

# **OVERCOMING ENTERPRISE SYSTEMS EDUCATION DEFICIENCY**

## ***A Simulated Laboratory Pedagogic Approach***

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**Abstract:** Despite various initiatives concerning undergraduate industrial internship, students from the Enterprise (Information) Systems and E-Commerce tracks (Programs) within the College of Information Technology, United Arab Emirates University lack sufficient exposure and knowledge of the basic operations within a typical business enterprise. By and large, their internship programs lack focused activities due to student insufficient knowledge of enterprise organizational operations. Case studies supporting theoretical foundation within most enterprise systems or information systems related courses, lack realistic student learning experiences and therefore fail to impact in-depth concept articulation. While students are aware of advancement in technology, their appreciation on its extensive application and capabilities leading to effective organizational competitive advantage is superficial. Rather than mere concept appreciation in lectures, supported by Microsoft Dynamics Navision business enterprise systems application, students' practical laboratory simulation of typical enterprise operations provided the much-needed realism in experiencing real-life enterprise operations. Students' problem-based active learning experience on core enterprise operations typified in small-medium size Electronic-Enterprises were initially incorporated within selected basic courses. Positive student feedbacks on its impact to their learning outcomes encourage further extension of such initiative to other courses within the program track. An accompanying SWOT analysis on this approach indicated that the beneficial opportunities outweigh the potential threat of not implementing this initiative. This paper presents the research approach for identifying the problem in students learning, soliciting its research hypothesis and the eventual proposed Enterprise Systems Laboratory Framework in overcoming the identified research problem. It also discussed an overall future program plan as an extension to the proposed framework. This includes active industrial partnership beyond regular student internship to enhance further students learning experience as well as preparing them for potential employment.

## **1 INTRODUCTION**

As a nation very much dependent on its wealth in oil production, the United Arab Emirates (UAE) is progressively developing into an economic powerhouse due to its stable and viable nationhood that supports its growing industries. Within 10 years, from a mere desert state, the nation's vision of being a leading regional hub for countries within the Gulf Corporation Council in particular, is evolving at a tremendous speed. This outpaced the norms experienced by most other developing countries. This is made possible with the influx of foreign expertise to facilitate and hasten its progress. A major drawback though, is in the capabilities and readiness of its own people (Emirati nationals) to learn and absorb modern work ethics and

professionalism as practiced in the western and far eastern part of the world. They are very much embedded within their own tradition and very much conservative work practices. Due to the nation intention in prioritizing it's nationals employment status (Emiratization Program), young Emirati graduates are placed into management positions without significant exposure to life experiences, living in a structured yet formalized modernity that is common within an industrialized society. They have yet to experience the industrial revolutions of past eras, which shaped the mentality, and working attitude that the foreign expertise brings. While it is arguable for such needs, such mentality and experiences are essence in the infrastructure and operations of today's modern enterprise, worldwide. These enterprises computerized their operations by

optimizing extensive use of advance technology to achieve globalised competitive advantage.

The local educational system is in the frontline in facilitating such rapid progress. While technology can be imported, mental development and work ethics through education is an evolutionary process that requires nurturing within the appropriate environment. Traditional lecturing approaches are employed within the College of Information Technology (CIT), United Arab Emirates University. However, these approaches need to be reconsidered in order to incorporate the use of innovative technology, moving away from reliance on strictly theoretical concept appreciation (Bradford *et.al*, 2003; Antonucci *et.al*, 2004). Western case studies incorporated in active and collaborative learning methods without the use of advance technology is insufficient to equip Emirati graduates with enterprise operational readiness. Furthermore, most of the western industrial practices typified within these case studies have yet to become commonplace experiences in UAE. There is a need to better prepare graduates beyond the theoretical concept by incorporating industrial operational experiences equipped with application of advance technology within a simulated classroom environment (Joseph & George, 2002). Its effectiveness can be further optimized by incorporating a direct partnership with local industries that are using similar technology. While a generic industrial internship is a practice within higher educational institutions, such industrial interaction and collaboration should be based on an objective specific course learning outcome. Such outcome is directed at cross appreciation of theories covered in lecture applied to a simulated scenario based laboratory environment (Watson & Schneider, 1999; Johnson *et.al*, 2004). Finally, a more focused internship of applying what has been learnt through participation in a guided operation in the industry.

This paper will highlight the findings on students' apprehension in working with modern enterprise, in particular private entities. It also includes a SWOT analysis justifying the needs for such changes in the education approach before introducing the proposed framework to incorporate simulated business enterprise as part of the core laboratory learning outcome. This will proceed with the initial evaluation on the implemented proposal with a discussion section to project the research future initiatives

## **2 EDUCATIONAL FACTORS AFFECTING EMPLOYMENT READINESS**

A likert scale based survey that hypothesized migration of IT skilled work force from foreign countries into UAE for employment purposes revealed the feeling of apprehension among majority of the young Emirati graduating students in securing employment within the private sector. The findings highlighted factors favouring their employment within their government ministries as their responsibilities there are confined to addressing domestic organization operational skills. Such an environment is more accommodating than the internationally dynamic and complex environment characterized in typical globalized business enterprise within the private sector. The surveyed sample population consisted of graduating students from the Information Systems and E-Commerce tracks who are in their final semester. They were specifically chosen because they form the majority of student population within the College of Information Technology who would most probably find a job in relation to the use of Enterprise Systems application within typical business operations. While the survey main intention was to solicit feedbacks on their preparedness to join the workforce, among other things, it also revealed needed improvement in their education system especially towards assimilating them into privatized business enterprise. Among the questions relevant to this research were confined towards how well students are trained with IT skills and their level of confidence in using them. The latter focused on whether their interest or expectation in acquiring IT skills has changed from before they joined the College of Information Technology as compared to at the point of finishing their studies. Their employment preference was correlated with these questions to assert definite pattern of behaviour. Other adjacent influencing factors affecting their choices were also solicited.

The findings revealed that 61% of the surveyed population did not believe that the various courses taught while they were in the college of IT have converted them to be an IT savvy. They believed that it will take them at least another 5 years before they are confident to be at the same level of IT skill among the "imported" foreign expertise. Among the population, 68% had a changed of interest in IT due to various reasons. Among them, 63% of the male students found difficulties in learning the subjects. The findings recorded that 37% of the surveyed

population blamed extensive lecturing on theoretical concepts rather than hands-on practical appreciations. Other accompanying reasons are poor teaching techniques, lack of proper resources and 29% of the votes cited variety of dissatisfactions that led to their changed of interest towards IT. A question on whether IT courses taught will prepare students for an IT career, revealed a worrying result where 44% of the population were unsure of the relevance and appropriateness of these course since they could not associate the taught theoretical fundamentals with what being applied in the industry. Another 18% of the population strongly agreed that majority of the courses have no relevance to their choice of career path. The findings also highlighted that male student could earned better salary of more than 30% in Engineering and Business related positions with a correlation of a better employment career path in these sectors than IT.

In preference towards employment, 84% wanted to work in their government ministries instead of private business enterprise. Among the reasons correlated to the above findings are better salary scales within the government sectors that have a stable career path. In addition, such environment adopts traditionally habituated working ethics typically practice within Arab society that they can associate themselves very well. On the contrary, the private sectors are more prone towards a cosmopolitan working atmosphere where majority of the Emirati nationals is not familiar and not comfortable with. In the age of globalised enterprise, such former preference is very difficult to accommodate. Most globalised enterprise would optimize variety of expertise in a mixed male-female and cross-culture environment. These have yet to be well accepted within the UAE society. On another extreme, cost of labor, particularly employees from most Arab countries, Indian sub-continent and the less developed central Asia are very low as compared to the Western employee. Since much of the enterprise operations within UAE are still manually done adjacent to high cost for automation, large majority of enterprises are less motivated to fully innovate with advance technology.

These findings highlighted a need to revamp the current pedagogic approach in preparing young graduates for employment especially into a more dynamic and versatile business enterprise (Seethamraju, 2004a). There is a need to heightened students appreciation and level of confidence through extensive practical hands-on in IT application usage and its capabilities beyond textbook case studies. By assimilating students into

in-class real life enterprise application simulation of various business case scenarios typified in local business operations, would provide the realistic appreciation and in-depth familiarity that will facilitate their transition into the real world of business enterprise. In addition, further alignment with a focus internship programs, in-line with such simulated exposure, can only elevate their self-confidence, informed perceptions of enterprise working environment as well as potentially achieve a much effective internship experience. These called for a new pedagogic approach in providing students with such applied knowledge to better prepare them for the real world. There is a need for a simulated business enterprise laboratory to provide students with such experiences.

### **3 SWOT ANALYSIS ON SIMULATED ENTERPRISE SYSTEMS LABORATORY**

The proposal is to develop a business enterprise systems laboratory to simulate typical business enterprise operations. This laboratory will be equipped with state of the art enterprise business application suites together with relevant supporting hardware. The learning outcome will be patterned to simulate local enterprise business case scenarios for student easy articulation of the given theoretical concepts to be covered against its practical applications.

The strength of this proposal is with a supportive partnership with industries particularly providers of the business enterprise application as well as companies that are optimizing such application in their enterprise operations. In-line with the above objectives to resolve the identified problems, a full sponsorship estimated at US\$200K from Microsoft Dynamics (Enterprise software application provider) and Dynamic Vertical Solutions (Solution Consultant) for developing this lab were solicited. Simultaneously, a direct collaboration with industrial partners who optimizes such application is necessary to exploit an effective internship programs. The sponsorship includes hardware/software with licenses as well as periodical consultation services to facilitate the lab and course materials developments. In addition to our external partner's strength, the CIT Information System (IS) track consists of a team of self motivated teaching faculty members, strategizing this initiative, its development and eventual implementation. The potential weakness is without

the consultant facilitation, the development time for this initiative will be significantly long and laborious.

The opportunities benefiting CIT students, college and university, are not limited to students exposure to the application of such technology; but also the immersive learning experience of the operational electronic-enterprise which compliment the theoretical concepts. Students will participate and experience firsthand a typical business enterprise operation within the core functional areas of Sales, Purchase, Accounting, Inventory as well as Information Technology departments. They will be progressively introduced to the various laboratory modules that featured the numerous functionalities within the enterprise application systems as used by each department. Depth of coverage will be intensified as student progress from core level courses into the junior and subsequently senior level courses. This will be mapped to the various course learning outcomes as defined within each course curriculum. The lab will also be progressively extended to include all courses within IS track. Potential senior students who have completed significant number of laboratory modules will be encouraged to attend free-of-charge professional workshops and training sessions organized for sponsors' industrial partners. This will enhance further their industrial exposure through networking with participants from industry. Students will also be encouraged to enroll for Microsoft Dynamics certification where ever possible. CIT collaborations with sponsors will also lead to student internship with their industrial partners who adopt such technology within their organizations. Such a progressive pedagogical approach will also prepare our students for potential employment with these industrial partners. These benefits will provide added value to the college as a whole and act as a differentiator for the IS track when compared to similar programs at other establishments.

The threat of not implementing the plan will mean the above identified stigma will continue and eventually the Emiratization initiative by the government will be much longer to achieve. Failure to implement this proposal may also lead to continued reduction in student number and interest in studying courses within the IS track. The long-term impact, IT professional will remain to be dominated by foreign talents instead of the local Emirati workforce.

#### **4 MICROSOFT VERTICAL ENTERPRISE SYSTEM LABORATORY**

While it could be claimed that this proposed pedagogic approach is nothing new, its essence is to supplement taught IS theories with technical-cum-hands-on experience for student in preparing them to be IS specialist. Student learning experience is categorised into 4 phases of Appreciating Business Operations & its Application of IS/IT, Appreciating Integrated E-Enterprise, IT Governance & Systems Development and finally, Strategic Management of IS/IT. This didactical design simulates a scenario of student being employed by a Retail SME IT department and progressively learning new IS/IT skills throughout their 3 years studying within the college. Student will be introduced to SME functional operations which are aimed at providing knowledge on how business operates. This includes introduction to elementary application programming and databases that typically support a computerised business operations. Subsequently, an integrated ERP will extend student appreciation towards an electronic-Enterprise that optimises state-of-the-art IS/IT. This is followed by various responsibilities performed by an IT department in maintaining and supporting organisation used of IS/IT. It will include IT governance, analysis and design of user's new IS/IT requirements. The final phase emphasised on how IS/IT can be aligned to support business competitive advantage through business intelligence for management purposes.

The developed Microsoft Vertical Enterprise System Laboratory (MVESL) provided a simulation environment depicting a typical real-life business Enterprise Resource Planning (ERP) operation within a medium size enterprise [Rosemann & Watson, 2002; Hawking *et.al*, 2004]. It will be equipped with advance technology necessary to operate an electronically integrated retail business. The initial targeted students are from the Information Systems and E-Commerce tracks within the CIT. The lab can also be optimized by students from the College of Business and Economics, majoring in Business and Accounting and/or Management Information systems. Based on guided role-play, these students will be exposed to a typical functional business operation simulating a day-to-day transactional processing for such organization. In rotation, student will perform scenario-guided business activities typically done by employees in various departments. They will optimize various IT devices supported by Microsoft Dynamics Suite, in

particular Dynamic Navison and its related business applications in running these operations. Dynamics Navison for retail industry has been chosen due to, in a larger extend, student familiarity with such enterprise operations especially whenever they visit established supermarkets within UAE. This laboratory could also be extended to include business intelligence tools for managers to analyze business information for the purpose of daily operational as well as short-term decision-making facilitating organizational strategic initiatives.



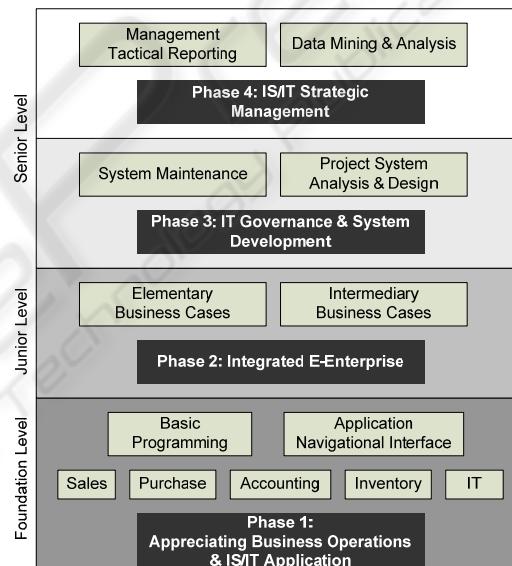
Figure 1: Hardware and Software Setup.

The vision of this laboratory, with the direct support from Microsoft Dynamics and its Gold Certified partner, Dynamic Vertical Solution Inc., is to provide a simulated real-life integrated Electronic-Enterprise business operation. With guided facilitation from faculty members, students can apply the various theoretical concepts covered in lectures into a simulated IS/IT environment essentially optimizing the full spectrum of Microsoft Enterprise Resource Planning software and its related supporting technologies. The targeted benchmarks are to overcome the research identified stigma with additional bonus of accrediting students with specific Microsoft certification programs inline with the learning outcomes for this laboratory. These can be achieved by addressing short-term and long-term goals. Within the former, apart from implementing the various supporting hardware and software equipments (see Fig.1), specific training sessions with a consultant from Microsoft partner will train faculty members as trainers as well as help to prepare laboratory syllabi for students' practical lab sessions. These sessions instruct on how various theoretical concepts can be applied and demonstrated within the various functionalities featured in Microsoft Dynamic Navision. The long-term goal is to revamp, in phases, the lab components for all of the courses within both tracks in line with the full spectrum of Microsoft Enterprise

software and related supporting hardware technologies.

While the laboratory should not be vendor driven, exposing student to a specific line of product suites ease the complexity in different terminologies and potentially business jargons advocated by different vendors. The intended outcome is to emulate an advanced and sophisticated business environment for student to have a 1<sup>st</sup> hand experience on Microsoft lines of products in supporting business operations. In progression, the building block (see table 1.) that frame student learning will be initiated with the introduction of business operations emphasizing the main roles and responsibilities of each functional department within a typical business enterprise setup.

Table 1: Proposed Laboratory Curriculums.



At this foundation level, student will be exposed to introductory programming skills using Microsoft .NET. Basic database concepts and the application system back-end databases will also be introduced. In addition, students will be exposed to basic Dynamics Navision navigational GUI to provide appreciation of typical IS application systems used in an enterprise. Such combination provided the link for student to appreciate the programming syntax, its corresponding logic which supports the running of the application interfaces that student see as well as how data is being captured in the system back-end. The junior level designed as laboratory tutorial, will guide students with various elementary and intermediary features and functionalities of the ERP system as performed by the various departments. Using the Dynamics Navision, student will be given various business cases to perform. The tutorial is a

step-by-step walkthrough laboratory exercises for student to emulate the various business case transactional activities. Such laboratory activities will be mapped to the various theoretical concepts covered in lectures. In their senior level, various aspects of IT governance will be introduced. The intention is to expose student to the core operation within an IT department in maintaining such systems. This will be followed by project based system analysis and design to simulate extension of new ERP functionalities as typically requested by the various departments. The final phase involves introducing business intelligence within the syllabi by emphasizing various management reporting tools and data mining analysis for tactical management decision-making process.

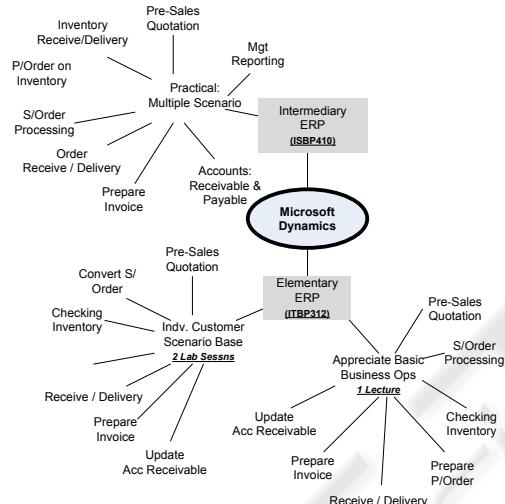


Figure 2: Sample Laboratory Details.

The Fig. 2 highlights sample breakdown coverage for the selected courses that have been implemented within the simulated laboratory. For instance in the Elementary ERP module, supported by business process workflows, student will walkthrough a typical core business operation. This will help them to appreciate the various transactional activities necessary in performing for instance, completing a sale cycle. Subsequently, in groups, student will perform a tutorial based step-by-step business operation with the Dynamic Navison application software. Starting with simple master record data-entries, student will progress into processing sales order, record posting and Inventory management. This will progress into a much elaborated multiple scenario business cases at the intermediary level.

Fig.3 projects the laboratory physical layout resembling typical departments within a business environment. These departments are

separated using office divider to encapsulate sub-organizational activities that differs from that in another department.

## 5 FRAMEWORK IMPLEMENTATION ANALYSIS

The lab implementation described above was implemented during summer 2009 and deployed to the first cohort of students during the Fall semester of 2009. The first course to make use of the laboratory was a senior level ERP (Enterprise Resource Planning) course. The course had previously been delivered in dual lab and lecture mode, with the main focus being on the theoretical application of ERP in a business enterprise.

The lab component of the course made use of ERP vendor developed training material, which provided a guided tutorial on various elements of ERP functionality. As identified in literature it is this process of successfully integrating applications such as ERP into the curriculum that present the greatest challenges for faculty and lab engineers [Fedorowicz *et.al*, 2004; Seethamraju, 2004b].

The revised approach employed the MVESL to immerse the students in a simulated business environment. The cohort, consisting of 20 students were divided into groups and assigned to initial functional areas; accounting; sales; purchasing etc. The students were then given a defined set of tasks, which exposed them to the typical functions of each area within the simulated business. During the semester the students spend three weeks in each of simulated departments generating data in each department, which was then used by other groups in the simulated environment. The immersion in the virtual business environment allowed the students to gain a more detailed understanding of how a retail enterprise functions and to experience how data is generated, managed and used with such an enterprise.

Students performed a broad range of tasks ranging from booking items into inventory, to invoice matching, sales order processing and supplier purchasing. Such experience could not have been gained in a typical classroom setting and would have been difficult to achieve with industrial visits or internship, given the live nature of business and the inexperience of the students. The laboratory component of the course was also expanded to cover 2 hours per week rather than the typical 1-hour and as a result the lecture component of the course was

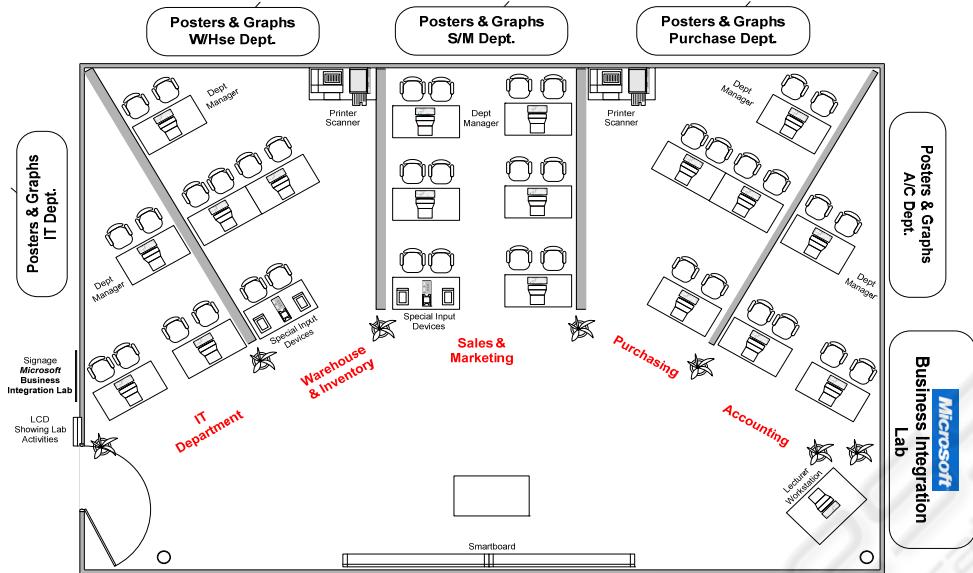


Figure 3: Simulated Enterprise Systems Laboratory Layout.

reduced to 1 hour. The change in time division between lecture and lab was made possible by the transfer of material from lecture to lab. For example, the discussion of the sales order process, from enquiry through to order processing was moved the lab component and rather than simply describing the process students had to physically provide details for a customer enquiry, price the quotation, process the order and invoice the customer. As a result of this simulation the students could physically see the effect of their actions (relating to this sale) on the enterprises inventory and accounts.

The lecture component of the course was used to discuss the pure theoretical aspects of ERP and its evolution. Lectures also provided opportunities for students to examine case studies, which reinforced the knowledge, which they had developed during hands on sessions. A survey was conducted with the cohort following completion of their studies and the results indicated that students gained positive experience in a number of key areas as a direct result of the changes to the delivery style and implementation of the MVESL. Table 2 below shows the responses of students in relation to the question "*I am familiar with the business processes performed by a typical sales department in a retail SME setting*", indicating that students who completed the course using the MVESL approach felt more comfortable with the basic concepts and operations of a sales department. These figures correspond to over 60% of the respondents, who felt they had a firm grasp of the business processes involved. This compares to just 20% for students who had taken the course during the previous two

years (2007-2008). Similar response rates were recorded for all aspects of the business processes covered in the ERP course.

Table 2: Sample MVESL Implementation Analysis.

	2007/2008 Traditional Lecture Approach	2009 MVESL Approach
Strongly Agree	2	4
Agree	10	13
Neutral	17	5
Disagree	11	2
Strongly Disagree	3	0
Total Respondents	43	25

## 6 DISCUSSION

The previous sections of this paper have described the problems faced in the providing enterprise based education to students in the College of Information Technology at the United Arab Emirates University and the design and implementation of a laboratory to equip students with an environment in which they can develop an understanding of how a real enterprise functions. The first cohort of students have completed their education within the laboratory and this section of the paper presents a discussion of the lessons learnt as a result of this experiment.

Feedback from students indicates that they gained a significant benefit from a more hands-on immersive approach to the course and that perhaps more importantly they enjoyed the process of learning. Responses to the questionnaires from 2007-2008 students indicated that whilst they

covered the lecture material and were aware of the issues involved in ERP deployment in an enterprise, they continued to struggle with the practicalities of business processes. As educators we are able to explain through textual and diagrammatic the sales order process and the functional areas involved and affected. However, it is only through practical exposure that students are able to experience and physically see the wide-ranging interactions within the organization that a single business process produces.

Students have gained significant insight into the daily operation of an integrated IS and have developed a more detailed understand of how theoretical business processes are practically implemented. Unlike a semester long internship program, this approach strictly matched theoretical coverage with the comprehensive simulated practical skills acquired in lab throughout 3 years. Internship program is not comprehensive enough to provide such intended skills as acquired in the lab. Furthermore, while some industrial partners provided limited working exposure, most are sceptical in students' ability to perform and contribute to their minimal level of expected productivity. Mostly, students are given trivial responsibilities that do not require much training and attention yet fulfil the minimal internship requirements. Henceforth, skills acquisition in such simulated lab are far extensive than internship programs.

The immediate future will extend the laboratory usage to include Microsoft certification programs inline with the courses offered in Enterprise System as well as Electronic Commerce (EC) Track throughout students' progression into their senior year. This will prepare students for the necessary Microsoft certification exams before their graduation. In due time, we intend to introduce strategies which will allow students in majors such as Business and Accounting in the College of Business and Economics, to avail of the laboratory and the data which is generated from the lab sessions. This will also incorporate professional courses for external entities from industry for training opportunities that may lead to further certification outcomes.

## 7 CONCLUSIONS

This paper presented an implementation of a virtual enterprise in a university setting, with the aim of equipping UAE National students with the required level of hands-on skills and business practice knowledge in order to be confident of their

successful integration into private sector employment in the UAE. We highlighted the unique challenges faced by national students when entering the private sector, focusing on the barriers to their entry. The design and implementation of the MVESL was discussed and the initial results from the first cohort of students studying under the new conditions were presented. The results of the new approach are encouraging and the authors believe that sustained use of the facility will enable Enterprise Systems students to flourish in the private sector in subsequent years. The authors would like to thank Microsoft (Gulf) and Dynamic Vertical Solutions for their continued support of the MVESL project.

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