Modern Education
and Computer Science
PRESS

Incorporating SAP® ERP Training into Industrial College Education: A Usability Evaluation

Abdelsalam Shanneb
Jubail Industrial College, Jubail Industrial City 31961, Kingdom of Saudi Arabia
E-mail: Shanneb_a@jic.edu.sa

Abstract: The main vision of Jubail Industrial College (JIC) is to "*To excel in providing technology education and training, applied research, and innovation to support sustainable economic and industrial development of the Kingdom of Saudi Arabia*". To ensure the readiness of JIC students for successful careers, they need to be exposed to the latest software tools and technologies currently used in the surrounding industry. The Enterprise Resource Planning (ERP) course is part of many degree programs at JIC where the academic staff is utilizing the SAP® University Alliance Program (SAP® UA) to inject a practical component into the theoretical ERP course. This paper presents insights into the integration of SAP training in an ERP course by assessing the usability of the SAP® UA system. In particular, our goal is to evaluate the usability aspect of the SAP® UA system among future industrial and petroleum employees. Since, the SAP® UA system has been used in the college for ten years, and the available relevant literature in this region and under the same circumstances is very limited, we undertook this research to determine the acceptance of the SAP® UA system among JIC students. The System Usability Scale (SUS) was the tool of choice in our research and the final results obtained generated a SUS value of 67 which falls within the acceptance range.

Index Terms: Enterprise Resource Planning, SAP® University Alliance (UA), ERP Education, System Usability Scale (SUS), Usability Evaluation, Industrial Education

1. Introduction

The acronym ERP for Enterprise Resource Planning was coined back in 1990 by the Gartner Group [1]. SAP® is a major ERP software provider with more than 437,000 customers in 190 countries around the world [2]. ERP SAP plays an extremely vital role in running the businesses of its customers, as many companies use the SAP system for daily operations and reporting. The SAP market footprint in the MENA region is substantial and diverse. Recently, SAP announced its engagement in the digital transformation of Expo 2020 Dubai by using SAP solutions to manage the 25 million expected visitors in terms of process and cost optimization and to facilitate the engagement of the 192 participating countries [3].

Jubail Industrial College (JIC) is located in Jubail Industrial City, home of one of the largest petrochemical and industrial clusters in the World. JIC is under the Educational Sector of the Royal Commission for Jubail and Yanbu, an independent organization of the Saudi Arabian Government, whose main task is to govern all aspects of Jubail Industrial City. Since its inception as a training center then and as an industrial/technical college since 1989, JIC has always been keen to adopt the latest technology in teaching and training students in several academic departments so most of its graduates can find jobs in this petroleum and industrial region.

The SAP University Alliance program offers JIC software and staff training that normally costs businesses hundreds of thousands of dollars. SAP provides the training version of SAP, which simulates a business environment that enables students to experience the real-world feeling of how to manage information while driving a complex enterprise. The introduction of SAP training to JIC programs would provide students with greater employability potential, higher starting salaries, and enhanced learning experience putting theory into practice. Although many colleges and universities in the region are now incorporating SAP in their academic programs, JIC was the first institute in KSA to participate in the SAP UAP program back in 2010.

Quite a few studies report the poor usability of some ERP systems used in the industry [4, 5], also, some studies reported the difficulties with learning to use ERP systems [6]. However, we didn't encounter any study that addresses a similar educational environment like the one under study. We believe that our study is matchless due to the uniqueness of the study sample in terms of the learning institute, location, and culture. Our main objective of this research is to evaluate the suitability of the SAP package in terms of its ease of use among students in an industrial college whose main training is mostly based on hands-on modules on petrochemical, electrical and mechanical courses. We also believe this study should be followed by other studies to investigate the effect of the SAP training among the college's alumni in terms of employability.

We strongly believe more studies about outlining the experience of integrating the ERP SAP software are needed

because of the lack of major studies in developing countries [7]. This paper paints a full picture of the impact of introducing an SAP training module to an ERP course in an industrial college, where students were allowed to access the real system and apply the ERP concepts taught in a course. This study surveyed students and faculty who were part of the ERP SAP experience in the last two academic years. The next section highlights the importance of ERP systems and the need to incorporate more ERP training in postsecondary education. In section 3, we present a comprehensive literature review on the research conducted on the integration of ERP training in the educational curricula of different postsecondary programs around the world. Section 4 presents some details of the Global Bike Inc.; the case study supplied by SAP UA and students use in the SAP lab. In section 5, we outline the details of the conducted survey, then we present the results and their analysis in section 6. We finally conclude in section 7.

2. On ERP and SAP training

Based on a single, unified, integrated, and shared platform, an ERP system eliminates the barriers to information sharing among all business and management functions as well as processes. This removal of communication and information sharing obstacles highlights the main role of an ERP system in increasing the operational productivity, processes, and profitability of any organization [8, 9, and 10].

The global growth in ERP usage and adaptation has led to a growing need for skilled labor in using ERP. This growing scope for post-secondary education to incorporate ERP teaching and training is outlined in the literature review section below. The course MIT 264 (Enterprise Resource Planning) is a core module in the Associate degree of Computer & Information Technology degree plan at Jubail Industrial College (JIC). This ERP course is also offered as an elective course in other associate and bachelor degrees in different industrial-related, technology, and petrochemical majors such as Chemical Engineering, Electrical Power, Non-destructive Testing, Instrumentation & Control, and Polymer Engineering.

Any ERP course would not be complete without some hands-on practice with ERP software, and because SAP is the ERP market leader, we chose to offer hands-on training for the ERP course through the SAP platform. Also, most of the colleges and universities use SAP as the tool of choice for their ERP courses. The ERP University Alliance program provides academic institutions with a completely functional ERP system for teaching and training through a subscription at a yearly reasonable cost. Without this arrangement, it is very hard for any academic unit, college or university, to provide their students with access to an ERP system that exactly resembles an ERP system used in the surrounding industry.

3. Literature Review

Many have written on the use of ERP in the higher education curriculum. In this section, we grouped a good some references to the related literature based on two different important aspects of the subject; the importance of an ERP course and SAP Training for better employment and the ERP teaching models.

3.1   Importance of an ERP course and SAP Training for better employment

In the following citations, evidence of the benefit of ERP training exposers is presented. If this exposure was successfully implemented, students would be more prepared for the job market once they graduate. [11] Described in an early study the experiment by a university to offer an ERP emphasis in the information system curriculum, and how this emphasis can improve declining enrolment in some Information technology programs. Another study by [12] demonstrated a strong incentive for students to enroll in an ERP course based on the higher salaries for graduates who have been trained in SAP or similar ERP systems. According to [13], the skills gained through ERP training provide added value for students who are trying to get involved in highly competitive jobs.

The need for injecting an ERP hand-on training into the academic curriculum is becoming necessary as the demand for ERP skilled labor is increasing. [14, 15, 16, 17, 18, 19, 20, 21, and 22] Presented the need for universities to prepare graduates that master the concepts of business processes based on the ERP paradigm. Hence, the need to prepare their curriculum by adopting ERP materials in lectures. [23] Argued that global demand for ERP specialists with the appropriate competencies exists. [13] Highlighted the need for a curriculum that is enriched through the hands-on experience gained by students working on a real ERP system, specifically SAP.

All of the above-cited papers addressed the importance and other aspects of ERP study and SAP Training in terms of better future employment and salary, however, none has addressed the usability aspects of ERP/SAP systems in an industrial college's educational environment in the MENA region. Although our paper does not touch upon employability prospects of potential graduates with ERP/SAP training, it serves as a basis for future needed research in the potential employment of JIC graduates with ERP/SAP education and training in the surrounding industrial area.

3.2   ERP Teaching Models

SAP® is the main ERP system in the various sizes and sectors of the surrounding industries in this region. Mega companies such as ARAMCO and SABIC are widely utilizing this ERP platform. This widespread use makes it an ideal software platform to be implemented in the hands-on component of an introductory ERP course in our case. Following the lead of many academic institutions around the world, JIC subscribed to the SAP® University Alliance (UA) program.

While many studies have shown the success of the implementation of ERP concepts through the UA program, some have resulted in disappointing outcomes. In general, ERP systems are huge and complex. Teaching ERP concepts presents a challenge for many ERP educators [24, 25, and 26]. The multidisciplinary scope of ERP systems first requires teaching the cross-disciplinary coordination between several essential business functions. Then the mapping of the related details to the ERP software, a steep learning curve that may present some challenges to educators.

Some studies [28 and 29] proposed a comprehensive framework for transforming the business process of an organization where students learn by doing. This proposed shift from teaching ERP technical aspects to the organizational transformation process where students learn by creating the needed transactions as they go so students focus more on the organization transformation process rather than on the technical aspects of ERP systems only.

[30, and 31] Took an initial approach by listing a set of factors on which successful implementation of the UA program should be based on. The study was conducted in the United States where possible ERP/SAP integration obstacles were identified. Understanding the suggested factors and how they relate to each other could be an approach for staff and administrators to make an informed decision on the readiness for implementing ERP/SAP training. Another interesting ERP learning approach presented by [32] in the hope of easing the use of complex ERP systems for newcomers. Based on experiential learning, several methods were used, such as a simulation game [17, 33, and 34], to introduce the basic ERP concepts in addition to a survey conducted to gauge students' perceived usability of SAP and students' self-assessment of knowledge obtained and skills acquired.

Although there exist a few teaching models for teaching ERP concepts, the ERP course understudy has been structured by the SAP provider (SAP® University Alliance (UA)) to meet the demand of ERP competencies where students are exposed to the fundamentals of ERP through class lectures and in-lab hands-on training. Teachers make use of the many case studies supplied by the UA program. These case studies reflect a fictitious model company scenario in which students have to map the theoretical aspects of the cross-business functions to the corresponding SAP transactions. The use of a case study approach in such a way seems very relevant in this course. It has also been reported [27] as the approach of choice for enriching the theoretical side by providing great insight and resemblances to the industry cases.

4. The Global Bike Package

In this section, we briefly present the Global Bike teaching and learning environment provided by the SAP UA program. The Global Bike Case study is the main teaching and learning environment supplied by the SAP UA program for ERP courses. It is a fictitious model enterprise that consists of the main Global Bike Inc. (GBI) headquartered in Dallas (US) and the affiliated company GBI Deutschland GmbH in Heidelberg (Germany). The GBI enterprise manufactures and sells high-quality bicycles and trades bike accessories. Students during the lab session of the ERP course are required to attempt several given activities and questions. The ERP course consists of a theory part where students are taught basic business functions and business processes in most enterprises. Emphasis is put on the advantages of the concept of integrating almost all related and different business functions by removing the barriers to share information between these functional divisions.

The GBI teaching material provides a holistic and ample curriculum that consists of teaching modules in the form of presentations, exercises, case studies, datasheets, and lecturer notes. The SAP ERP under evaluation is the hands-on component of the ERP course, which consists of interactive online tutorials, self-practice assessments, and exercises that intended for an introduction to ERP basics, where students learn how the SAP system supports different business processes in an enterprise. Since this is a one-term course with a two hours per week lab session, students are only experimenting with the case studies of some business units namely, Human Capital Management (HCM), Sales and Distribution (SD), Financial Accounting (FI), and Material Management (MM). Throughout the term and by using the test case as guidance, students learn how to create an organizational structure, master data, and business roles to integrate the different functional business processes mentioned earlier.

5. Methodology

5.1 System Usability Scale (SUS)

Studies have found that data obtained by questionnaires can be both reliable and valid for the assessment of user satisfaction with computer-based applications [35, 36, and 37]. Many well-known questionnaires are available for evaluating the usability of computer-based products, such as the Software Usability Measurement Inventory (SUMI) [38], the After- Scenario Questionnaire (ASQ), the Computer System Usability Questionnaire (CSUQ), and the Post-Study System Usability Questionnaire (PSSUQ) [39]. Also, the USE questionnaire [40], the Questionnaire for User Interaction and Satisfaction (QUIS) [41], the Website Analysis and Measurement Inventory (WAMMI) [35], and finally the questionnaire of System Usability Scale (SUS) [42]. The SUS was chosen for its simplicity, reliability, low-cost, and subjective assessment tool. It is a relatively young tool compared to other industry survey tool; however, it proves itself to be a reliable quantitative tool for adding more observations on software usability [43].

5.2   Instrumentation

The SUS consists of 10 statements with 5-point possible results ranging from strongly agree to strongly disagree, so participants require less effort and time to complete. The SUS is also a survey tool not designed for a particular technology, as it can be used to evaluate a wide variety of technologies and products [44]. As stated earlier, the main goal of this study is to evaluate the usability of the SAP system provided by the University Alliance program and currently utilized by the students at Jubail Industrial College. The research approach adopted in this study was qualitative and quantitative. The Likert SUS tool is utilized to obtain a reliable evaluation of the SAP system by analyzing the results of the usability evaluation questionnaire returned from students and teachers. In addition to the standard set of 10 questions on the SUS scale, an additional open-ended question was included to broaden the scope of this study. The instrument was implemented using an online tool and interviews in some cases. The sample size consisted of 72 male students and 4 staff members who were part of the ERP course over three full-time semesters.

5.3   Procedure & Results

Step 1)   Participants were given a brief orientation on the purpose and importance of this survey and how the study and survey will be conducted.

Step 2)   Participants were asked to fill out the questionnaire after an explanation was introduced on how to fill out the questionnaire. The 5-point Likert of the SUS states 1 as the Strongly Disagree, 2 as Disagree, 3 as Neutral, 4 as Agree, and 5 as Strongly Agree. Students who participated in the survey were pursuing an associate degree in computer and information technology degree. The survey was presented in the English language taken from the standard template as in (Appendix A). As the language of instruction in all JIC majors in English, we are quite confident that the participants' language level is adequate to understand the survey statements. All participants were instructed to check all items and check the neutral option in case they felt they could not answer any of the items.

Step 3)   To obtain the final SUS final score, the raw data were collected and processed according to (Brooke, 1996). Table 1 displays all data sets where the first column displays the original average score for all answers of each statement, the second column shows the SUS score for each SUS statement; for the positively worded statements (1, 3, 5, 7, and 9), the SUS score is calculated by subtracting 1 from the original average score, while for the negatively worded statements (2, 4, 6, 8, and 10), the SUS score is obtained by subtracting the original average score from 5.

Table 1. Final raw results and SUS scores.

	SUS Statements	Original Mean Scores	SUS Scores
1	I think that I would like to use the SAP system frequently.	4.18	3.18
2	I found this SAP system unnecessarily complex.	2.33	2.67
3	I thought this SAP system was easy to use.	3.47	2.47
4	I think that I would need assistance to be able to use this SAP system.	2.68	2.32
5	I found the various functions in this SAP system were well integrated.	3.95	2.95
6	I thought there was too much inconsistency in this SAP system.	2.11	2.89
7	I would imagine that most people would learn to use this SAP system very quickly.	3.14	2.14
8	I found this SAP system very cumbersome/awkward to use.	2.01	2.99
9	I felt very confident using this SAP system.	3.61	2.61
10	I needed to learn a lot of things before I could get going with this SAP system.	2.37	2.63

Step 4)   In the last step, the final SUS score is calculated by summing up the SUS score of all statements. Table 2 displays the total sum as 26.85, then to obtain the final SUS score, the obtained sum is to multiplied by 2.5 to obtain the final SUS score. In our case, the final SUS score was 67.13.

Table 2. SAP Usability Scores.

SUS Statements	SUS Scores
1	3.18
2	2.67
3	2.47
4	2.32
5	2.95
6	2.89
7	2.14
8	2.99
9	2.61
10	2.63
Sum of all SUS Scores	26.85
Final SAP SUS Score	**67.13**

6. Results Interpretation

The SUS final score has no meaning by itself; it needs some comparison to make it more meaningful. Based on studies by [45, 46, and 47], norms obtained from data collected from a large sample size generate good percentiles. Percentiles are based on normalized SUS scores obtained from large datasets. These percentile ranks tell you how well is your score in comparison with other collected data. Figure 1 depicts the average line score of 68 which is to be used as an acceptable limit according to [51]. Any score above is considered above average and any score below 68, is below average. It can be seen that the achieved final SUS score for the SAP system under evaluation is within the suggested average line.
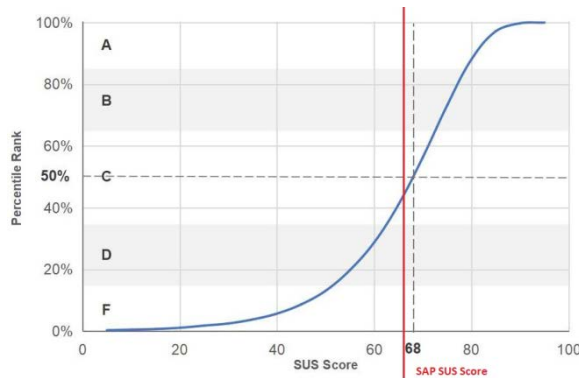
Fig. 1. SUS Percentile Grades and Ranks.

In addition to the above interpretation for the SUS score, Figure 2 from [51] summaries additional categories such as the adjective scale [48] which is a 7-point scale that contains adjectives ranging from "*Worst imaginable*" to "*Best imaginable*" to describe the experience using words instead of numbers. The obtained SAP SUS score in our study falls within the "OK" range.
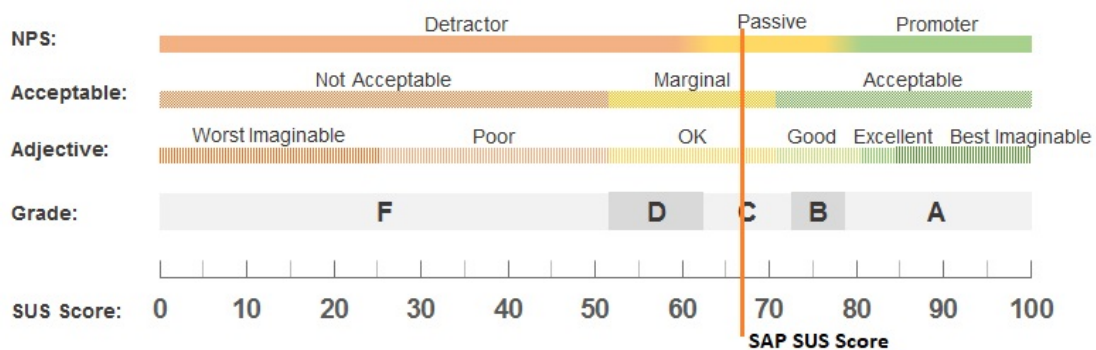

Fig. 2. Other SUS Scores Classification.

I.J. Education and Management Engineering, 2020, 5, 1-9

Although the SUS is based on a single reference score for the participants' view of the SAP system, the scores are not for the different individual survey items that are less indicative of their own. [45] Suggest that it is essential that we look into the details of the score of each of the SUS statements. [50] presents a graphical illustrative usability tool, he suggests a five-pointed star, which can be indicative of the general usability if the star has a uniform positive pattern, and also, it could depict individual undesired scores. Applying the five-pointed star tool to our raw scores is depicted in Figure 3; a good uniform "five-pointed star", a positive reflection of the usability of the SAP by our students and staff.
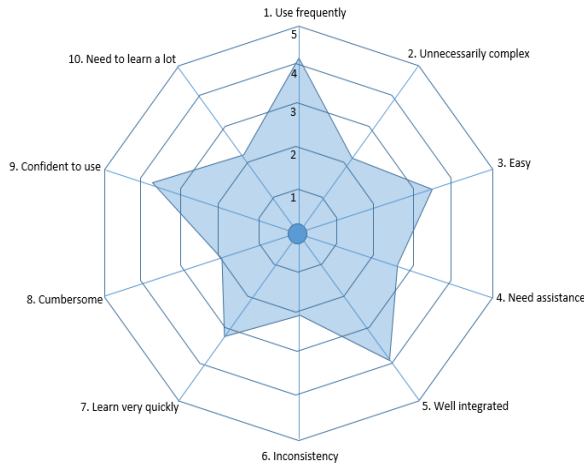
Fig. 3. SUS five-pointed star.

Another scale [45 and 48] uses the acceptability terms "*Not Acceptable*", "*Marginal*", or "*Acceptable*". Again, our results are marginally accepted as seen in Figure 4. The last scale by [52] is based on the Net Promoter Score (NPS) by [53]. NPS is used as a management tool to measure customer satisfaction and loyalty. The NPS's classification is based on three levels of recommendations; "Promoters" who are most likely to recommend the product, on the other hand, "Detractors" are very likely to discourage the product, and "Passive" are in between. A minimum of 81 SUS score is needed to be a "Promoter". Our SUS score falls in the high "Passive" range as the "Detractors" range is from the SUS average of 53 and below.
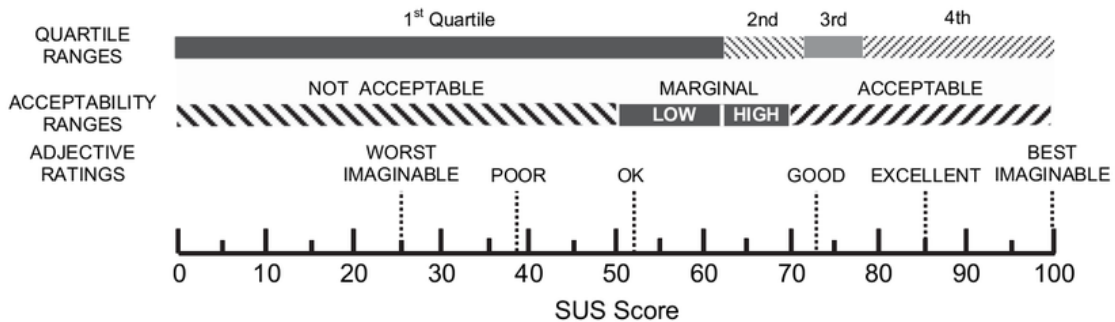

Fig. 4. A comparison of SUS scores by quartile, adjective ratings, and the acceptability of the overall SUS score [48]

7. Discussion

Our main objective of this study was to evaluate the usability of the SAP® UA system that has been in use by the college students for the last ten years. Based on the five different interpreted results from the previous section, we can comfortably state that the SAP® UA has received acceptable perception by the students. Like many integrated software systems, ERP SAP is a very complex product. Many studies report the challenges facing instructors learning and teaching the complexities of ERP systems [6, 54, 55, and 56]. Besides, several other studies have reported on the poor usability of ERP software [4, 5, and 30]. At times, students facing these difficulties are forced to focus on the completion of the assigned task rather than understanding the intended business process [57 and 29].

Although our main research objective of gauging the usability of the SAP® UA has been achieved, the instructors through their collective experience teaching this course, have outlined some crucial issues and identified a few gaps that reflect the marginal usability acceptance of the SAP UA software. Students, also reflected on their experience using the SAP UA software. The qualitative data obtained by the interview method where teaching staff and students were asked

about the main obstacle and difficulties that they face in the process of using the SAP system, and here are the main findings:

1. The major concern reported by the instructors was regarding the support from the ERP SAP UA on training. The initial training program provided 10 years ago was mainly focused on how to navigate through the SAP system and did not address the academic requirements. However, further training by SAP incurs a high cost that is met by a lack of funding, training, and development of the instructors is essentially required to address pedagogical and technical issues for adopting SAP.
2. SAP is complex and evolving, so instructors need to maintain currency and confidence in teaching SAP skills. Any lack of training will result in instructors with limited skills and knowledge, which will likely lead to the limited success of SAP utilization.
3. Since SAP is a business application, pedagogically unsuitable instructional purposes, at times, students find it difficult to know what mistakes they did during the execution of the case study transactions. This is due to the lack of clear error messages and instructions on how to resolve such issues.
4. Other minor issues regarding some technical problems, account setup, maintenance issues, connectivity issues, and lack of real-time support are also reported by instructors.

8. Conclusions

We believe the goal of this study was achieved. With the help of the System Usability Scale (SUS) tool, we managed to scientifically obtain good indicative results. The overall results indicate a reasonable acceptance rate among the students. As no previous studies on the usability of the SAP UA system have been done in this region and under the same circumstances, we believe this study has made some advancement in this field and has identified some obstacles and gaps related to the integration of ERP SAP training in the industrial college education system in this area. We are hopeful that studies such as this could potentially improve the usability of ERP systems in educational institutes. We also suggest conducting more studies and surveys in the surrounding industry on SAP usage to gauge the need for creating more ERP SAP courses and training. As [31] put it; "more research is needed to quantify the level of support needed from universities and SAP, and what processes need to be put in place to maximize the success of the UA program."

References

[1] Dahlen, C., Elfsson, J. "An Analysis of the Current and Future ERP Market with Focus on Sweden," The Royal Institute of Technology, Stockholm. (1999).
[2] [ONLINE] Available at https://www.sap.com/about/customer-involvement.html. (2020).
[3] [ONLINE] Available at https://news.sap.com/mena/2019/10/expo-2020-dubai-runs-sap-to-help-personalize-visitor-experiences/ (2020)
[4] Singh, A. & Wesson, J. "Evaluation criteria for assessing the usability of the ERP system," Proceedings of the 2009 Annual Conference of the South African Institute of Computer Scientists and Information Technologists, SAICSIT Conf. 2009, South Africa, October 12-14.
[5] Yeh, J. Y. "Evaluating ERP performance from a user perspective," In Proceedings of the IEEE Asia-Pacific Conference on Services Computing (APSCC'06). IEEE Computer Society. (2006).
[6] Topi, H., Lucas, W. & Babaian, T. "Identifying usability issues with an ERP implementation," In Proceedings of the International Conference on Enterprise Information Systems. Miami, USA, 24-28 May (2005).
[7] Blount, Y., Abedin, B., Vatanasakdakul, S., & Erfani, S. "Integrating ERP (SAP) in the Accounting Curriculum: A Systematic Literature Review and Case Study," Accounting Education, 25(2), (2016). pp. 185-202.
[8] Magal, S. R., & Word, J. "Integrated Business Processes with ERP Systems," Hoboken NJ: Wiley. (2012).
[9] McGaughey, R. E., & Gunasekaran, A. "Enterprise Resource Planning (ERP): Past, Present, and Future," International Journal of Enterprise Information Systems, 3(3), (2007). pp. 23-35.
[10] Rabaa'I, A.A., Bandara, W., & Gable, G.G. "Enterprise systems in universities: a teaching case," In 16th Americas Conference on Information Systems (AMCIS), August 12-15, (2010). Lima, Peru.
[11] MacKinnon, R., Rogers, C., Kung, H.-J., Gardiner, A., Whitworth, J. E., & Williams, S. "Creating an ERP emphasis on the IS curriculum," Issues in Information Systems, 7(1), (2006). 284-288.
[12] Andera, F. "Salary Comparison of Central Michigan's College of Business Administration Graduates who have and have not taken SAP R/3 Supported Classes," Issues in Information Systems. (2004). 8-14.
[13] McCann, D., and Grey, D. "SAP/ERP Technology In A Higher Education Curriculum And The University Alliance Program," Issues in Information Systems Vol. 10, No. 1. (2009).
[14] Boudreau, M. "Learning to Use ERP Technology: A Causal Model." In Proc. 36th Annual Hawaii International Conference on System Sciences, (HICSS'03), 8. (2003). pp. 235-244.
[15] Strong, D., Fedorowicz, J., Sager, J., Stewart, G., and Watson, E. E. "Teaching with enterprise systems." Communications of the Association for Information Systems, vol. 17, no. 1. (2006). pp. 728-755.
[16] Ravesteyn, P., & Kohler, A. "Industry Participation in Educating Enterprise Resource Planning." Communications of the IIMA, vol. 9, no. 2. (2009). pp. 45-56.
[17] Cronan, T. P., and Douglas, D. E. "A student ERP simulation game: A longitudinal study." Journal of Computer Information Systems, vol. 53, no. 1. (2012). pp. 3-13.

[18] Guthrie, R. W., and Guthrie, R. A. "Integration of enterprise system software in the undergraduate curriculum." In Proc. ISECON 17. (2000).

[19] Hayen, R. A., and Andera, F. A. "Investigation of the integration of SAP enterprise software in business curricula." Issues in Information Systems, vol. 6, no. 1. (2005). pp. 107-113.

[20] Hayen, R. L., and Holmes, M. C. "SAP Enterprise Software In Curriculum Integration." Issues in Information Systems, vol. 15, no. 1. (2014). pp. 141-148.

[21] Hayen, R. L., and Holmes, M. C. "SAP Enterprise Software Learning Experience In China." In Proc. ASBBS Annual Conference. 21:1. (2014). pp. 373-388, Las Vegas: ASBBS Annual Conference.

[22] Kung, L.A., and Kung, H.J. "Pursuing a Vendor-Endorsed ERP Award for Better Job Prospect: Students' Perceptions. Information Systems Education Journal, v.15 no.3. (2017). Pp. 29-41.

[23] Beer, S. "IT Salaries to rise as CRM, CMS, and ERP skills shortages loom." [ONLINE] Available at http://www.itwire.com/it-people-news/recruitment/40982-it-salaries-to-rise-as-crm-cms-and-erp-skills-shortages-loom?start=1

[24] Ayyagari, R. "Hands-on ERP learning: Using openERP, an alternative to SAP®." Journal of Information Systems Education, 22(2). (2011). pp. 123-133.

[25] Pellerin, R., and Hadaya, P. "Proposing a new framework and an innovative approach to teaching reengineering and ERP implementation concepts." Journal of Information Systems Education, 19(1). (2007). pp. 65-79.

[26] Watson, E., Noguera, J., Maurizio, A., and Holmes, K. "Business School Curriculum Innovation through the SAP Global University Alliances: Progress and Challenges." International Journal of Business and Information 1 (2). (2006).

[27] Al‑Mashari, M., and Al‑Mudimigh, A. "ERP implementation: lessons from a case study." Information Technology & People, Vol. 16 No. 1. (2003). pp. 21-33.

[28] Wang, M. "Integrating SAP to information systems Curriculum: Design and Delivery." ISEDJ, 9(5). (2009).

[29] Wang, M., El-Masry, E-H.E. and Zhang, X. "Assessments and Outcomes of an ERP/SAP Fundamental Course." Issues in Information Systems, (2009). pp. 109-114.

[30] Khoury, S., Jenab, K. and Staub, S. "Faculty perceptions of the integration of SAP in academic programs." Management Science Letters, 2 (4). (2012). pp 1047- 1052.

[31] Khoury, S., Rich, L., and Kouroush, J. "Obstacles to the integration of SAP training in academic programs." Strategic Management Quarterly, 3, no. 1. (2015). pp. 95-115.

[32] Beranič, T., and Heričko, M. "Introducing ERP Concepts to IT Students Using an Experiential Learning Approach with an Emphasis on Reflection." Sustainability 2019, 11(18). (2019).

[33] Rajšp A., Horng-Jyh, P.W., Beranič, T., and Heričko, M. "Impact of an Introductory ERP Simulation Game on the Students' Perception of SAP Usability." In: Learning Technology for Education Challenges. LTEC 2018. Communications in Computer and Information Science, vol. 870. Springer. (2018).

[34] Scholtza, B., Kapesoa, M., and de Villiers, M.R. (Ruth). "The usefulness and ease of use of a mobile simulation application for learning of ERP systems." SACJ 29(2). (2017).

[35] Kirakowski, J., and Cierlik, B. "Measuring the usability of web sites." In: Proceedings of the Human Factors and Ergonomics Society annual meeting. (1998). pp. 424–8.

[36] Hinderks, A., Winter, D., Schrepp, M., and Thomaschewski, J. "Applicability of User Experience and Usability Questionnaires." Journal of Universal Computer Science, vol. 25, no. 13. (2019). pp., 1717-1735.

[37] Woodruffe-Burton, Helen. "The Questionnaire: A Weak Link in Corporate Identity? Qualitative Market Research. (2020).

[38] Kirakowski, J., and Corbett, M. "SUMI: The software usability measurement inventory." Br J EducTechnol. 24(3). (1993).

[39] Lewis JR. "IBM computer usability satisfaction questionnaires: psychometric evaluation and instructions for use." International Journal for Human-Computer Interface. 7(1). (1995). pp. 57–78.

[40] Lund, AM. "Measuring usability with the USE questionnaire." Usability Interface. 8(2). (2001). pp. 3–6.

[41] Chin JP., Diehl VA., and Norman KL. "Development of an instrument measuring user satisfaction of the human-computer interface." In Proceedings of the SIGCHI conference on Human factors in computing systems. (1988). pp. 213–8.

[42] Brooke, J. "SUS - A quick and dirty usability scale. Usability Evaluation." [ONLINE] Available at http://hell.meiert.org/core/pdf/sus.pdf. (1996).

[43] Tullis, T.S., and Stetson, J.N "A comparison of questionnaires for assessing website usability." Proceedings of UPA, Minneapolis, MN. (2004).

[44] Kortum, P. and Bangor, A. "Usability Ratings for Everyday Products Measured With the System Usability Scale." International Journal of Human-Computer Interaction, 29:2. (2013). pp. 67-76.

[45] Bangor, A., Kortum, PT., and Miller, JT. "An empirical evaluation of the system usability scale." International Journal for Human-Computer Interaction, (2008). pp. 574–94.

[46] Tullis, T. S., and Albert, B. "Measuring the user experience: Collecting, analyzing, and presenting usability metrics." Burlington, MA: Morgan Kaufmann. (2008).

[47] Sauro, J. "A practical guide to the System Usability Scale." Denver, CO: Measuring Usability LLC. (2011).

[48] Bangor, A., Kortum, P., and Miller, J. "Determining what individual SUS scores mean: Adding an adjective rating scale." Journal of Usability Studies, 4(3). (2009). pp. 114–123.

[49] McLellan, S., Muddimer, A., and Peres, S. "The effect of experience on System Usability Scale ratings." Journal of Usability Studies 7(2). (2012). pp. 56–67.

[50] Caglarca, S. "Usability Testing" [ONLINE] Available at http://www.sercancaglarca.com/portfolio/destinationuppsala.html (2020).

[51] Sauro, J. "5 Ways to Interpret a SUS Score." [ONLINE] Available at https://measuringu.com/interpret-sus-score/. (2018).

[52] Sauro, J. "Predicting the Net Promoter Scores from System Usability Scale Scores." [ONLINE] Available at https://measuringu.com/nps-sus/. (2012).

[53] Reichheld, F. "The One Number You Need to Grow." Harvard Business Review, 81 (12). (2003). pp. 46–54.

[54] Holub, I. and Bruckner, T. "Measuring the Complexity of SAP Systems." Complex Systems Informatics and Modelling Quarterly. 60-67. 10.7250/csimq. (2016).

[55] Bansal, V. and Negi, T. "A Metric for ERP Complexity." Business Information Systems, proc. of the 11th International Conference, BIS, Innsbruck, Austria, vol. 7. (2008). pp. 369–379.

[56] Rosemann, M. and Watson, E. "Integrating Enterprise Systems in the University Curriculum." Communications of the Association for Information Systems, Vol. 8. (2002). pp 200-218.

[57]   Winkelmann, A. and Leyh, C. "Teaching ERP systems: A multi-perspective view of the ERP system market." Journal of Information Systems Education, 21(2). (2010). pp. 233-237.

Authors' Profiles

Abdelsalam Shanneb, Ph.D.(University of New South Wales), Assistant Professor, Department of Management and Information Technology, Jubail Industrial College, KSA. Research interests include E-Governance, ERP, Blockchain, and Cybersecurity.

Appendix A. Survey Form	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I think that I would like to use the SAP system frequently.	☐	☐	☐	☐	☐
2. I found this SAP system unnecessarily complex.	☐	☐	☐	☐	☐
3. I thought this SAP system was easy to use.	☐	☐	☐	☐	☐
4. I think that I would need assistance to be able to use this SAP system.	☐	☐	☐	☐	☐
5. I found the various functions in this SAP system were well integrated.	☐	☐	☐	☐	☐
6. I thought there was too much inconsistency in this SAP system.	☐	☐	☐	☐	☐
7. I would imagine that most people would learn to use this SAP system very quickly.	☐	☐	☐	☐	☐
8. I found this SAP system very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9. I felt very confident using this SAP system.	☐	☐	☐	☐	☐
10. I needed to learn a lot of things before I could get going with this SAP system.	☐	☐	☐	☐	☐