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A New Innovative Undergraduate Degree Program in Enterprise Computing at Zayed University: Successes, Challenges and Future Directions

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Abstract

The significant and rapid growth of the UAE economy in the last decade has acknowledged the importance of the knowledge economy (KE) to drive the country's economic growth and development. In response to the KE, educational institutions are re-examining their academic programs to better prepare their graduates for the 21st century market needs. This paper reports on the experience of the College of Technological Innovation at Zayed University in offering a new specialization referred to as Enterprise Computing (EC) in Fall 2012 to attract more students and meet the needs of the KE. This specialization exposes students to the latest developments and best practices in the Enterprise Business Systems including Enterprise Resource Planning (ERP), Supply Chain Management (SCM), Customer Relationship Management (CRM) and others. Since the introduction of the specialization, the journey has been full with a lot of challenges, successes, opportunities as well as lessons learned. Furthermore, universities consistently lack a framework with which to properly assess their academic programs. In this paper, seven key areas of measurement were used to assess the EC academic program. The implementation of the EC specialization at ZU shows how universities can rethink their own educational systems to produce graduates who can meet the challenges of the 21st century. Future directions that should help sustain the EC development are also discussed in the paper.

Keywords: Enterprise System, Enterprise Application, Academic Program, Enterprise Computing, Curriculum Development, Outcome-Based Learning Model, Training, Development.

JEL Classification: Z00

Paper Classification: Research Paper

Introduction

Dubai Government has promptly recognized the importance of the Information and Communication Technology (ICT) sector as a job creator and vital infrastructure for the growth of the United Arab Emirates (UAE) in general and Dubai Emirate in particular. The establishment of Dubai Internet City, Dubai Media City, Dubai Knowledge Village, Dubai Silicon Oasis free zones,

and the series of reforms and incentives support this recognition. To build upon these success stories, the Dubai Strategic Plan 2015 emphasizes the rapid increase of ICT in Dubai (Dubai Strategic Plan 2015, 2007). In the strategic plan, Dubai describes the aims targeting the knowledge-based economy (as cited by Gremm, Barth & Stock, 2015): "Preparing Dubai's workforce for the high-value, knowledge-driven economy, which requires attracting and retaining highly skilled employees, improving Nationals' qualifications and increasing their motivation". The plan is to train and educate Emirates' appropriately to build an ICT knowledge society with its four main components: research, development, innovation and education.

The significant and exponential growth of the UAE economy in the last decade has also acknowledged the importance of the knowledge economy (KE) as another source of revenue and economic growth. The concept of KE is based on the view that the ability to produce, distribute and use information and knowledge are essential for the economic growth and development (OECD , 2000). KE promises both opportunities and challenges. In such an environment, organizations expect fresh graduates with a different set of values, skills, knowledge and competencies. In response to the KE, educational institutions are re-examining their role, rethinking their standards & practices and accelerating curriculum reforms (Gardner, 1993) to better prepare their graduates for the workplace.

Organizations are searching for IT graduates equipped with critical thinking and managerial skills to meet the rapid growth of the IT market in the UAE and the Gulf region as well. They would like graduates to be creative, innovative, and last but not least entrepreneurial. Hence, the IT market is looking at universities' educational programs (or curricula) to produce knowledge workers capable of tackling the 21st century promises.

Upon assessment of the needs of the current students, society, and market and future needs for KE that may arise, the College of Technological Innovation (CTI) of Zayed University (ZU) launched the Enterprise Computing (EC) specialization in Fall 2012. Since then the journey has been full of challenges, success stories, as well as lessons learned. Through this paper, the present study discusses the experience in developing this cutting-edge specialization that revolves around enterprise business systems such as Enterprise Resource Planning (ERP), Supply Chain Management (SCM), Customer Relationship Management (CRM) and others. The EC specialization is in line with one of ZU's objectives which states "to establish a cutting-edge educational environment that promotes creativity and innovation'' and one of the core values of ZU that "is to provide innovation through adoption and development of the highest global practices in teaching, learning and research".

According to Shan & Earle (1998) EC "involves the development, deployment and maintenance of the information systems required for survival and success in today's business climate". The EC specialization at CTI was developed in response to the challenges that today's organizations face worldwide. Indeed, organizations are no longer confined into specific location or time zone. Their functional areas are spread over different regions, even continents that work under different legislations. The EC specialization aims at training students to apply IT knowledge and skills in using enterprise applications to public and private organizations. It is designed to prepare the students for a broad range of careers that are focused on providing sound solutions to organizations.

The remainder of this paper is organized as follows. First, a brief description of ZU, CTI, and EC specialization is given. Then, the research gap and the contribution of the study are highlighted followed by a discussion on the research questions. Then, a discussion on the challenges that CTI faced along with how such challenges were tackled and then the coverage of the key areas of measurement of the EC program is discussed. Finally, recommendations, limitations of the study and scope for future research are presented.

Background

ZU is an academic federal government institution in the United Arab Emirates (UAE). It operates in two campus branches - one in Dubai and the other in Abu Dhabi. Currently, the University is educating more than 9,000 male and female students. It has adopted an outcome-based learning framework to ensure that the student education is driven by specific outcomes such as teamwork, critical thinking, and leadership. Moreover, the purpose of such a framework is to prepare graduates for a rapidly changing and unpredictable future. The University is accredited by the Middle States Commission on Higher Education (MSCHE) in 2008 (Zayed University, 2015).

CTI is one of the six colleges at ZU. It offers two main specializations in Information Technology: Security & Networking and Enterprise Computing. After assessing the needs of the students and the demands from the market, CTI put together a set of Information Technology and Business courses for the EC specialization as part of an 8-semester plan. The EC specialization was endorsed by the CTI National Advisory Council and approved by the college curriculum committee, approved by the university curriculum committee, and was officially launched in Fall 2012. The specialization adopts a series of hands-on labs and case studies from major enterprise application vendors.

Upon completing the degree course requirements, the students who sign up in the specialization earn a Bachelor of Science in Information Technology Specialization in Enterprise Computing (BSIT/EC). The BSIT/EC consists of 16 core IT courses (49 credit hour), 9 specialization courses (27 credit hours), and 2-3 elective courses. This is in addition to one to two years of study in the general education program. Overall, the students are required to complete 127 credit hours. In Spring2013, the first batch of 13 students graduated from the specialization in Dubai.

Research Gap and Contribution of the Study

This study aims to fill the research gap in the academic and professional literature by investigating how Institutes of Higher Education (IHE) response to the urgent needs of preparing their students to be ready to join the workplace of the knowledge economy by continuously improving their academic programs and introducing new ones. Introducing a new academic program is full of challenges and opportunities for all stakeholders to meet the Institute's goals and objectives.

The primary purpose of this study is to answer the following questions:

- What are the challenges and opportunities that are associated with introducing new academic program?
- What are the key areas of measurement to be used to assess an academic program?

This study makes a modest contribution to the academic and professional literature on the factors and the corrective actions that need to be considered when introducing a new academic program. Furthermore, the study identifies and applies seven key areas of measurement to assess an academic program.

Discussion

A growing number of academic and professional research papers and articles suggest that launching new academic programs is time consuming, resource intensive and exhausted process. It requires in-depth proposal to answer questions like: Why is the program being proposed? How will it meet the institution's goals outlined in the mission statement? How does it fit into the

institution's overall strategic plan? How will it be integrated in the current institution's established programs? Do returning students want or need the program? Does market research indicate sufficient demand in the region? How does the program meet the requirements of emerging knowledge based economy, or new trends in disciplines and professions? What kind accreditation is required for the program?

Institutes of higher education recognize the effort of launching a new academic program, as they have established policies, procedures, guidelines, and templates to help academic units to introduce new programs in a more effective and efficient manner. The present study collected many data items about launching a new academic program by visiting many institutes of higher education's web portals and reviewing several academic and professional research papers and articles (Ratcliff, 2004; Norman & Molly, 2011; Vassilakis, 2012; Slagle & Smith, 2009; Ali & Farag, 2009; Lagos & Lainos, 2000). New academic programs can be successful when the ideas and all of the analysis flow from experienced faculty who will be involved in the development and the launching of the program. IHE carefully evaluated new proposals for introducing new programs to ensure the sustainability of the program since closing an academic program potentially has serious impact on the institute, students, faculty, and community. There are many reasons for making a decision to discontinue an academic program including: declining demand, not in-line with the strategic plan of the institute, changes in the external national and international accreditation requirements.

Based on the above mentioned challenges of introducing a new academic program and after careful analysis of the data collected and intensive discussions among the authors of this article, the seven key areas of measurement emerged as essential to assess the EC academic program.

Challenges and Success

Launching a new academic degree program is expected to go through various challenges and the EC specialization at ZU is no exception. CTI encountered many challenges in developing BSIT/EC. During the first two years, the specialization suffered from low enrollment due to the limited understanding of the words: enterprise and computing; inappropriate marketing strategy; the dominance of some buzzwords like business careers and managerial positions; and many students were unaware of or heard very little about the EC specialization. As such the specialization was not considered by many students and enrollment was limited to only a single digit number.

The low enrollment concern was further compounded by the required minimum number of students in a cohort so that a specialization remains active. As a result the EC was under close scrutiny putting more pressure on the college as well as the faculty teaching in the specialization.

The limited understanding of the EC specialization also impacted the process of identifying internship opportunities for the students. Many found it difficult to articulate their degrees to potential employers in both public and private sectors.

To address the aforementioned challenges a task force of faculty from both Dubai and Abu-Dhabi campuses was formed along with appointing a coordinator for the EC specialization. Different actions were taken place to market the specialization properly, to increase the enrollment, and improve the curriculum. Implementing the agreed-upon corrective actions would not have been possible without the following factors:

- Full engagement of faculty in the specialization;
- Full support of the Dean of the college;
- Collaboration with some enterprise system vendors through seminars for the students, academic fieldtrips to some organizations using enterprise applications, etc.;
- Continuous review of the study plan;
- The appointment of a Program Coordinator;
- Investment in software and hardware resources to ensure proper delivery of course material;
- Partnership with an enterprise application vendor through its Academic Alliance Program has given CTI access to a full range of online resources.

These successes pose new management and academic challenges to sustain a successful program. Many universities recognize their academic challenges, but few know the details of where their biggest challenges lie, to be able to assess their academic program to sustain a successful program.

Key Areas of Measurement to Assess the EC Academic Program

Universities consistently lack a framework to properly assess their academic programs. The present study used the following key areas of measurement to assess the EC academic program:

- Reference curriculum,
- Perception of the specialization
- Enrollment in the specialization
- Employment of the EC graduates
- Staffing the specialization
- IT and Facilities' infrastructure
- Competitiveness of the specialization.

Reference curriculum

At the early stages of offering a specialization on EC, a team of CTI faculty was formed. Unfortunately the lack of a commonly acknowledged reference curriculum for EC specialization has led into an ad-hoc study-plan that could be used as a basis to start with. Such reference could have been a valuable core body of knowledge to ensure the program's quality.

The team developed the EC curriculum by: defining the objectives of the EC curriculum; choosing EC as the appropriate title; creating a list of courses that a student must complete (this was based on the knowledge of the team); developing the master syllabi for each course including the course description, teaching approach, assessment component for each course, establishing a system of curriculum evaluation, and integrating people (soft), academic and professional skills in the curriculum. By integrating these skills across the curriculum, the students will be given the opportunity to develop key skills as they progress through their degree requirements and program of study (de la Harpe, Radolf & Wyber, 2000). The structure of the EC specialization curriculum is shown in Table 1.

Table 1: Required Courses in Enterprise Computing Specialization in ZU

Course #	Course Title	Credit Hours
CIT 261	Enterprise and Information Systems Foundations	3
CIT 361	Enterprise Systems	3
CIT 362	IT in Logistics and Supply Chain	3
CIT 371	Mobile Computing	3
CIT 372	Cloud Computing	3
CIT 400	Green Computing	3
CIT 463	Enterprise Systems Developments	3
CIT 465	Knowledge Management	3
CIT 492	IT Infrastructure and Emerging Technologies	3

In 2013/2014 academic year, the EC specialization went through an in-depth assessment to come up with recommendations to improve the specialization performance and to reflect on the new KE needs. One of these recommendations was to restructure the study-plan in order to offer flexibility and depth of content. Students will have the flexibility to select two elective courses in addition to the seven required courses. Two new courses were also introduced to provide in-depth coverage that was initially missing from the curriculum. Moreover, CIT 492 "IT Infrastructure and Emerging Technologies" has been restructured to focus on "Emerging Technologies for the Enterprise". The new program structure is shown in Table 2.

Table 2: Revised Enterprise Computing Specialization

Course #	Course Title	Credit Hours
CIT 261	Enterprise and Information Systems Foundations	3
CIT 361	Enterprise Systems	3
CIT 362	IT in Logistics and Supply Chain	3
CIT 369	Business Process Management	3
CIT 463	Enterprise Systems Developments	3
CIT 468	IT Strategy, Management, and Governance	3
CIT 492	IT Emerging Technologies for the Enterprise	3
CIT xxx	Elective 1 (Selected Courses)	3
CIT xxx	Elective 2 (Selected Courses)	3

Perception of the specialization

In many ways, the specialization was perceived to be ahead of its time. ZU was one of the first universities in the region that sought out industry partners to deploy their applications for the students to use. The university partners' feedback has been positive and supportive. Soon, other universities followed suit and have considered offering a similar program. CTI faced some challenges in launching the EC specialization and some of these were reflected in the students' perception of the major. Students' perception of the learning environment (Trigwell & Prosser, 1991 and Gijbels, Segers & Struyf, 2008) is one important factor of students' learning mediation. Other factors include: approaches to learning (Prosser & Trigwell, 1999), and motivation and ability to self-regulate learning (Zimmerman, Bandura & Martinez-Pons, 1992). Shrestha (2013) concluded that the public is concerned primarily with the trust, credibility, process, and the

output of any academic program. The perceptions of the ZU students' learning environment were evaluated by conducting a survey. The survey was disseminated to some CTI students in December 2013, the students often choose their majors through word-of-mouth and by learning more about the different majors on the Majors' Day, a day where all colleges showcase their majors. Considering the EC specialization was new, the college had some difficulty in attracting enough students to sustain the specialization.

Enrollment in the specialization

Currently the EC specialization is only available for female students. The student intake in the EC program has steadily increased over a short period of time. There has been a significant increase in the popularity of the EC specialization among pre-major students who are joining the college. Indeed they saw EC as a program that offers better job opportunities compared to other programs. This was demonstrated in a survey of students enrolled in the EC specialization who were asked why they chose EC as their specialization. Half of the respondents mentioned availability of potential job opportunities. About one third of the respondents indicated novelty of the EC specialization prompted them to choose EC. Around 26 percent indicated that their choices were influenced by their family. Finally, 23 per cent indicated that the potential jobs had attractive salaries.

The future plan is to make the program available to male students. This addition will help with future student recruitment and contribute to the long-term viability of the specialization. This will also open the door for more Emiratis to join the private sector that is always looking for EC graduates.

Employment of the EC graduates

De la Harpe *et al.* (2000) suggest that "there is concern worldwide that existing undergraduate programs are not producing graduates with appropriate life-long learning skills necessary for their careers" (Bandaranaike & Willison, 2015). The graduates', in general, are receiving good degree specialization, but they also need to receive a variety of analytical, people and soft skills to be able to handle complex information, analyze it and communicate it effectively. Warn & Tranter (2001) suggest that "graduate recruiters want a variety of other skills, personal and intellectual attributes, rather than specialist subject knowledge, oral communication, teamwork, self-management, problem solving, leadership" (Muhamad, 2012). Shrestha (2013) indicated that employability and practical skills followed by curriculum and faculty are the main factors to enhance the reputation of an academic program. The EC specialization addresses graduates' concerns about job opportunities. Moreover, the increase in the intake can be attributed to the success of the recent graduates who secured jobs in various sectors that rely on enterprise applications (e.g., ERP and SCM) in their daily operations. Some of CTI recent graduates have been offered jobs from their internship sites such as DEWA, ETISALAT, and Dubai Aluminum (DUBAL).

One of the challenges that CTI/ZU and other federal academic institutions face is to motivate Emirati graduates to join the private sector. The public sector is almost "saturated". The Emiratis "must be steered into private sector" is the title of an article in the Abu-Dhabi-based National newspaper shows that "the Emirati public sector employment market is reaching "saturation point" and the Government should focus on educational reform and the subsidization of private sector wages". The article further indicated that "the state can no longer act as an employer of first and last resort and public sector jobs should not be part of the "social contract" by which the Government distributes oil wealth to its nationals".

One of the main causes of youth unemployment across the Middle East is the "experience trap" that leaves many university graduates unemployed after their graduation. Students in the region often face both a "skills gap" and an "experience gap". The "skills gap" is not having access to the type of education necessary to acquire skills for a competitive positioning in today's job market, including pathways to employment or founding their own small businesses. Meanwhile, the "experience gap" arises where businesses, independent of size or industry, demand higher levels of these essential skills along with experiences that students do not have. One of the strength of the ECP is the partnership that CTI has with several leading IT companies including SAP, IBM, CISCO, EMC, etc.

IT and Facilities Infrastructure

Laboratory-oriented courses in academic programs are essential to help students acquire the skills and capability to be ready to join the very competitive market place. The views of the advocates of laboratory-oriented courses expressed in statements such as "There is only little value to the experiment if you do not perform it yourself, question it, or modify it in order to provide answers to your queries" (Kingsley, 1890). The faculty of CTI recognized the importance of having laboratory-oriented courses and integrated these courses in the EC curriculum.

ZU takes advantage of its state-of-the-art ICT infrastructure as well as modern campuses. Indeed the campuses are fully networked and allow students to connect to various university networks and the Internet from anywhere (e.g., classrooms, library, offices, student hubs, and cafeteria).

At ZU, each student is required to purchase a laptop that will be loaded with software packages through the university's help desk to have easy access to technology needed to facilitate the learning process and to complete their class work independently without having to be on campus all the time. Also, each faculty member receives a laptop loaded with up-to-date software packages to help in delivery the course content and communicate with students through a standard learning management system. In addition to the university's main network, CTI has an independent network infrastructure for teaching and research. All ZU courses are accessible via standard learning management systems that the students and faculty can access anywhere, anytime using a web portal.

Being part of enterprise system vendor' academic alliance program, CTI accesses the necessary software that support labs. Three of the EC course offerings require that students access these enterprise systems to give them the necessary hands-on skills that are sought by future employers. Particularly in CTI, the IT infrastructure has improved during the past few years. Since launching the EC program, several specialized lab facilities have been added to support the different specializations' curricula and to provide space for the students to work on their projects.

Staffing the specialization

Since faculty and staff have a considerable influence on the overall success of any academic program, staffing the program is perhaps the single most important responsibility of the university and college administrators represented by the Dean of the college. At the time of launching the program, the college had only two faculty in both campuses with Information Systems background and one new hire with Enterprise and Industry experience. It was very difficult to select, recruit and retain a team of faculty and staff members that have the needed skills, with appropriate knowledge and attitudes to support student learning in the Enterprise Computing. This area is very unique and very few Ph.D. holders are specializing in this area.

Moreover, some of the university alliances made with ES vendors required that faculty be certified in their software in order to teach some of the courses. This requirement put additional pressure on the staffing requirement to either hire certified professionals or train the existing faculty. The faculty has since been trained and certified by their vendor alliances to support the teaching activities of the college.

Competitiveness of the specialization

To be competitive, University should be able to add value to its academic programs by anticipating what society expects from its graduates (de la Harpe *et al.*, 2000). University adds value by developing generic competencies in the program curriculum to prepare students for the workplace and become adaptive and adaptable (Warn & Tranter, 2001). ZU is one of three federal institutions in the UAE. The other two are Higher Colleges of Technology (HCT) and UAE University (UAEU). HCT operates 16 campuses in six cities while UAEU operates in Al Ain. The closest program similar to CTI / EC specialization is offered by the UAEU Enterprise Systems specialization and HCT's Business Solutions major.

UAEU offers a Bachelor of Science degree in Information Technology (BSc in Information Technology) within seven specialization tracks. One of these tracks is Enterprise Systems (ENSYS), which is equivalent to ZU Enterprise Computing specialization. The structure of the ENSYS's curriculum is shown in Table 3.

Table 3: Required Courses in the Enterprise Systems Track at UAEU

Course #	Course Title	Credit Hours
ISBP301	E-Enterprise	3
ISBP309	Enterprise Information Systems	3
ISBP331	Business Integration Lab I	1
ISBP350	Enterprise Resource Planning	3
ISBP370	System Analysis & Design	3
ISBP431	Advanced Database Systems	3
ISBP432	Advanced Database Systems Lab	1
ISBP433	Business Integration Lab II	1
ISBP440	Business Intelligence	3
ISBP455	Knowledge Management	3

HCT offers a Bachelor of Applied Science in Information Systems: Business Solutions . Business Solutions major is equivalent to ZU Enterprise Computing specialization. The structure of the Business Solutions' curriculum is shown in Table 4.

Table 4: Required Courses in the Business Solutions Major at HCT

Course #	Course Title	Credit Hours
CIB 2003	Technology Based Marketing	3
CIB 3003	Human Resource Management and Systems	3
CIB 3103	Object Oriented Analysis and Design	3
CIB 3203	Accounting For Managers	3
CIB 3303	E-Business Principles	3
CIB 3403	Advanced Database Technologies	3
CIB 4003	E-Business Applications Development	3
CIB 4103	Business Finance	3
CIB 4203	Customer Relationship Management Systems	3
CIS 2403	Object Oriented Programming	3

Currently, there is no direct competition from these two federal institutions. At the same time, the direct competition is from other majors in the CTI and the College of Business (CoB). Particularly, the Security and Network specialization in CTI and the Business and IT (MIS) specialization which are joint specialization courses between CTI and CoB.

Recommendations, Limitations of the Study and Scope for Future Research

The implementation of the EC specialization at ZU shows how Universities can rethink their own educational systems to produce graduates who can meet the challenges of the 21st century.

The merits of the EC undergraduate degree are shown and the challenges that CTI faced when thinking about, launching, and running the specialization are discussed. CTI handled challenges relating to the perception of the course by running a survey to understand the root cause of the problem. EC faculty was able to start educating those who were declaring the majors through active presentations to the students enrolled in the Career Exploration course (COL105). In addition to the marketing material used during the Majors' day, the EC's course offerings were strengthened by the addition of infrastructure, staff and labs to ensure that their specialization has a competitive advantage over that which is offered by its competitors.

The implication of the study for the academic and Enterprise Computing practitioners is that they need to be better equipped to take into account the several factors that need to be considered when introducing new academic or training programs. On the other hand, the implication for senior management is that they should be aware of the key areas of measurement to ensure a higher success factors in launching, assessing and sustaining an academic program.

Future plans include the addition of some courses that will strengthen the specialization and the collaboration with enterprise system vendors. Other actions include placing the interns in these vendors' ecosystems.

Reference curriculum framework for EC specialization and framework for assessing the effectiveness of academic specialization could be possible topics for future research.

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