<u>**Research Assessment 1**</u>

Date: September 6, 2019

Subject: Introduction to SAP Software

APA Citation:

Michael Rosemann, & Amelia A. Maurizio. (2005). SAP-related Education -- Status Quo and

Experiences. *Journal of Information Systems Education*, *16*(4), 437–453. Retrieved from

http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=19398771&site=ehost-

live

Assessment:

Once I decided to pursue a degree in Computer Science, after earning my high school diploma, I asked myself: what exactly do I want to work on in the Computer Science field? Usually whenever someone thinks of Computer Science, their first reaction is, "Oh, it's just a bunch of coding" or "Yeah I've heard about Java", but Computer Science is much more than just writing code or learning JavaScript. Computer Science is a very broad subject that ties into Information Technology, Engineering, Cybersecurity, Business, and many other fields, and the reason why I wanted to include this information is because I too used to think that Computer Science just meant coding. After researching more about the field, I realized that there are so many different valuable softwares that can be used throughout Computer Science that each one has to be studied individually. Due to the fact that there are so many different softwares in Computer Science, I decided to research about a software called SAP ERP for my first few research assessments. After reading the first part of "SAP-related Education - Status Quo and Experiences", I learned that there are so many different classes, that are still being modified, in college, which can help me enhance my profile as a professional in Computer Science. These classes are always changing because SAP is best learned through individual experiences and projects.

In short, the first part of the article was mainly about research and surveys that are always being conducted on students and professors to continuously change the curriculum for teaching SAP. Because Enterprise Systems (ES) is a fairly recent subject that has been taught in institutes for only about 10 to 15 years, the curriculum is not completely stable. The reason why I like that the curriculum is not set is because it gives the classes an ISM type of feeling. Most of the SAP classes in colleges around the world are "leveraging industrial work experiences and projects" in order to have the most effective learning. This gives students such as myself to have the chance of working with SAP software in a company, but as a part of learning rather than learning it from a textbook or any powerpoints.

Although ES-SAP is a much more recent software compared to others, I'm surprised that it hasn't received much recognition in colleges and outside. In the article I read, only a total of

1731 lecturers around the world were involved in administering SAP in the university. I understand that SAP is a much more complex software that is used mainly for businesses and enterprise management, but it's one of the most used software around the world. In my opinion, universities have to start providing more classes in a Computer Science Degree that talk about SAP.

As the first part of the article continues, it talks about the process of giving surveys to students and lecturers from which the data to improve the SAP related classes are collected. The main doubt I had about this process is: what is the funding for these classes? Is there enough money being given to expand this curriculum? Because in my opinion, surveying students and lecturers to get better results is a good idea, but not the most efficient. No where throughout the reading does it discuss the financial situation of the programs' growth.

All in all, SAP is a highly developed software that is still yet to be introduced thoroughly in colleges and high schools. I think that it will eventually be introduced pretty soon because languages such as java and python are becoming very frequently taught in all schools. I still have a lot more to read about ES-SAP, and I'm still a bit confused about the topic, but hopefully by the end of my research and interviews I can find answers to my questions about SAP.

SAP-related Education – Status Quo and Experiences

Michael Rosemann
Queensland University of Technology
126 Margaret Street, Brisbane Qld 4000, Australia
m.rosemann@qut.edu.au

Amelia A. Maurizio
SAP America, Global Education Alliances
3999 West Chester Pike, Newtown Square, PA 19073, USA
amelia.maurizio@sap.com

ABSTRACT

Integrating Enterprise Systems solutions in the curriculum of not only universities but all types of institutes of higher learning has been a major challenge for nearly ten years. Enterprise Systems education is surprisingly well documented in a number of papers on Information Systems education. However, most publications in this area report on the individual experiences of an institution or an academic. This paper focuses on the most popular Enterprise System - SAP - and summarizes the outcomes of a global survey on the status quo of SAP-related education. Based on feedback of 305 lecturers and more than 700 students, it reports on the main factors of Enterprise Systems education including, critical success factors, alternative hosting models, and students' perceptions. The results show among others an overall increasing interest in advanced SAP solutions and international collaboration, and a high satisfaction with the concept of using Application Hosting Centers.

Keywords: Enterprise Systems, ERP, SAP, Off-the-shelf software

1. INTRODUCTION

Enterprise Systems (ES) form the core of the application infrastructure of most large organizations. While the initial focus of these solutions was on the integrated support for all intra-organizational processes (logistics, accounting, human resource management), the scope has extended in three directions. First, ES now also cover advanced solutions for inter-organizational processes such as Customer Relationship Management (CRM), Supplier Relationship Management (SRM), and Supplier Chain Management (SCM) (Klaus et al. 2000). Second, complexity-reduced versions of those systems now target the market of small and medium-sized organizations. Third and most recently, the scope of ES extends to the technical integration platform that underlies the landscape of those applications as demonstrated in new ES platforms based on the idea of a Service-oriented Architecture.

The increasing global implementation of ES since 1993 (Chung and Synder 1999; Davenport 1998; Davenport 2000; Rosemann 1999) did not initially correspond with a similar integration of ES into the curricula of universities and other institutes of higher learning (Gable et al. 1997). The consequence was not only a shortage of graduates with a solid understanding of and appreciation for this kind of system, but also a lack of credible academic research on ES

(Eder et al. 1999; Gable 1998). A main reason for this development has been the tremendous complexity of ES, which posed a significant challenge for many institutions. It wasn't until 1997 that ES found their way into the curricula of Business, Information Technology/Information Systems and Engineering schools (Gable and Rosemann 1999).

ES education is an area demanding special attention for a number of reasons (Rosemann and Watson 2002). Students have a strong interest in this subject hoping to gain market driven skills. While this often ensures high attendance, student perceptions and expectations must be managed carefully in that it is not the objective of such initiatives strictly to enhance student skills via training activities. Managing ES is typically comprehensive and complex. The frequency of upgrades and innovations from one software release to the next characterizes the rapidly evolving nature of these IS solutions. Because of the frequency of changes in the functionality within the system, it is often difficult for the lecturer to stay abreast of these changes and to understand the implications of these changes to business practice, as well as research and education. By the time textbooks of satisfying quality are available, there are new system upgrades and innovation cycles to deal with almost making the text book obsolete. ES are used to support the learning of traditional business functions (e.g., accounting, cost management, operations management, human resource

management), contemporary business process analysis (e.g., order-to-cash, plan-to-produce, procure-to-pay, hire-to-retire), and advanced technological solutions (e.g., data and knowledge management, systems administration, application development, Web services).

This paper provides a condensed overview about the status quo of ES education using SAP's solutions as an example. The paper is based on a global survey which was conducted between September 2003 and January 2004 involving responses from 305 lecturers and more than 700 students. It updates and extends a previous global survey on the integration of SAP solutions into the curricula from 1999 (Gable and Rosemann 1999).

The paper is structured as follows. Section 2 briefly summarizes previous related work on ES education. Section 3 provides background information in terms of the survey design and participants in this study. The discussion of current practices and experiences with SAP-related education in section 4 forms the core part of this paper. The perceived major issues and success factors are discussed in section 5. The final section summarizes the findings and provides also a subjective outlook on future challenges in this area.

2. RELATED WORK

While ES were integrated quite late in the curricula in comparison with system implementations in practice, a high number of publications have been published in this area. In fact, until four years ago, publications on ES education formed a large part of all ES-related academic publications (Esteves and Pastor 2001). Comprehensive overview articles on ES education can be found in Watson and Schneider (1999) and Rosemann and Watson (2002). MacKinnon provides a brief overview about SAP-related offerings at 17 universities that are accredited by the Association to Advance Collegiate Schools of Business (MacKinnon 2005).

However, the majority of papers reflect on *individual experiences* within a new program, such as a specific MBA program (Winter 1999), or a certain discipline, such as Information Systems Master of Science programs (Holmes and Hayen 1999a, 1999b). The experiences of Louisiana State University in integrating SAP solutions into their IS curriculum have been documented by Watson and Noguera (1999). Becerra-Fernandez et al. (2000), Elam et al. (1999), Lederer-Antonucci (1999) and Bradford et al. (2003) report on experiences with the integration of ES into the curricula of Business Schools. Foote (1999) describes an SAP-accounting class and other SAP-related courses in the US. Shoemaker (1999) sketches a six-hour introduction to ES for sales and marketing professionals.

The practical nature of SAP solutions motivated many academics to create new educational models based on the notion of problem-based learning and involving current industry problems. Rosemann, Sedera and Sedera (2000), Hawking and McCarthy (2000), Stewart and Rosemann (2000, 2001) and Rosemann et al. (2001) discuss such ways of leveraging *industrial work experiences* and projects for

ES courses. A number of academics contributed to the area of ES education with re-usable teaching cases (e.g., Brown and Vessey (2000). Initially, those case studies were often based on the easily accessible experiences of the ES implementation at the academic's university (Mahrer 1999; Sieber et al. 1999).

The overall impact of reorganizing ES subject matter into existing curricula and the special challenges posed to faculty have been reported by Stewart et al. (1999a, 1999b). The *benefits and pitfalls* of teaching conceptual knowledge with ES as a learning vehicle have been critically evaluated in terms of learning outcomes and effort by Watson and Noguera (1999) and Scott (1999).

An example of a syllabus for the *remote delivery* of an introductory subject via the Internet is given by Holmes and Hayen (1999a). Holmes and Hayen describe the design of a course consisting of 10 lessons which introduce the concepts, fundamentals and framework of ES (see also http://sap.mis.cmich.edu/sap-esoft00.htm). Rosemann (2001) compares effectiveness of the on-campus version of a post-graduate ES class with the corresponding off-campus version. McCarthy and Hawking (2004) discuss current technologies, which facilitate e-learning experiences in the context of ES.

In some cases, the integration of ES into the curricula triggered innovative *international collaborations*. Stewart and Rosemann discuss an increased international collaboration at universities in order to deliver ES education more cost-effectively (Stewart and Rosemann 2001). Klose et al. (2004) report on a joint project between a German and an Australian university in the context of SAP-based supply chain management. Rosemann, Scott and Watson (2000) summarise their experiences in a SAP-based collaboration between two American and one Australian university. Lederer-Antonucci and zur Mühlen (2001) outline the setup and experiences of an award-winning collaboration between an American and a German university. Tracy et al. (2001) report on a SAP-funded initiative related to the setup of a student marketplace.

As this brief overview indicates, most publications in this field reflect individual experiences. The core of all experiences is often similar and can be summarized as challenging for the involved academics and rewarding in terms of students demand. Papers that are actually based on more theoretical models of learning in the context of ES education have been the exception (e.g. Scott 1999).

In summary, ES education is well discussed with a clear focus on papers reporting on individual experiences. However, the majority of these papers could be seen as case studies or action research.

3. BACKGROUND

This research project had the objective to identify the current and global status of the integration of SAP solutions into the curriculum of institutes of higher learning. SAP has been

---

Handwritten margin notes:

SAP is an enterprise resource planning software. Incorporates key business functions of an organization.

The introduction of SAP in colleges/universities shows how limited this subject was provided throughout the US. Most learning was through past experience.

Project-based and hands-on work with ES has much more profound effect rather than previous times.

Faculty faces more challenges in attempts to reorganize ES subject matter.

Learning about ES online vs on campus.

International collaborations in SAP/ES related schooling explains why having a job in ES related field is commonly a traveling job.

Finding a mentor in the field of ES can give me proper individual experiences mentioned throughout this section.

Learning from others' experience is the best way to learn for ES.

chosen as an example for an Enterprise System due to its globally market leading status, the wide scope of its functionality, the mature SAP University Alliance Program, the comprehensiveness of the related research, and the support by SAP for this study. A survey was chosen as the research methodology as the focus was on collecting and analyzing a high number of responses in a well-understood domain (Gable 1994).

3.1 Respondent Source and Controls

SAP's Global University Alliance Director developed questions and provided a comprehensive list of lecturers involved in the integration of SAP into the curriculum. SAP also provided funding for an Honor student for the development of an online survey, data collection and data analysis. With this online survey, it was possible to gather cost-effectively and quickly an international view on the current status of the integration of SAP solutions in curricula. The survey was an extended update of a similar survey from 1999 (Gable and Rosemann 1999).

The main difference between the study conducted in 1999 and the current study is that in addition to collecting information from faculty, information was also collected from students. The lecturers' contacts have been provided by SAP with the attributes name, university and email address. Thus, there was no knowledge about the actual role of those individuals other than that they were members of the SAP University Alliance Program. We gained access to the student responses through these contacts. In the invitation to the lecturers, we included instructions to encourage the involvement of their students in answering the 5 minute survey as part of one of their SAP tutorials.

Country	Number of contacts
Australia	39
Brazil	20
Canada	226
China	9
Czech Republic	6
Finland	14
France	13
Germany	852
India	9
Japan	28
Malaysia	2
Mexico	9
Netherlands	19
New Zealand	17
Philippines	2
Singapore	6
Slovenia	10
Spain	9
Switzerland	14
Thailand	2
UK	6
USA	416
Venezuela	3

Table 1. Invited lecturers per country

A total of 1,731 e-mail contacts has been provided by SAP through their SAP Global University Alliance Program. Table 1 shows the number of contacts per country reflecting the true international character of this study. These are contacts of lecturers currently involved in teaching or administering SAP in their department and or university. To ensure that the lecturers' survey was accurate and that complete control over the respondents existed, an authentication mechanism was put in place for the lecturers' online survey to identify and ensure that the lecturer only entered the response once and that only "invited" lecturers were able to complete the survey. Every respondent had to enter his/her email address before (s)he was able to complete the survey. The students' survey website, however, was only disclosed to the lecturers in their invitation e-mail. It did not include such a control mechanism.

3.2 Survey Design

The survey design was based on three sources. First, the core skeleton of the survey for the lecturers was based on the instrument previously developed and used by Gable and Rosemann in 1999. Second, a significant update of the survey took place based on new system developments (e.g. the development from SAP R/3 → mySAP Business Suite) as well as changes in the mode of system management, i.e. the increased popularity of mySAP Application Hosting Centers. Third, the survey for students was developed from scratch. A pilot test with six Australian lecturers involved in SAP-related education motivated only minor changes.

3.3 The Lecturer's Survey

The lecturer's survey was divided into these six sections:
- (A) Curriculum Implementation Issues
- (B) Learning SAP
- (C) Administering SAP
- (D) Cross-university collaboration
- (E) Impact on public perception
- (F) SAP-related subjects

All the sections inquire about the respondent's overall experience and integration of SAP into the curriculum. In the following, each section is explained in more detail.

3.3.1 Curriculum Implementation Issues: This section consisted of two open-ended questions which were included in the original 1999 survey. The first question explored the major issues as perceived by the lecturers when introducing SAP into the curriculum. The second question captured the perceived success factors for SAP education. The respondent was required to fill in at least one answer for each question and had the opportunity to provide up to four answers for each of the two questions. This data provided qualitative information on the major challenges in establishing and delivering successful ES curricula. The purpose was to confirm issues and success factors as they have been reported in various papers.

3.3.2 Learning SAP: This section captured the lecturer's opinion regarding the best way to comprehend SAP solutions. The focus here was on the different learning instruments and methods for the lecturer and staff involved in SAP education. The data in this case was captured on a

five point Likert scale ranging from 'unimportant' (1) to 'highly important' (5). The following alternatives represent a minor update of the alternatives as included in the 1999 survey.

- SAP training courses
- Workshops
- SAP Innovation Congress
- 3rd party training courses (classroom)
- CBT (Computer Based Training)
- SAP web pages (www.sap.com)
- SAP online help (help.sap.com)
- Hands-on (learning by doing)

A better understanding of the most effective training channels provides valuable guidance for new lecturers in the area of ES education, who regularly face the question of how to comprehend the SAP solutions in a restrictive timeframe. The feedback is also of significant importance for the SAP University Alliance Program.

No.	Option	Context-specific questions
1.	The university hosts own SAP application	• Do you plan to use a UCC in the next 12 months? • Number of staff and people involved in administering the SAP application
2.	The university uses a UCC	• When have you become a member? • Degree of satisfaction with the UCC support in the following dimensions: – response time – quality of response – system performance – value for money
3.	The university is a UCC	• Degree of satisfaction with the UCC in the following dimensions: – response time – quality of response – system performance – value for money
4.	The university uses a third party ASP	• Degree of satisfaction with the ASP's support in the following dimensions: – response time – quality of response – system performance – value for money

Table 2. Questions on my SAP UCCs

3.3.3 Administering SAP: With the establishment of mySAP University Application Hosting Centers (aka University Competence Centers, UCC), it was important to include a new section, which considered the alternative modes of system management. In September 2003, 13 SAP UCCs existed and it was of high interest to study the

utilization of those centers as well as the perceived satisfaction. Four choices were set as options for the respondent:

- The university hosts its own SAP application
- The university uses a UCC (in which case a drop down list with the 13 UCCs was provided)
- The university is a UCC (in which case we asked which UCC they were)
- The university uses a third party Application Service Provider (ASP) (in which case we asked which ASP and if any other parties are involved)

Depending on the selected choice, different sets of questions were presented to the respondent (see Table 2).

The section also included items related to the overall impression of SAP as a corporation.

3.3.4 Cross-university collaboration: The Global University Alliance Program helped to establish a close peer-to-peer network between the Alliance members. The intent of this section was to capture the actual status of collaborations between the members and the forms of such collaborations. This section is based on a very similar section in the '99 survey.

3.3.5 Impact on public perception: Also similar to the '99 survey, we included a section on the actual impact of the integration of SAP solutions in the curricula. This section used a five point Likert scale in order to rate the impact on the public perception. The following table details different questions of this section.

No.	Question	Scale
Q17	Increase in student demand	5: substantially 1: not at all
Q18	Increase in employer interest	5: substantially 1: not at all
Q19	Increase in employer demand for students with SAP knowledge	5: substantially 1: not at all
Q20	Reaction of students to SAP introduction	5: positive 1: negative
Q21	Reaction of industry to SAP introduction	5: positive 1: negative
Q22	Reaction of employers to SAP introduction	5: positive 1: negative

Table 3. Questions on the actual impact of the SAP integration

The results of this section provide valuable indicators for the actual success of the SAP initiative. This is measured based on demand and employability of the students and also how receptive students are of the SAP education.

3.3.6 SAP-related subjects: This section forms the core of the entire survey as it collects detailed data on the individual units taught at the participating institutions. This section had to be substantially revised in comparison with the '99 survey as it investigates the integration of specific SAP solutions into the curricula. This section had to be completed for each unit in which the respondent is either currently

referencing/using SAP or in which he/she plans to reference/use SAP in the future. For each unit, the respondent was required to provide details of the subject in terms of number of hours for lectures/tutorials and consultation. The respondent was also required to indicate the SAP modules the unit touched on and SAP support tools used in the course of this unit. Inputs were measured on a five point Likert scale from "casual" to "in-depth". The data collected in this section provided insights into the detailed design of the curricula and the most popular SAP solutions.

3.4 The Student Survey

A main motivation for the survey was the collection of feedback from the students. In the end, students are the customers of the entire SAP education program. Exploring their feedback is similar to a customer satisfaction study. The student survey was a significantly reduced subset of the lecturer survey with some variations. Students were approached by the lecturers involved in this study within SAP-related tutorials. The web-based design of the survey allowed an easy integration into hands-on sessions with the SAP system. The survey for the students has been very brief and on average it took 5 minutes to complete it. There were no incentives for the students to participate in this survey. There were only two sections in the survey:

(A) Major Issues and Success Factors
(B) Learning SAP

3.4.1 Major Issues and Success Factors: Similar to the lecturer survey, this section included only two questions. The first was *"Please list any major issues that you have experienced with learning SAP solutions as part of your courses."* The student was required to provide up to five answers. This allowed us to compare the students' viewpoints with the lecturers' viewpoints. The second question was *"Please list any key success factors you have identified for learning SAP solutions."* Success is viewed very differently by individuals. With the data captured here, we could contrast the students' perspective with the lecturers' perspective.

3.4.2 Learning SAP: Successful ES education requires a deep understanding of the main challenges students face when they are exposed to SAP solutions. This section investigated a few of the main perceptions by students in this context.

4. DATA COLLECTION AND ANALYSIS

4.1 Issues related to the international nature of this study
Data in this study had been gathered from lecturers from all over the world. This gave rise to many problems mainly in terms of language and the different semester structure in the different countries.

In order to increase the user acceptance and the understandability of the survey, it was decided that the two surveys also be translated by native speakers into Spanish and German. Once the data collection phase was completed, translators had to be engaged again to convert qualitative

data back into English to maintain consistency for the entire data analysis.

The next problem was the different semester periods. As students were involved in the data collection, it was important to send out the survey at a time when the students could be approached (e.g. in a tutorial). Furthermore, students had to have a certain experience as consumers of ES education in order to develop an opinion. As German participants formed a significant percentage of the respondents and the German semester timeframe is quite different, we broke the invitation to complete the survey into different phases: global universities and German universities. The non-German participants received the first invitation on 19 September 2003. A reminder was sent out on 1 October 2003. The first invitation to the German participants was sent out on 26 November 2003 followed by a reminder on 8 November 2003.

Qn No.	Question	Scale
Q4	Please rate the ease of use of SAP software.	1: very difficult 5: very easy
Q5	Have you explored the SAP software beyond the classroom experience?	1: not at all 5: very much
Q6	Do you believe your SAP experience added value to your employability?	1: not at all 5: very much
Q7	Did the exposure to SAP software increase your interest in a SAP-related occupation?	1: not at all 5: very much
Q8	Overall, how would you rate your enjoyment of your experience with SAP software?	1: not at all 5: very much
Q9	What is your overall impression of SAP as a corporation?	1: positive 5: negative

Table 4. Questions on Students' Learning of SAP

4.2 Response Rate

4.2.1 Lecturer survey: 109 of the 1731 e-mails sent out did not reach their destination. Either the contact person was no longer with the institution or the e-mail bounced back because of an invalid address. A further 23 contacts replied stating that they do not have any SAP experience and asked to be excluded from the contact list. This leaves 1731-109-23 = 1599 valid contacts. During the course of the survey, 17 additional contacts were included due to recommendations from other contacts increasing the number to 1616. Of these 17 contacts 14 responded to the survey. At the end of the survey, 305 persons responded, which leads to a response rate of 19 %. Of these 305 responses, only 238 completed the entire survey, i.e. 15 %. 20 participants indicated that they do not have any experiences in SAP education and 47 participants did not complete the entire survey. This could be because the person responding was heavily engaged with other tasks while completing the survey or the completion of the survey took longer that the participants expected and they were not able to finish the