

Enterprise Resource Planning Teaching Challenges faced by Lecturers in Africa

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Abstract

ERP is considered a scarce graduate competence and yet a requirement in industry due to ERP pervasiveness. The dominance of ERP systems in the market has intensified the demand for ERP skills by industries. Many universities globally and in Africa have recognised this demand and are trying to incorporate ERP systems into their curriculum. However most universities in Africa have struggled to integrate and teach technology due to challenges such as poor technology infrastructure. This paper therefore reviews literature to identifying potential challenges that are faced by educators while teaching ERP in African universities.

Keywords

Enterprise Resource Planning, ERP Education, ERP Challenges, Africa ICT Education

Introduction

An Enterprise Resource Planning (ERP) system is an enterprise-wide software system that provides comprehensive functionality and allows integration of core business processes in organisations (Hawking, Stein, & Foster, 2004; Klaus, Rosemann, & Gable, 2000; Scholtz, Calitz, & Cilliers, 2013). ERP systems offer significant benefits to ERP adopters discussed in literature (Cronan & Douglas, 2013; Mohamed & McLaren, 2009; O'Leary, 2004), making them competitive in the business community. Significantly, it has driven the demand for ERP specialists with the right competencies to implement, maintain and support ERP systems in organisations (Chen, Razi, & Rienzo, 2011; Scholtz, Cilliers, & Calitz, 2012; Winkelmann & Leyh, 2010).

In response to the ERP specialist demand by enterprises, several Higher Education Institutions (HEIs) globally and in Africa have integrated ERP knowledge curricula to provide graduates with the industry-relevant ERP competencies (Al-Mashari, 2003; Chen et al., 2011; Cronan & Douglas, 2013). African Higher Education Institutions have been striving to integrate Information Communication Technologies (ICTs) in their curricula as Sife, Lwoga and Sanga (2007) discussed, to respond to the pressure and demand established by industries on ICT graduates. However, many barriers such as poorly

developed technology infrastructure in African institutions have been identified in the literature (Sife, Lwoga, & Sanga, 2007), making ICT integration in African Institutions a complex process (Cameron, 2008; Lotriet, Matthee, & Alexander, 2010).

There is a need of identifying challenges that are faced by educators while teaching ERP in African universities. Identifying the barriers of ERP teaching in Africa will enlighten involved parties such as industries, faculties, students and ERP vendors. This paper documents a literature review on ERP teaching challenges faced by lecturers in African Universities. This review first explores Enterprise Resource Planning (ERP) by providing a brief description of its definition, its growth and demand in business environment as described by various studies. This is followed by an outline of ERP roles and competencies needed as identified in the literature. The next section briefly explores ERP integration in Higher Education Institutions (HEIs) specifically how it is structured and its learning objective. Lastly, this review looks at technology teaching challenges and ERP teaching challenges faced by lecturers and construct a research framework that would be used in the research study.

Enterprise Resource Planning

An Enterprise Resource planning system also known as an enterprise system, enterprise-wide system or integrated software package has been defined by several scholars but with minimal differentiation (Hawking et al., 2004; Scholtz et al., 2013; Shtub, 2001; Jansen van Vuuren & Seymour, 2013). Scholtz et al. (2013) define ERP systems as a unified, consolidated, and reliable network of business systems built in a single platform. Other authors (Hawking et al., 2004; Shtub, 2001; Jansen van Vuuren & Seymour, 2013) also defined ERP systems as generic and packaged enterprise systems that support management of core business activities such as finance, sales, purchasing, and human resource.

An ERP system provides a unified enterprise view of an enterprise business throughout the business functions and departments by integrating business processes (Klaus et al., 2000; Umble, Haft, & Umble, 2003). A unified view is possible as ERP systems include enterprise database where all business transactions are entered, recorded, processed, monitored, and reported (Umble et al., 2003). As a result, ERP systems bring about information sharing and holistic management of business processes (Scholtz et al., 2013), which in turn creates a competitive advantage to both small-medium sized organisations and large organisations (Chen et al., 2011; Cronan & Douglas, 2013; Tian & Xu, 2015).

Growth and Demand of ERP Systems

ERP systems have become dominant in both small-medium sized and large sized organisations (Loh & Koh, 2004; Mohamed & McLaren, 2009; Pang, 2008). According to O'Leary (2004), ERP systems are designed to support business process integration, hence improving information quality, decision making and firm performance. For this reason, ERP systems are able to add value to businesses hence offering competitive advantage to organisations. The survival efforts of many companies in the rapidly-changing and competitive marketplace have led many organisations to adopt ERP systems (Gocer et al., 2011; Klaus et al., 2000), hence the increasing dominance. All types of organisations, manufacturing and non-manufacturing organisations such as hospitals,

universities, governments and including those in developing countries are adopting ERP systems (Oliver & Romm, 2001; Sheu, Chae, & Yang, 2004; Soh, Kien, & Tay-Yap, 2000).

Growth of ERP systems is also evident by the number of ERP vendors currently in the market such as SAP who has over one hundred thousand customers. Successful implementation of ERP systems and maximization of ERP benefits are affected by the level of appropriate competencies of ERP teams in industries (Cronan & Douglas, 2013; Scholtz et al., 2013). It is reported that organisations that use or want to adopt ERP systems face difficulties in hiring appropriate specialists and implementers of ERP systems (Cronan & Douglas, 2013; Ramburn, Seymour, & Gopaul, 2013). It is essential for organisations to have knowledgeable and skilled ERP teams to avoid errors during selection, implementation and maintenance of ERP systems which could result in financial disadvantages (Winkelmann & Leyh, 2010). Subsequently, this has led to the global demand for ERP competencies in organisations (Chen et al., 2009; Cronan & Douglas, 2013; Mohamed & McLaren, 2009).

ERP Roles and Competencies

ERP system integration in an organisation has to be supported by different roles and their work tasks (Johansson, 2009). The different roles in implementing ERP systems are consultants, project managers, key-users, and technical support (Hirt & Swanson, 2001). *ERP Consultants* assist ERP software consumers to configure and derive value from the system by providing knowledge and guidance on the product and its processes (Volkoff & Sawyer, 2001). *ERP project managers and their team* are responsible for the deployment of ERP system and supporting ERP full-life cycle system activities. *Key-users* of ERP may be part of the project team, and are expected to have a substantial understanding of the integrated business processes underlying the system (Al-Mashari, 2003; Cronan & Douglas, 2013). *ERP Technical Support teams* provide technical support services such as installation of releases and required network capacity.

Rank	Competence Category	Competency
1.	Interpersonal	Communication skills Ability to work co-operatively in a team Ability to interact with various groups Time management skills Understanding of organisation culture Ability to listen Problem solving
2.	Business	Knowledge of business functions Financial accounting ability
3.	Business Process Management (BPM)	Knowledge of the importance of integrated nature of business processes Knowledge of the typical business processes and activities in an organisation Ability to map organisational business processes with those in ERP software Process Modelling knowledge Ability to use modelling techniques Process modelling tool technical skills (e.g. Visio, Aris)
4.	ERP Implementation and configuration	Implementation knowledge Knowledge of ERP implementation methodologies Interface knowledge General configuration knowledge Ability to determine the appropriate approach to implement ERP Ability to evaluate different ERP software products

		Ability to map the organisational structure with ERP elements Ability to configure an ERP for implementing the relevant module
5.	ERP Transactions	Ability to create master data and perform transactions in finance Ability to create master data and perform transactions in sales Ability to create master data and perform transactions in procurement Ability to create master data and perform transactions in other modules

Table 1. Key Competencies for ERP Consultant (Scholtz, Cilliers & Calitz, 2011)

Various studies (Boyle & Strong, 2006; Esteves & Bohórquez, 2007; Hawking, McCarthy, & Stein, 2004) attempted to define ERP competencies required by ERP graduates which are necessary for a successful implementation of ERP software. Kraemmergaard and Rose (2002) identified ERP management competencies and categorised them into personal, business and technological competencies. Whilst Boyle and Strong (2006) described and categorised five competencies for ERP graduates from analysing previous studies along with additional survey research. The key skills from Boyle and Strong (2006) are ERP Technical Knowledge, Technology Management knowledge, Business Functional Knowledge, Interpersonal skills and Team skills. Boyle and Strong (2006) ranked business functional knowledge and interpersonal skills as the crucial competencies for ERP specialists. Jensen, Fink, Moller, Rikhardsson, and Kraemmergaard (2005) mentioned business functional knowledge and interpersonal skills are needed throughout ERP implementation phases unlike the technical knowledge competencies and team competencies which are needed during project and shakedown phases. Finally, Scholtz, Cilliers & Calitz (2011) defined key competencies for ERP Consultants in Southern Africa (Table 1).

ERP Integration in Higher Education Institutions

The growing demand of ERP Competencies has kept pressure on Higher Education Institutions (HEIs) internationally and in Africa to transfer specialised ERP knowledge to their students and graduates by integrating ES/ERP course in their curricula (Al-Mashari, 2003; Chen et al., 2011; Cronan & Douglas, 2013; Scholtz et al., 2012). Cronan and Douglas (2013) suggested that ERP training and learning in HEIs should be within the business context in order to achieve industry-relevant ERP competencies. Boyle and Strong (2006) also pointed the need for schools to focus on entire business processes rather than one business function to infuse a holistic view of business processes in ERP systems to learners. More ERP learning objectives have been defined in the Information Systems curriculum guide which is displayed in Table 2 (Topi et al., 2010).

Learning Objectives for Enterprise System Course
1. Understand the fundamentals of enterprise systems and issues associated with their implementation.
2. Evaluate the costs and benefits of implementing an enterprise system.
3. Understand how enterprise systems integrate functional areas into one enterprise-wide information system
4. Explain how "best practices" are incorporated in enterprise systems
5. Recognize how an organizational process often spans different functional areas.
6. Describe the role of enterprise systems in carrying out processes in an organization.
7. Learn to integrate key concepts from functional-oriented courses, such as accounting, marketing, and organizational behaviour, to promote the development of integrative skills
8. Explain how integrated information sharing increases organizational efficiencies
9. Identify, describe, and evaluate the major enterprise system software providers and their packaged systems.
10. Understand current trends related to enterprise systems.

Table 2. Learning Objectives for Enterprise System Course (Topi et al., 2010)

ERP Course Structure

Several framework for adopting ERP systems in the IS or business curriculum by HEIs have been proposed in literature to meet the demand of ERP competencies (Al-Mashari, 2003; Scholtz et al., 2012). ERP courses include the theoretical level, where student are exposed to ERP and its module through class lectures and demonstrations (Scholtz et al., 2012). ERP educators also make use of case study teaching approach to maximize students' learning outcomes (Shtub, 2001; Wang & Hwang, 2014). Case studies reflect a fictitious model company scenario where students have to analyse, understand the situation and implement the problem in ERP systems (Al-Mashari, 2003; Chen et al., 2009; Shtub, 2001). The use of case study has been reported as an approach that enriches the theoretical side of practice and provides insight to industry cases (Al-Mashari, 2003).

Furthermore, some universities have made alliances with ERP vendors who provide to the institutions with ERP systems for instructional purpose and as a result have enabled innovative learning of ERP system (Al-Mashari, 2003). Students get hands-on experience in real ERP systems where they are required to access, manipulate and report information (Scholtz et. al, 2012). Authors (Alshare & Lane, 2011; Cronan, Léger, Robert, Babin, & Charland, 2012) reported students perceive knowledge gain and satisfaction of ERP course when incorporating hands-on ERP system in their curricula.

While ERP education is at an important crossroads, it has at the same time been under researched (Eden, Sedera & Tan, 2012). The emergence of software vendor assisted academic alliances, public-private partnerships and the use of simulation software in teaching only increases the complexity further (Eden et al., 2012).

Framework and Choice

There are no clear frameworks that have been used to understand the complexities and challenges inherent in multi-stakeholder teaching technology. There are several frameworks that could be applied to this study to identify challenges in teaching technology in Africa such as Teaching-Organisation-Environment (TOE) Framework and Technology Transfer Framework (TTF). The TOE framework is an organisational-level theory that describes contexts which influence adoption and implementation of innovation in organisations (Baker, 2012). TTF has also been used in literature to describe different organisational and institutional interactions involving technology-related exchange (Bozeman, 2000; Korson & Vaishnavi, 1992). The researcher however, has grouped potential ERP teaching challenges in Africa as shown in Table 3, consisting of technology teaching challenges in Africa and ERP specific teaching challenges reviewed in Literature. The researcher will use this proposed challenges as a framework of this study. These challenges will now be discussed.

Challenge Category	Challenge Description	Support from Literature
Administration	Lack of systematic approach to technology implementation	Sife et al., 2007
	Lack of top management support	Furuholt & Ørvik, 2006; Sife et al., 2007
	Poor administration support	Bingimlas, 2009; Sife et al., 2007
Teachers	Poor structural support from administration	Bingimlas, 2009; Sife et al., 2007
	Planning course material	Cameron, 2008
	Unsatisfying salaries	Cameron, 2008

	Lack of expertise and confidence	Hennessy et al., 2010; Shtub, 2001
Technology	Unreliable access to electricity and internet	Bingimlas, 2009; Hennessy et al., 2010
	Lack of technical support personnel in institutions	Bakari et al., 2005; Sife et al., 2007
	Inadequate technology hardware	Cameron, 2008; Sife et al., 2007
	Lack of appreciation of technology	Tusubira and Mulira, 2004
Resources	Lack of financial resources	Adam, 2003; Bingimlas, 2009; Furuholt & Ørvik, 2006; Sife et al., 2007
	Lack of course content and text books,	Bingimlas, 2009; Cameron, 2008
Students	Affordability; Understanding and Usability	Cameron, 2008; Scholtz et al., 2013; Sife et al., 2007

Table 3. Potential ERP Teaching challenges in Africa

Challenges in Teaching Technology in Africa

Numerous studies have identified barriers to ICT teaching in Africa (Bingimlas, 2009; Furuholt & Ørvik, 2006; Sife et al., 2007; Valdez et al., 1999). Firstly, implementing new courses in universities consumes a lot of time due to its long process which includes a lot of paperwork and committees' approval (Cameron, 2008). To add to that, Alford, Carter, Ragsdale, Ressler, and Reynolds (2004) reported that some administrators fear the expense to start new courses while others keep away from new tracks as they are rooted to their traditional tracks.

Sife et al. (2007) reported the lack of a systematic approach to ICT implementation as one of the challenges of teaching technology in Africa. Many higher learning institutions in developing countries embrace the ICT integration process without clear plans and strategies to guide the process of integration (Furuholt & Ørvik, 2006; Sife et al., 2007). Moreover, poorly developed and distributed technology infrastructure of many African universities is another challenge towards teaching technology (Sife et al., 2007). Most universities in Sub Saharan Africa (SSA) are characterised with limited infrastructure such as internet access, bandwidth, hardware and software provision and unreliable access to electricity (Bingimlas, 2009; Hennessy, Harrison, & Wamakote, 2010).

Other studies (Furuholt & Ørvik, 2006; Sife et al., 2007) mentioned the lack of top management involvement and administrative support in ICT as one of challenges that face most developing countries while trying to teach and implement technology. Administrations could facilitate and provide a better environment for the integration such as ICT policy, ICT incentives and resources (Bingimlas, 2009).

Furthermore, lack of technical and structural support was another barrier towards teaching technology (Furuholt & Ørvik, 2006; Sife et al., 2007). School administrators are reported to offer very little structural support to teachers to effectively use technology in classrooms and little technical support such as needed network capacity (Bakari, Tarimo, Yngstrom, & Magnusson, 2005; Bingimlas, 2009; Sife et al., 2007).

In addition, studies indicated that teachers' lack of expertise and confidence in ICT is a prominent factor hindering the teaching of technology in most developing countries (Hennessy et al., 2010; Kozma, McGhee, Quellmalz, & Zalles, 2004). Tusubira and Mulira, (2004) also mentioned little knowledge and appreciation of integrated ICTs in some institutions, and negative attitudes like interpreting ICTs as an expensive and demanding

advanced technologies act as barriers towards ICT integration.

Lack of funds is another key barrier towards successful implementation and integration of ICTs in education (Adam, 2003; Bingmlas, 2009; Furuholt & Ørvik, 2006; Sife et al., 2007). As a result most African universities fail to sustain ICT integration due to high cost of ownership (Adam, 2003). Davis and Comeau (2004) mentioned universities fail to afford to ERP equipment at the same rate as ERP implementers, making it difficult to offer ERP courses that are relevant and up-to-date.

Challenges for ERP Teaching

ERP integration in African universities is not trivial, similar to any other ICT integration it may face a number of challenges some similar as those described in section 5.1 (Cameron, 2008; Chen et al., 2011). Other challenges specifically for ERP teaching found in literature are: Firstly, developing ERP curricula demands high detailed planning and high technology support (Chen et al., 2011) including organising resources such as course materials, qualified trainers, ERP systems for hands-on experience, case studies and examinations (Al-Mashari, 2003; Scholtz et. al, 2012; Shtub, 2001). For instance, developing ERP case studies that can adequately capture the range of complexities and decision points of the dynamic nature of process implementation in organisations was challenging (Al-Mashari, 2003; Cameron, 2008). Also, a lot of time was consumed by instructors to assemble course materials as there was no comprehensive academic textbook that existed for ERP integration (Cameron, 2008).

Moreover, Universities cannot afford to adopt ERP equipment at the same rate as ERP implementers, making it difficult to offer ERP courses that are relevant and up-to-date (Davis & Comeau, 2004). On the other hand, it is mentioned that ERP systems provided by vendors to institutions are not designed for instructional purpose, making the whole learning process a little challenging to students (Cameron, 2008; Scholtz et al., 2013). Shtub (2001) pointed that enormous amount of time was required to learn the details of all screens and functions of a real ERP system.

Summary

ERP systems are one of the major Information Communication Technology advancements that are widely adopted by the business community. The popularity of ERP systems is mainly due to its ability to integrate enterprise-wide data and processes. Further, its numerous benefits have led most organisations irrespective of their size to adopt and implement ERP resulting in high dominance in the market. Owing to ERP dominance in the market, there is currently a high demand of ERP knowledgeable and skilled employees globally and in Africa. This demand has led Higher Education Institutions to integrate Enterprise Systems courses in their curricula. Relevant ERP competencies and learning objective of ES/ERP course have been described to guide universities in transferring knowledge. However, it has been noted that most Sub Saharan universities face challenges when integrating technology into their education system. These challenges hinder universities from producing industry-relevant competent graduates.

Our broader research study aims to identify the challenges faced by lecturers when teaching ERP systems in Africa. Several ERP and general ICT teaching challenges have

been identified from the literature yet are under-researched and have not been confirmed in studies in Africa. Hence the proposed ERP teaching challenges in Africa as identified in this paper will inform further case study research to allow academics and administrators designing and teaching ERP to discuss, confirm challenges and also identify other challenges.

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