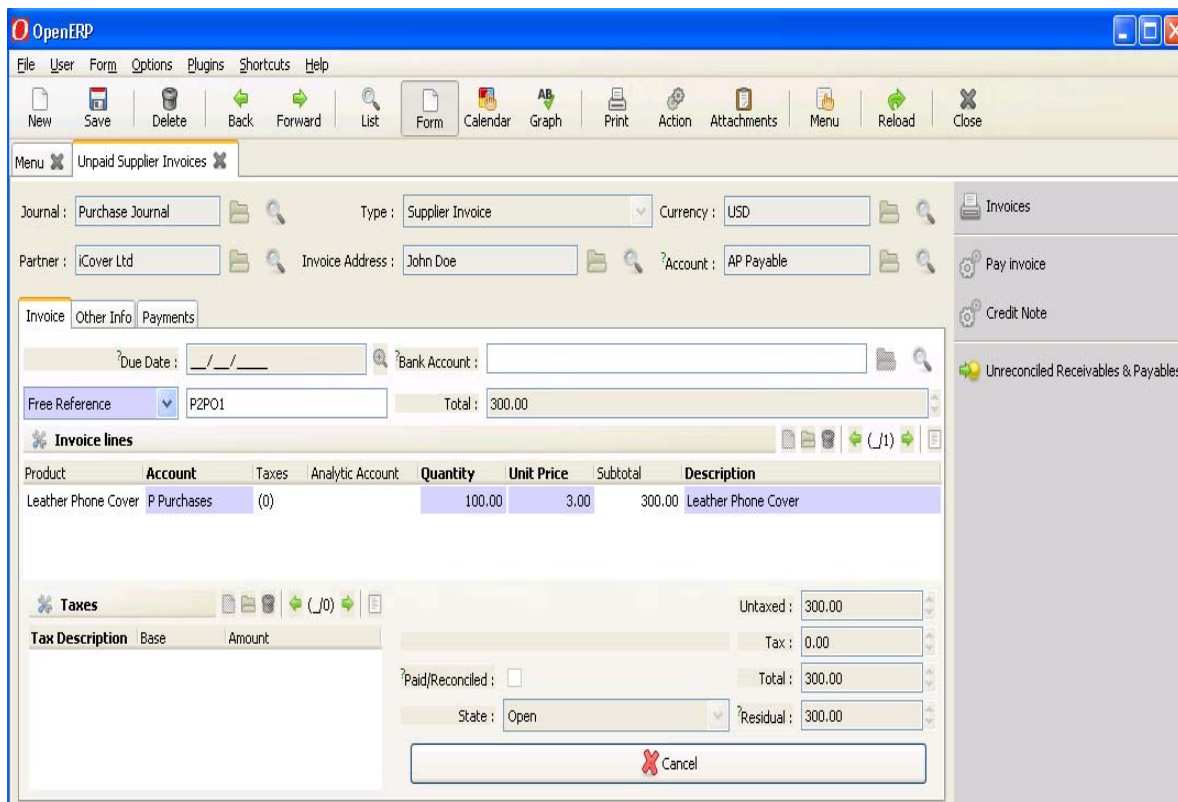**Figure 5: Stock Details for 'Leather Phone Cover' Product**

Figure 6: Unpaid Supplier Invoice

Figure 7: Chart of Accounts before the Supplier is Paid

Figure 8: Chart of Accounts after the Supplier is Paid

Figure 9: Customer Details

The main issue students faced during the role playing exercise (i.e. access to information) is alleviated by using the ERP solution. Students expressed that it was much easier for them to check 'whether the customer was in good standing' before they started the sales process which triggered various events. The result being that the purchase department didn't order the products, nor did the warehouse actually ship the products to the customer. Overall, the students really enjoyed the hands-on exercises as was evident through class interactions. Students were keen to learn about OpenERP® solution because it is freely available and potentially see the use of this tool without the need for initiation costs. Further, the user interface for OpenERP is not complex – so the students can actually focus on learning the advantages of integrated systems rather than be overwhelmed by complex integrated solutions. In the end, the students can really see the issues with functional information systems and appreciate the value of ERP solutions.

4. CONCLUSION

This paper makes an important contribution by providing details and experiences with using a free ERP solution. Initially, we argued that learning hands-on ERP skills is important and still very relevant. However, a review of published studies in JISE shows a bias towards commercial ERP solutions (like SAP®). We argue that this puts educators at disadvantage as it gives the impression of high entry barriers to teach hands-on ERP skills. Our experiences from a simple role-playing exercise and related hands-on component using OpenERP® are discussed. Student experiences show that they really appreciate 'enterprise' solutions and can 'see' the information flow across departments. It is hoped that knowledge of free OpenERP® solution provides new avenues for educators teaching enterprise system courses.

5. ENDNOTES

1. We focus our discussion on SAP®, as it receives high visibility as described in literature review section.
2. OpenERP® comes as prepackaged software that includes postgres database and a local server. Therefore, the installation process is very simple. The program is installed on individual Microsoft® XP machines, with one machine allocated for each student. Once installed, we didn't face any maintenance issues. As an option to standalone program, it is also possible to use OpenERP® online. A free trial is available at http://www.openerp.com. We didn't use the online version as we needed the ability to access the program throughout the semester.
3. Although there are no prerequisites for this course, all students take core courses introducing them to problem solving and programming concepts. The average class size is 13 students per semester.

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