

Educational ERP Systems In The Market – A Comparative Study

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Abstract

An Educational ERP System is a solution developed to bring together the various modules and processes in an educational environment and also to improve the efficiency of such processes. This paper will examine the different ERP solutions in the market. The comparison is made on the basis of a number of factors such as, the technology used, whether or not the solution is made open source, cost of the solution and the corresponding features it provides. This comparison takes into consideration the various success factors for ERP solutions. We also provide various factors we have used in making our comparative study and provide a final summary stating a way to decide the preferences for different solutions in different scenarios.

Keywords: 6 Steps, Comparison, Education, ERP, Framework, ICT, Quantitative Analysis, SME, Success Factors.

I. INTRODUCTION

The ERP is a set of industry-driven concepts and systems, and is universally accepted by the industry as a practical solution to achieve integrated enterprise information systems.^[15] Enterprise resource planning (ERP) is a suite of integrated applications that any company, in this case, colleges and universities can use to collect, store, manage and interpret data from many business activities. ERP facilitates information flow between all business functions, and manages connections to outside stakeholders.^[2]

Early ERP systems were developed for large enterprises but smaller enterprises are increasingly using ERP systems. Vendors like SAP and ORACLE have also recognized this segment and developed solutions like Business ByDesign.^[25] However, the implementation of such ERP systems is quite difficult. To motivate the SMEs it is necessary to identify the critical success factors for the ERP solutions and also to find the different challenges to the implementation of different ERPs specific to the organization.^[7] With the knowledge of these factors it is easier to make a choice among the various ERP systems available in the market.

While ERP systems are often the preferred solution (Holland et al., 1999), many of the legacy systems they replaced offered a great deal of value from their unique, bespoke features. For example, when Dow Corning implemented SAP, they found that their staff headcount rose: features of their legacy systems offered more functionality than the ERP that replaced them (Ross, 1999). With regards to implementing the ERP systems in the Educational sector, a major challenge is to integrate the Traditional Information System. The methods used by the various solutions in the market to tackle this problem, must also be analyzed in process of making a decision not only from the point of education and research activities, but also from business aspect which uses ICT (Information and Communication Technology) to support other business functions (administrative, accounting, etc.).^[16] An increasing number of higher education institutions have introduced ERP systems in order to improve their operations and make them manageable and more transparent. Even so, the initial investment in both money and manpower, and the financial risk associated with the failure of such a vast system, makes the small scale Enterprises, such as Educational Institutes apprehensive of using them. By compiling the results of studies made on different solutions, this paper aims to provide an appropriate framework to help these institutes plan their solutions and thereby, reduce the risk associated with developing and implementing an ERP solution in an Educational Institute.

II. UNDERSTANDING THE CRITICAL FACTORS

An educational institute is analogous to SMEs in the context of developing automation solutions, with a limited workforce having an IT expertise and a critical budget restraint.

Studies have found that SMEs do not regard financial constraints as the main reason for not adopting ERP systems, but suggested structural and organizational reasons as a major cause. [11] These studies have also found that the decision makers' attitude towards IT adoption, and his understanding of the IT industry standards and the estimated cost of setting up an ERP system, its complexity and compatibility of the solution with the existing system to be the main hurdles in the adoption and integration of a market – ERP solution with the organization's current information system.

Some other studies [11] found that one main challenge in implementing ERP in SMEs is that, the decision making usually lays with one person, usually a Chief Executive Officer or a Chief Financial Officer, who does not necessarily have project management or technical background. They are usually concerned with costs and due dates and hence their sole decision making does not always lead to feasible implementation. Several papers have identified critical success factors in ERP implementation.

However, certain key factors determine the success or failure of an ERP system. These are listed as the Critical Success Factors (CSF). Such factors must be considered as entities in themselves and also in a temporal context of the activity undertaken. [8]

Due to lack of knowledge on requirement specifications, SMEs are usually at the mercy of ERP vendors, and due to the fact that SME owners often withhold important information. This leads to a misfit between the system and the organization. Vilpola and Kouri [12] have proposed a new method for SMEs requirement specifications whereby key personnel from major business functions are interviewed in order to analyze and collect the main business processes, the needs and problems experienced in current processes. As a result of these interviews, the discrepancies between standard ERP operations and the existing company processes will be identified. [8]

These critical factors are analyzed over a period of six stages of development – Initialization, Adoption, Adaptation, Acceptance, Routinization and Infusion. The top three factors in each of these phases are given in table 1.

Table - 1
Top Critical Factors In Development of An ERP Solution [32]

<i>INITIATION PHASE</i>	<i>ADOPTION PHASE</i>	<i>ADAPTATION PHASE</i>	<i>ACCEPTANCE PHASE</i>	<i>ROUTINIZATION PHASE</i>	<i>INFUSION PHASE</i>
<i>CHANGE MANAGEMENT</i>	<i>VENDOR TOOLS</i>	<i>CHANGE MANAGEMENT</i>	<i>USE OF STEERING COMMITTEE</i>	<i>USER TRAINING</i>	<i>USE OF CONSULTANTS</i>
<i>USE OF STEERING COMMITTEE</i>	<i>CHANGE MANAGEMENT</i>	<i>INTER-DEPARTMENT CO-OPERATION</i>	<i>INTER-DEPARTMENT COMMUNICATION</i>	<i>PROJECT MANAGEMENT</i>	<i>INTER-DEPARTMENT CO-OPERATION</i>
<i>CAREFUL SELECTION OF PACKAGE</i>	<i>TOP MANAGEMENT SUPPORT</i>	<i>USER TRAINING</i>	<i>CHANGE MANAGEMENT</i>	<i>USE OF VENDOR TOOLS</i>	<i>PARTNERSHIP WITH VENDOR</i>

III. FEATURES OF AVAILABLE SOLUTIONS

As a comparison of the education-domain based ERP solutions available in the market we have chosen different ERP Systems in a way that they provide a sample over a wide range of attributes, including closed-source, open-source or, free or paid, technology or platform on which the solutions are built and so on.

Now we provide a set of basic features provided by the products –

A. Fedena

- (1) Optimized for customization
- (2) Hosted on Cloud Servers
- (3) Multiple language support
- (4) Mobile Version
- (5) Flexible pricing

B. Onecampus

- (1) Organized manner of modules
- (2) Technically Rich
- (3) Smart Solutions (Report Making)
- (4) Provides in-built learning systems

C. EducationERP (Odo)

- (1) All-round support for all educational requirements
- (2) Student-oriented approach
- (3) Dynamic Report-making

D. CampusERP

- (1) Simplistic UI
- (2) Segregation of Modules by Role
- (3) Support for Parental Monitoring

Table - 2
Product List

<i>Product Name</i>	<i>Solution Provider</i>	<i>Open Source</i>	<i>Technology used</i>
<i>Fedena</i>	<i>Foradian Tech^[17]</i>	<i>Yes</i>	<i>Ruby</i>
<i>OneCampus</i>	<i>Rsmart^[18]</i>	<i>No</i>	<i>Cloud based SaaS</i>
<i>Odoo^[23]</i>	<i>OpenERP4you</i>	<i>Yes</i>	<i>Python Scripts</i>
<i>CampusERP^[24]</i>	<i>Saral Technomart</i>	<i>No</i>	<i>ASP .Net</i>

IV. EVALUATION MECHANISM

There are two major categories of the large-scale software solutions that must be recognized while studying the various ERP implementations available in the market, viz. Open Source and Exclusive or Proprietary Solutions. Selection of a proper vendor is much important for successful implementation^[27].

Things to be kept in mind while selecting providers are -

- (1) Vendors’ stake in the market, background, previous experiences, and clientele.
- (2) Cost of implementation, acquisition, support and upgrade should be within budget constraints considering a margin for contingency measures.
- (3) Past implementation record of the vendor especially in similar vertical (here, Educational ERP Systems) with same software and the technologies used. This issue is not so critical these days, with major vendors providing a definitive Educational ERP solution.
- (4) Check their past track records in project delivery.
- (5) What kind of risk mitigation plans and business continuity assurances do they offer? An ERP Solution may last for around 10-15 years or even more. An SQA document must ideally include conditions dictating a service agreement with the vendor stating the terms for continued maintenance related operations.
- (6) The need for an implementation partner. This assesses the capability of the vendor to work with an existing application.

In addition to this, selection of software is also much important as a success factor.

Listed things should be kept in mind to avoid project failure as well as money and time loss^[28].

- (1) Functionalities and features of the software should match with the current business processes.
- (2) Easy customization possibility, user friendly and easy to use and understand.
- (3) Software technology should not be very old and scalable whenever required.
- (4) How good is the software in your vertical? And cost of AMC charges for software upgrades and updates, customization cost, hardware requirements/specifications if any in short, an estimate of the TCO (Total Cost of Ownership) is obtained.

A. Six steps to an effective ERP assessment and software selection^[29]

These steps identify a sequential manner which makes the selection of an appropriate software and vendor easier.

- 1) *Identify both industry-specific and general ERP packages.*

The purpose of an educational ERP is quite concise and focused in its scope and also the budget constraints are stricter, this will eliminate a number of traditional, generalized ERP Solutions and vendors. It is typically recommended to have a “long list”^[29] of six to eight vendors. If the organization has an existing application, this would be a good time to decide whether to go for an entirely new application or to enhance the existing system into a full-blown ERP by looking at the capabilities of the vendor and/or the home IT team.

- 2) *Once the long list has been compiled, identify the key requirements that a package must have in order to make the short list.*

Certain key requirements may be compiled by the team that will be working on the ERP system, once it is deployed. This team may include the IT/Network Administrator, the Student Representative, the Department Representatives, Office Staff and the Activities Director/ Head of the Institution. Additional requirements may involve any restrictions involving transfer of data from a previous solution or a knowledge system e.g., Moodle, Zillion^[31]. These “deal-breakers”^[29] should help you arrive at three or four short-listed vendors. A simple Request for Information (RFI) mail may help in understanding whether the vendor is capable of providing these key requirements within the budget constraints. The figure below is from a correspondence with a confidential ERP vendor for the Educational Market.

to me [redacted]

Hello [redacted]

Thank you for your interest in a demo of [redacted]

We will resume conducting demos the week of January 5th.

In the meantime, can you please take a look at the questions below and send me your answers.

Once I hear back from you we can schedule a demo for you for the week of January 5th if that works

- How did you hear about [redacted]
- What is your current campus portal system?
- Do you currently utilize single signon Authentication?
- Are all of your online services easily accessible and searchable through the existing portal?
- Are you currently "mobile-enabling" services to accommodate all devices?
- What are your mid- and long-term plans with the current portal system?
- What day and time works best for a demo?
- How many people do you want to include in the demo?

Suggested additional attendees for this webinar might include:

- Faculty Leadership
- Student-focused leadership
- Director of student affairs
- IT director
- Director of communications (marketing)
- Director of enrollment, registration
- Director of development, alumni affairs

I look forward to hearing back from you and showing you more of [redacted]

Fig. 1: Sample Response to An RFI

a. End-User
<u>Scalability</u>
<u>Adaptability</u>
<u>Visibility</u>
<u>User Friendliness</u>
<u>Logical Flow</u>
<u>Familiarity</u>
<u>Proper Feedback</u>
b. Developer
<u>Modularity</u>
<u>Integration</u>
<u>Customizability</u>
<u>Ease of Re-engineering</u>
<u>Code Availability</u>
<u>Support</u>
<u>Maturity</u>
<u>Security</u>
c. Management
<u>Cost of Software</u>
<u>Cost of Hardware</u>
<u>Upgrade Cost</u>
<u>AMC Cost</u>
<u>Customization Cost</u>
<u>Upgrade Cost</u>
<u>AMC Cost</u>
<u>Customization Cost</u>

Fig. 2: List of Drilled-Down Generic Requirements

3) *Conduct a detailed assessment and analysis of the short-list vendors.*

While the vendors respond to the RFIs, it is imperative that “the team” start identifying the drilled-down business requirements that the educational institute needs in a potential ERP package. From these requirements, create demo test cases can be generated to ensure that each vendor demonstrates its product as it relates to those specific business processes. Vendors like to focus on their strengths and not necessarily on how their software fits with your business. ^[29] Once, the demo is performed and the results notified to the vendor, a proposal may be requested from the shortlisted vendors. Their responses will include their costs, software capabilities, and proposed implementation strategy. ^[29]

4) *During the short-list and demo evaluation, involve key users and ask them to complete evaluations for each of the vendors.*

These evaluations should be quantitative assessments of how well the vendors’ products address the key business requirements in demo tests. It is a good practice to have each stakeholder in the team to independently assess the system.

5) *In parallel with the functional assessments, assess the technical capabilities of the short-listed vendors.*

This should include areas such as scalability, ability to integrate with legacy systems, openness of the architecture, etc. The usefulness of this step varies from organization-to-organization. An institute with a large funding dedicated to the ERP system, can afford to turn over the entire development to an external business that can carry out the integration of the data, can afford to assign a lower priority to this phase. An institute with its own IT development team, on the other hand, must carefully analyze whether its home team can integrate the proposed solution with its legacy application or if it needs to purchase such solutions from the vendors additionally. In the latter case, the IT team must have sit-in meetings with the developers from the vendors, to discuss the implementation strategy.

6) *Make a decision based on the input from the vendor evaluations and technical assessments.*

Gathering the input you’ve received from the various assessments, and prioritize the vendors’ strengths and weaknesses. Finishing your selection may require more of a quantitative ranking and weighting to evaluate how well each of the packages meets your business requirements. (Refer Fig 5). The following usability and developer (IT team) requirements, may help assign this weightage.

The major factors to help evaluate the ERP solutions are those evaluating the usability (user-side) factors and development (vendor-side) factors.

“A user centric ERP system can empower even the most inexperienced employees as well as those with little IT knowledge.” ^[26] This statement by Mr. Malcolm Fox is especially true of the ERP systems in the educational sector. The critical factors in usability are scalability, changes in business model, a lack of visibility and overall complexity. ^[26] the visibility and complexity are closely related. Familiar navigations, a visual layout and a logical flow of operation, all help increase ERP usability. Improving the visibility of the application means modularizing the application, SoC and customizability. Each of these features in turn affect the developer side dynamics of the application.

The developer side factors involve ease of re-engineering the modules, integrating legacy information system.

The goal of this paper is to analyze the products in the form of this process and to provide a basic result which can then be used by various Educational institutes to arrive at their own conclusions.

Many ERP implementations last for 10 years or more. This process may seem overwhelming, but it is a good way to consider a comprehensive set of options in order to arrive at a decision.

V. COMPARATIVE CASE STUDY

While, we apply the framework mentioned in Section IV in the study of the various systems provided in the market, the method of gathering the information for the systems differs due to differences in the nature of the applications (open source or closed).

Table - 3
Study Methodology

Product Name	Sample Size	Methodology	Key Aspects Studied
CampusERP	20 Student Users, 3 Admin Users, 1 non-user	Demo Application Studied, E-mail correspondence	Error Checking, User Side Dynamics, Module Development.
Odoo	100 Student Users, 1 non-user	Downloaded Application, Cloud-based Demo	Integration Testing, Navigation Testing, Learnability.
OneCampus	15 Students, Module-wise admins	Webinar, Presentations, Demo Application	Platform Testing, Ease of Module Development, UI Complexity.
Fedena	10 Users.	Sandbox Application, Cheat Sheets	Separation of Roles, Usability for non-technical users, Scalability.

A. Sample Case Study using Framework defined in Section IV

1) *Step I: Determine the list of vendors according to organizational specifications*

We consider an institute with 2 colleges, each with 6 departments and up to 500 students, 30 faculty members, and 5 non-teaching staff per department. This organization has its prior data stored in a Content Management System. As such, limited technical support can be availed in the organization, hence, the need for a vendor that can provide continued maintenance after deployment. Accordingly, only mature solutions have been shortlisted. A team, including management and technical representatives must be formed in this step that will interact with the vendor.

2) *Step II: Detailed Analysis of Requirements*

Generic requirements such as adaptability and user familiarity are critical, since the users are practiced with the existing CMS application. Further, developer-side requirements need to have clear separation of modules for the different departments and colleges in the institute. All this needs to be accommodated in the budget assigned for the ERP, with a margin for contingency.

3) *Step III: Analysis of the Short-listed vendors*

Using these key requirements it is possible for the team to generate particular test cases. Evaluation of these test cases according to the demo will reveal any shortcomings or changes needed in application. The vendors are thereby notified and request for proposal is made. Depending upon the requirements, vendors provide their solutions and software cost.

4) *Step IV: Demo Evaluation*

Every member of the team must be present for the assessment of the selected vendors' product to addresses the requirements.

Stakeholders	Head of Staff/Dean	Department Rep	IT Head	Admissions I/c	Finances I/c	Management Rep	Student Rep	Parent Rep	Placement Cell Rep	Average Score
Factors										(Out of 5)
a. End-User										
Scalability	Well sorted listing of all aspects / 5	Easy Assignment	Excellent Verid	Multi-user regi	As the num	Proper Grouping C	New Account mu	NA	Proper Grouping Cap	3.22/5
Adaptability	No Support for dynamic addition of modules / 4	Some Functional	Easy addition of	The Registratio	Allows for a	Does not need pro		NA	Provides appropriate	3.5/5
Visibility	Highly visible / 5	Well Segregated	Besides editing	Well Designed	Sorting / Gr	Does not provide s	Well designed, la	NA	Well implemented s	3.4/5
User Friendliness								NA		
Logical Flow	view only processes,well organized / 5	Student List in as	The Meeting fur	Drop Down req	Mistake in fr	view only processe		NA	eligibility list generat	3.0/5.0
Familiarity	Application Dependant	lication Depend	lication Depend	lication Depend	lication Depend	lication Depend	lication Depend	NA	pplication Depend	4.0/5.0
Proper Feedback	Validation Errors are not reported / 3	Deleting student	Input values wit	Errors in transfe	Invalid amou	Input Errors do not a-		NA	Deletion of records	2.9/5.0
										3.34/5.0

Fig. 3: Sample Quantitative Analysis – Demo

5) *Step V: Technical Capability of the Vendor*

The vendor must be capable of handling errors such as Input values with attack vectors not providing appropriate feedback, mistakes in user fields not showing errors, security bugs, such as personal data being passed through URL , bugs in processing and finally it must be able to integrate the data from existing CMS.

6) *Step VI: Priority Grading*

Using the quantitative analysis as shown in figure 3., and accessing the technical capability of the vendors, a ranking of the shortlisted vendor is generated and budget considerations are taken in account to select the appropriate vendor for development and maintenance of the application.

B. Summary

By performing a similar study on a number of applications by different vendors in the market, we can summarize the results as per the ability to execute and completeness of vision. [5]

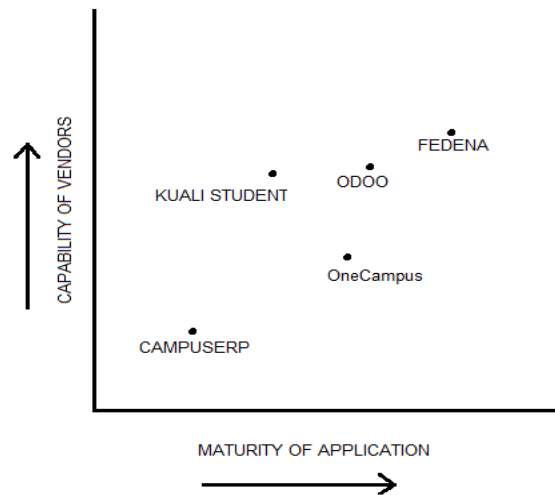


Fig. 4: Summary of Educational ERPs In Market

VI. CONCLUSION

This study of the available solutions in the market achieves two main objectives; one is to perform a study on a sample set of solutions. More crucially, it defines a framework by which any future in any new ERP systems; educational ERPs in particular, can be efficiently evaluated in a quantified manner, where the impact of different factors can also be quantifiably adjusted in this framework.

In all, this study helps to choose the correct solution for Educational Institutions based on the above mentioned factors.

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