

WHY ABAP IN THE IS CURRICULUM?

Clayton A. Maurer, maure1ca@cmich.edu

Rick A. Stoecker, stoec1ra@cmich.edu

Roger L. Hayen, roger.hayen@cmich.edu

ABSTRACT

This research examines the growing importance of information systems (IS) developers and students having a foundation in Advanced Business Application Programming (ABAP) knowledge. These individuals need this training and education to better apply development workbench technologies for the use in SAP applications. This effort explores concepts that are key learning areas of ABAP application development in an educational or general training session for a good foundation in today's business environments. It also relates how businesses look for specific knowledge of ABAP by potential new hires and what their expectations are of those individuals. The research applies a three prong collaborative approach whereby recent journal articles are examined, an industry interview is conducted, and online job opportunities are investigated. Articles from the last three years are explored that specifically relate to education and ABAP as well as SAP's Community network and help for up-to-date online resources. Information excerpted from an interview with a top SAP talent recruiter from a Fortune 50 company provides an employer's perspective on current directions toward hiring outside talent from universities. Statistics are analyzed from three major employment websites to reinforce the importance of ABAP in an IS curriculum. Overall, this triad of information sources substantiate one another and support the need for ABAP in the IS curriculum.

Keywords: ABAP, Advanced Business Application Programming, SAP education, SAP curriculum, enterprise software, ERP integration

INTRODUCTION

The maturity of Enterprise Resource Planning (ERP), and its newer direction of enterprise software (ES), brought about a demand in academic institutions for educational background in related coursework [10]. The main solution in the ES arena, SAP R/3 Enterprise by Systems Applications and Products in Data Processing (SAP AG), is a business software solutions applications and services. SAP AG is the leading industry solution in the ES space. This company was founded in 1972 by five former IBM employees

in Mannheim, Germany and is now based in Wall-dorf, Germany [6]. According to respected research giant Gartner Research, SAP was recognized as the market share leader for 2006 in ERP software with a total market share of 27 percent worldwide, compared with its closest competitor at less than half of what SAP has, with only 13.2 percent [12]. This measurement is based on total software revenue for the year (9.402B €), with over 38,000 total customers (121,000 installations), and 6,000 of those were new customers in 2006 [12].

With the enormity of the market share that SAP commands in the ERP solution space, the implications of the desirability in education and training in SAP are apparent. ERP covers such broad yet common industries and businesses within an organization as Customer Relationship Management (CRM), Financial Accounting Management (FI), Human Resource Management (HR), Materials Management (MM), Plant Maintenance (PM), Supply Chain Management (SCM), and Sales and Distribution (SD).

The SAP system kernel, the central component responsible for managing the system resources, is programmed in the C computer language [7]. This kernel is modified and programmed internally by SAP AG support, and generally not by users or customers. The whole SAP R/3 system however, is made up of ABAP programs, which are commonly created by customers to enhance features to meet a company's specific requirements, especially in reporting. ABAP is an SQL-like sub-language which originated for use in the SAP R/2 system and was intended for generating lists for printing [8].

Being its own sub-language, SAP AG programmers and architects work with customers in new releases to add more capability and improve ABAP commands in new releases of the ABAP programming language. With this continuous improvement to the ABAP language, recurrent education and training is needed by the tens of thousands of customers who write ABAP applications. The focus of this research is on the importance of an education that includes exposure and training in ABAP application development. This research is presented by first considering key ABAP

features and then reviewing the findings and their implications..

ABAP FEATURES

ABAP contains a number of features that support a robust development space for global software applications in the SAP R/3 environment [13]. These features serve as examples of the true production IS capabilities supported in ABAP. Several of the features stand out as providing important learning and experience for IS students. Some of the more important features are (1) multiple user-language support, (2) shared development environment, and (3) production database tables. Each of these is presented to provide an understanding of these robust IS production oriented characteristics in ABAP.

Multiple User Language Support

Multiple user-language support is the presentation of screen and report field names and headings in the user's logon language. Logon in Spanish, these appear in that language. Logon in German and they display in that language. The ABAP environment is designed to handle this. When an application program is developed in ABAP, the feature is just there. The programmer does not need to write separate code to make this happen. It is not even a subprogram that needs to be invoked by the programmer. ABAP is designed to get these field and report names from tables that are created automatically by ABAP. Yes, it is necessary to enter these alternative language values in the appropriate table. However, no coding is necessary within an ABAP program to operationalize this feature. It is just there. And, this is very important for global companies operating truly global IS, whereby the same code is executed regardless of a user's logon language or global geographical location.

Shared Development Environment

A shared development environment is a true production environment. There is only one space where students develop ABAP applications. What one student does can impact other students. So, students must exercise extra care in developing ABAP programs and conducting data testing. However, this environment is what occurs in the "real world" and is an important learning experience for students. The ABAP environment also provides for moving code from development, to testing, and to production. Again, a "real world" experience for developing applications for global businesses.

Production Database Tables

Production database tables are used in developing ABAP applications. Most ABAP programs use existing tables, which are created by SAP AG for use across the business transactions of the various application modules that make up SAP R/3. Under some application requirements, additional fields are added to existing tables. Rarely are new tables created for an ABAP application. This is the usual and customary arrangement with ERP software. The integrated database provides data for all application functions within the ERP software. Hence, application extensions occur through the use of existing table with fields added to some tables for special requirements. Clearly, this is a different environment than that encountered by students developing programs in other languages, such as Visual Basic. With those development environments, students frequently create database tables for a single application. They do not face the challenge of applications with shared tables, which is the environment of ERP software. Working with existing data tables of the SAP R/3 environment is a challenge for students who have become oriented to creating new tables for each program they develop. Searching for related data tables challenges students, while providing experience with this dimension of ERP software development. Overall, these examples of ABAP features illustrate a "real world" focus for application development that is not included in other programming language courses. Learning about this environment is useful to IS students regardless of whether their ultimate career is in working with the SAP R/3 software or with other ERP software, as corporate production software for business transactions.

FINDINGS

The maturity, growth and influence of SAP in the ERP realm coincides closely with the resulting demand of SAP-related course offerings to graduate and undergraduate students at academic institutions. The drastically-escalating increase of SAP-related courses and programs at institutions of higher education can be demonstrated by the graph of Distribution of (SAP) subject's first introduction [11]. Figure 1 illustrates when SAP-related courses were first offered in college level curriculums. In Figure 1, a new course offering is the first time a course has been offered by an educational institution. These courses may be the same as one offered by another institution. There is a steady addition of two to five courses in SAP newly offered at institutions from 1990 to 1994. In 1995, the number of new SAP-related course offerings increases to 18, followed by 28 more

in 1996 and 31 more in 1997. In 1998, they increased more than 50% to 48 new course offerings, and that has nearly doubled in 1999 by increasing to 83 new courses offered. Since the 1999 increase of 83 new SAP-related courses offered, the graph dis-

plays there have been at least 100 new SAP-related courses offered in each successive year. This represents a total of 660 SAP-related courses being created at various educational institutions from 1990 through 2003.

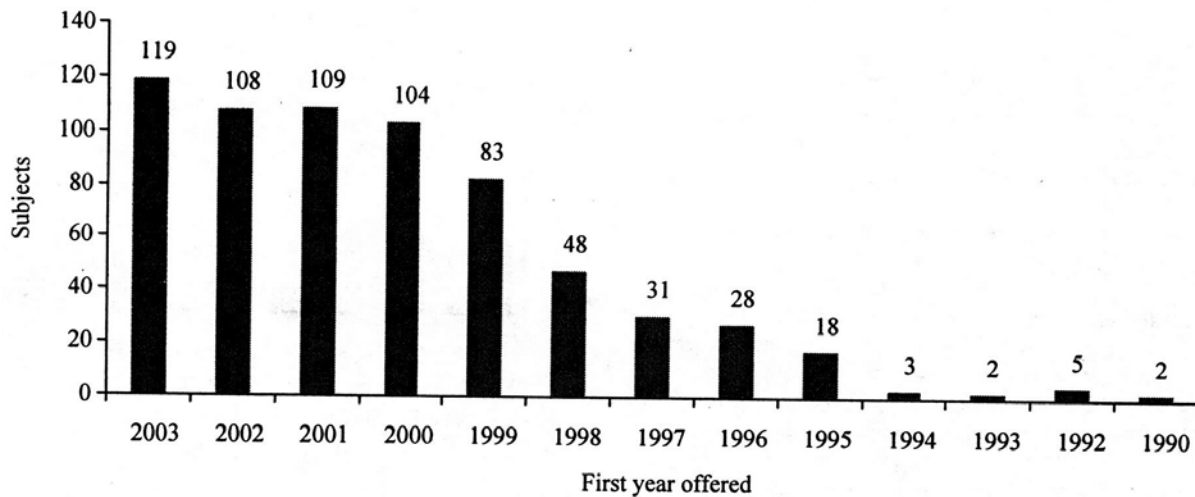


Figure 1. Distribution of subject's first introduction in years

The chart (Figure 1) does not mean there is a plateau in the number of courses being offered for SAP. There is actually a steady increase in the number of courses offered during this time period. Related to this is the importance of the use of ABAP as a critical support tool in an IS educational program featuring SAP R/3. Rosemann [11] reports a study, in which a survey design is used to investigate the distribution of faculty and students directly involved in associated SAP programs. Of the tools surveyed, ABAP finished a close fourth in the Usage Ratings of SAP Support tools. The tool that was perceived most important by respondents was IDES (Internet Demonstration & Education System), followed by the Implementation guide (IMG), and the SAP Reference Models third. Here, IDES is a training data set provided by SAP AG. It is used in SAP AG delivered training and is also made available to SAP customers, including educational institutions. With IDES, adequate transaction and master data are provided for immediately carrying out a number of SAP R/3 transactions. Without IDES considerable effort is required to setup adequate data for processing transactions. The implementation guide (IMG) is the tool used in carrying out SAP R/3 customization through various table setting, such as entering a company's organization structure and chart of accounts. The reference models portray database table relationships that support transaction processing.

Boyle [1] references a survey of 105 IT professionals who were involved in ERP implementation and support in which one of the key technical skills that industry expects from graduates of ERP programs is experience in an ERP-related programming language such as ABAP. He explains further that an IS program for ERP should offer a dedicated course specifically in ABAP application development. Boyle found that a major role for graduates of technical IS programs with an ERP component is as a developer. This means that the graduating IS students need a working knowledge of ABAP in order to create management reports and dialog programs when enhancing the ERP system.

Further, Boyle [1] outlines five specific ERP courses that should be in the core of an educational ERP program for SAP. The ABAP Programming course, which he describes in detail, is one of these courses. "This course introduces the fundamentals of the ABAP programming language. Students will write professional quality ABAP reports that read data from the database. Later in the course, students will create online transactions (i.e., dialogue programs) that allow users to select data from the database. Topics covered include the ABAP workbench, basic ABAP syntax, OPEN SQL, user defined tables, ABAP events, report writing, dialogue programming, screen and menu painters, logical unit of work, and database locks. Students will also be introduced to Netweaver and its relationship to ABAP. Netweaver

is the overarching software platform that provides the SAP Web Application Server on which ABAP transaction applications are executed, and it contains the basic ABAP language.

Prior work by Boyle and Stay [2] is the mechanism by which the actual aforementioned web-based survey was distributed to the 105 IT professionals. This sets the foundation of the necessity of ABAP knowledge by graduates in his study. Using comments from respondents of the survey, he was able to determine the technical skills that were determined to be perceived the most important for graduates of ERP programs. The specific skills are systems analysis and modeling, databases, programming in ABAP among other possible languages like JAVA, and data management.

Interview

Primary data from an employer's perspective was obtained via a telephone interview (November 7, 2007) with Jim Whyte from the Dow Chemical Company. Mr. Whyte is an SAP architect for his company with responsibilities for recruiting college talent in the area of SAP. A phone interview was the most appropriate and effective method for conducting this interview. Permission was requested and obtained to disclose the identity of Mr. Whyte. The interview was scheduled for 30 minutes and comprised of 12 questions.

The individual interviewed is one of several professionals that perform college recruiting for the IT department of this company. Therefore, the responses to the questions in the interview do not in any way represent the company's perspective as a whole. However, they do provide a view of expectations for prospective IS graduates desiring to embark on an SAP related career.

Question 1 - Could you please give some core requirements (Marketing, Accounting, Finance or Economics) that you look for in a college graduate that is seeking a position in the field of SAP support? SAP-specific requirements?

Response: A Business background (degree) is very important. Past experience has shown that it is much easier to teach someone with a business degree to program ABAP than it is to teach an ABAP programmer about business. The overall preference is given to undergrads in MIS, BIS, or BUS programs, second are the students in IT programs if they have a minor in Business Administration or MIS.

Question 2 - Does the ABAP knowledge criterion vary for different entry level SAP roles, i.e. developer vs. support staff?

Response: No, entry level people are not typically involved in SAP development. Typically they will be doing break/fix work involving existing programs.

Question 3 - Could you please give some core requirements that you look for in a college graduate that is seeking a position in the field of SAP development? SAP-specific requirements?

Response: The two top would be ABAP and configuration, then a general knowledge of SAP, followed by some accounting and management and finally the SAP boot camp. (Author note: The SAP boot camp is a two week academy, known as Integrated Business Processes in ERP, which is delivered by SAP AG and culminates with a SAP certification examination. Individuals passing this examination are then officially SAP certified.)

Question 4 - Do you believe prior education or training in the ABAP workbench is a requirement for today's entry level SAP developer?

Response: It does give them an advantage over other entry level employees.

Question 5 - Do you believe prior education or training in the ABAP workbench is a requirement for today's entry level SAP support staff?

Response: It does give them an advantage over other entry level employees.

Question 6 - From your perspective are employers willing to invest in ABAP training for entry level SAP developers? If yes, approximately to what degree? If no, why?

Response: Yes, however the prospective candidates are much more attractive if they possess these skills prior to their hiring.

Question 7 - Do you see the need for ABAP workbench knowledge growing, staying the same, or declining over the next 5 years in the United States and for your company specifically?

Response: Yes, I see it growing for the US, as well as industry wide.

Question 8 - Does your company have a working relationship with schools of higher learning as far as developing program tracks to nurture development of desired skills in graduates?

Response: Yes, due to an anticipated need for the SAP skill sets a relationship was established approximately 8 years ago with a local university.

Question 9 - When seeking individuals as candidates for employment, does your organization seek candidates who are recent graduates with SAP knowledge, or candidates who have previous employment with SAP experience?

Response: Both, due to the fact that there are varying needs for experienced individuals as well as entry level employees.

Question 10 - Does your company have any expectations on the ratio of candidates they interview to be hired for entry level or advanced SAP roles?

Response: This varies based on the current economic climate.

Question 11 - Where does ABAP fall in the level of importance when looking for SAP candidates for both entry level and advanced positions?

Response: Leadership is one of the key characteristics that are sought; however, for immediate relevancy ABAP is indeed important.

Question 12 - What percentage of college hires from SAP programs remain with the company longer than 1 year? 2 years? 3 years?

Response: From his experience approximately a 90% retention rate has been maintained.

Overall, this interview support the need for and growth of ABAP knowledge by IS students seeking employment in IT positions. This reinforces the importance of delivering this knowledge through college level courses.

Employment Data

Another evaluative dimension relevant to the research topic is the current employment trends for jobs requiring some form of ABAP knowledge. These data confirm the desire for additional coursework in the area of ABAP.

Statistics were obtained from 3 major employment web sites: www.careerbuilder.com [3], www.monster.com [9], and www.careerjet.com [4]. The keyword 'ABAP' and the geographic area of 'United States' were used as the main search criteria for all three websites.

Figures 2, 3 and 4 show the distribution of jobs throughout the contiguous United States. A clear pattern was evident from all three sources, showing the demand for ABAP related jobs being primarily in the coastal states.



Figure 2. Jobs related to ABAP in the U.S. obtained from www.careerbuilder.com [3]



Figure 3. Jobs related to ABAP in the U.S. obtained from www.monster.com [9]

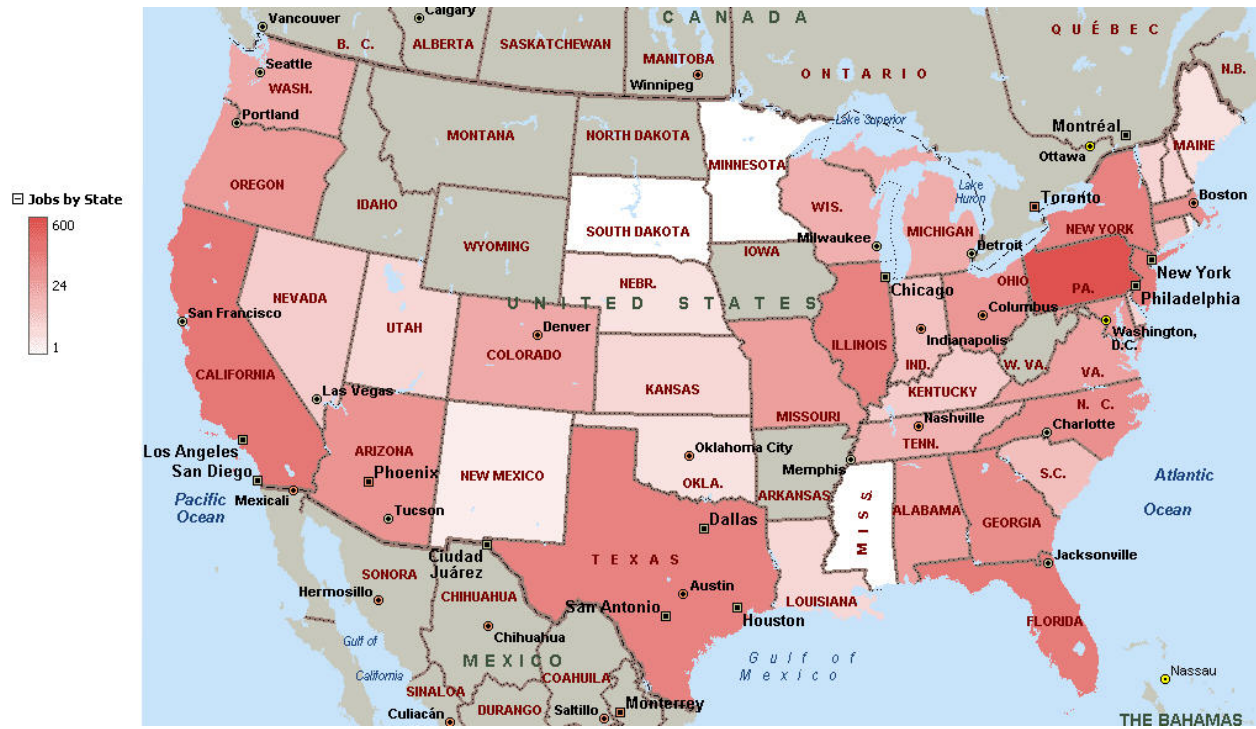


Figure 4. Jobs related to ABAP in the U.S. obtained from www.careerjet.com [4]

CareerBuilder (Figure 2) returned 555 jobs with some relevance to ABAP in the United States. Texas, Illinois, California, New Jersey, New York, Michigan, and Massachusetts comprised more than 50% of the total number jobs being sought requiring ABAP knowledge.

Monster (Figure 3) and Careerjet (Figure 4) reflected similar trends; however Careerjet had an extremely high concentration of jobs in Pennsylvania, where, antidotally, the headquarters for SAP America is located. Monster returned 691 jobs involving some aspect of ABAP while Careerjet returned 1923 jobs.

DISCUSSION

While having knowledge of ABAP programming has been the focus of this paper, it cannot be ignored that universally it is recognized as a cog in the machine, and not the machine itself when discussing critical components to an IS education with an ERP focus through a complementary concentration in SAP. SAP Configuration and the use of IDES and IMG are certainly tools and courses that are additionally respected in technical SAP programs. Even organizations that search for graduates with technical knowledge in SAP require their potential candidates to have a variety of course knowledge in business-related acumen. In business, an understanding of the inner-workings of the business unit processes is as important in the delivery of a solution as knowledge in the way to program the solution would be[5]. This is confirmed by Mr. Whyte, who places emphasis on business knowledge first, technical knowledge secondarily.

CONCLUSION

This research effort investigated the importance of integrating ABAP coursework into an IS degree program with an SAP focused ERP curriculum at institutions of higher education. The three dimensions of this research all support one another. The primary research conducted proved consistent with the previous resources that were examined. The websites confirmed the demand in the U.S. job market for ABAP application development knowledge/experience. The interview conducted with a talent recruiter from a Fortune 50 manufacturing company that actively uses SAP as their ERP solution, agreed completely with prior research on this topic. These different research views coalesce to substantiate the thesis indicating the need for ABAP in an IS curriculum with an SAP R/3 focus. Faculty of IS curriculum at various educational institutions should consider the inclusion of ABAP in their pro-

grams. This research is limited by the extent of prior research on ABAP curriculum integration and the extent of the industry interview response. Nonetheless, this still provided valuable directions in IS curriculum. Additional interviews and survey data can provide a more comprehensive analysis. Overall, future research efforts should explore each of these three dimensions individually in examining them in more depth.

REFERENCES

1. Boyle, T. A. (2007). Technical-Oriented Enterprise Resource Planning (ERP) Body of Knowledge for Information Systems Programs: Content and Implementation. *Journal of Education for Business*, 82(5), 267-274
2. Boyle, T. A., Strong, S. E. (2006). Skill Requirements of ERP Graduates. *Journal of Information Systems Education*, 17(4), 403-412
3. CareerBuilder Web Site. (2007). Retrieved November 17, 2007, from CareerBuilder's Web site: <http://www.careerbuilder.com>
4. CareerJet Web Site. (2007). Retrieved November 17, 2007, from CareerJet's Web site: <http://www.careerjet.com>
5. Gosain, S., Lee, Z., Kim, Y. (2005). The management of cross-functional inter-dependencies in ERP implementations: emergent coordination patterns. *European Journal of Information Systems*, 14(4), 371-387
6. Hayen, R. (2007). SAP R/3 Enterprise Software An Introduction (1st ed.). New York, New York: McGraw-Hill / Irwin.
7. Matzke, B. (2001). ABAP/4 Programming the SAP R/3 System (2nd ed.). Harlow, England: Addison-Wesley.
8. Monk, E., Wagner, B. (2006) Concepts In Enterprise Resource Planning (2nd ed.). Boston, Massachusetts: Thomson Course Technology.
9. Monster Web Site. (2007). Retrieved November 17, 2007, from Monster's Web site: <http://www.monster.com>
10. Peslak, A. R. (2005). A Twelve-Step Multiple Course Approach to Teaching Enterprise Resource Planning. *Journal of Information Systems Education*, 16(2), 147-155
11. Rosemann, M., Maurizio, A. A. (2005). SAP-related Education – Status Quo and Experiences. *Journal of Information Systems Education*, 16(4), 437-453
12. SAP AG Corporate Web Site. (2007). Independent Research Firm States SAP as

Worldwide Market Share Leader for CRM, ERP and SCM. Retrieved November 8, 2007, from SAP AG's Corporate International Web site: <http://www.sap.com/about/press/press.epx?pressid=8309>

13. SAP AG Help. (2004). SAP Library – Introduction to ABAP. Retrieved November 8, 2007, from SAP AG's Knowledge Warehouse Web site: http://help.sap.com/saphelp_47x200/help-data/en/e1/8e51341a06084de10000009b38f83b/frameset.htm