

Vendor-based network engineering education: an international comparison

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ABSTRACT: Universities are increasingly required to respond to market forces, such as employer and employee expectations. One such solution is to incorporate a vendor-based curriculum as part of a university award. However, there are advantages and disadvantages to this response. The article analyses such an approach and includes an international comparison. The survey findings reveal that a majority of students, academics and employers support the integration of vendor-based curricula in university education, where the curriculum emphasises a more academic approach with a complementary, vendor specific, practical component.

INTRODUCTION

An Internet-based survey of universities offering Information Technology (IT) courses at undergraduate and postgraduate levels of study indicate that there is a trend towards incorporating vendor-based curriculum. There is evidence that students prefer this type of course because they believe that professional certifications may give them an edge over other job applicants.

This article investigates the strengths and weakness of integrating vendor-based courses into a university curriculum from students', academics' and employers' perspectives. An international comparison was also conducted.

VENDOR-BASED COURSES IN AUSTRALIAN UNIVERSITIES

There are 39 universities in Australia. Several years ago, only eight universities offered vendor-based curriculum. A recent Web survey by the authors found that approximately 38% of them offer industry certified courses as standalone programmes or as units integrated in both the undergraduate and postgraduate curriculum. The major vendors were identified as Cisco and Microsoft.

Six universities offer standalone courses. A standalone course is defined as one that runs for less than one semester and leads only to a vendor certificate. Such courses are available not only to students enrolled in university courses, but also to the general public. This is also a means to raise revenue. However, it should be noted that private training providers also offer such courses. In effect, universities must compete with these other providers. This can be contrasted with an integrated course that makes extensive use of vendor curriculum.

Typically, the student obtains a university qualification and also has the option to sit a vendor-regulated examination and hence obtain a vendor-based qualification. Nine universities offer vendor-based courses in which modules are embedded in postgraduate or undergraduate awards within the Information Technology field. There is clearly a significant increase in the use of vendor curriculum within Australian universities.

VENDOR-BASED COURSES IN THE USA, UK AND INDIA

A survey by the authors found that a similar trend might exist for universities in the UK. Again, they offer industry certified courses as standalone programmes or as units integrated in the both undergraduate and postgraduate curriculum. In the USA, there is a wide variety of universities that range from small institutions meeting the needs of the local community to universities with outstanding international reputations. The community-based universities appear to use vendor-based curriculum for their undergraduate awards. This is not the case with the more prestigious institutions.

The authors conducted a detailed analysis of the courses offered at Anna University in India. Anna University is one of the premier institutes in southern India with special interests in engineering education. This University has 235 Indian engineering colleges affiliated to it. Very few of these colleges offer vendor-based curriculum as standalone courses. It should be noted that Anna University determines curriculum content and none of the undergraduate awards offered by the colleges include vendor-based curriculum. A survey was also conducted at Madras University, which offers IT undergraduate and postgraduate awards. Again, vendor-based curriculum is not offered.

Vendor curriculum in India appears to be predominantly provided by the private training sector. Companies like Aptech

and NIIT have more than 58% of the market share [1]. The popularity of these training institutes may be one of the reasons why universities have avoided using vendor curriculum. Other reasons may include: prohibitively high investment cost for Cisco equipment within the university and also that student demand exceeds the number of places the university can supply.

VENDOR NEUTRAL CERTIFICATIONS

Vendor neutral certifications are courses where the contents taught are not focused on a specific product or application [2]. They are more suitable for those seeking to obtain a broader knowledge. Most vendor neutral certifications are designed to train students on concepts required at the entry level or at the intermediate level in the specific field where the broad conceptual coverage of knowledge is more useful, eg Computing Technology Industry Association (A+, Network+, inet+ and others), Brain Bench certifications, Certified Internet Webmaster (CIW), GWEC, Prosoft, etc. CompTIA's A+ certification covers concepts on PC hardware and OS technologies. According to Mukely, *A+ is seen as the baseline certification for entry into the IT work force*, and that ... *some companies even use the A+ certification as a prerequisite to their own exams* [3].

The CIW certification has gained recognition among employers and IT professionals according to survey findings by Gartner [4]. Hoffman considers that vendor neutral certifications are gaining ground because of the dynamic nature of the IT industry and, in recent days, a technology professional is unlikely to stay in a specific company for his/her entire career and hence is forced to possess portable skills. Hoffman suggests that vendor neutral certifications help acquire such skills [5]. Although there are advantages to vendor neutral certifications, the survey findings on Australian universities indicate that none of them have integrated vendor neutral courses in their undergraduate or postgraduate awards.

THE INTEGRATION OF VENDOR-BASED COURSES: FEEDBACK

In Australia, Edith Cowan University, Perth Australia, offers vendor-based courses that include Cisco and Microsoft certification as a part of Information Technology (IT) degrees at both the undergraduate and postgraduate levels. A survey was conducted on undergraduate and postgraduate students. Some students were enrolled in vendor-based courses and others were not. In total, 15 students participated in the survey.

Undergraduate Students

All of the students who were enrolled in vendor-based courses thought that such curriculum offered a good opportunity to obtain not only a university degree, but also practical knowledge and skills directly appropriate to employer expectations. Furthermore, they wanted the opportunity to obtain an internationally recognised vendor qualification. However, most students believed that the university course might be sufficient evidence of expertise in that field. Students felt that they could obtain the benefit of both a university education and curriculum useful in obtaining employment. They considered that a university education provides a broad educational basis. They also believed that only a vendor-based certificate might be insufficient to obtain employment.

The students surveyed considered that a university was preferable to a private institute because they thought that courses at a university are taught by staff with teaching skills and experience in the field.

One student mentioned that the assignments, which are completed as a part of the unit, gives them a better understanding of the subject and enhances their problem solving skills. The majority answered that the examinations conducted at university at the end of the semester forced them to study the course and they believed that this could help them a great deal in their preparation for the vendor certification examinations.

It can be concluded, based on this survey, that undergraduate students believe that vendor-based curriculum provides better employment prospects and hence is an important part of their studies.

Postgraduate Students

The postgraduate students surveyed had varied opinions about the integration of vendor-based units in the postgraduate curriculum. A minority of students considered that integrating vendor-based curriculum is a good option, as it provides hands-on skills and the opportunity to use commercial products. Students from relevant backgrounds, such as bachelor degree in computer science or information technology, are of the view that university units should break the boundary of vendor specificity and should give attention to principles behind the technologies that would be required at a managerial level in the workforce.

It should be noted that postgraduate students have the option to study a number of undergraduate units as part of their award. Postgraduate students believed they should be given the opportunity to study vendor-based undergraduate curriculum, but at a higher academic level. Most students believed that obtaining a masters degree by completing vendor specific courses reduces the value and standard of the degree.

However, all did not share this opinion. One student thought that the course provides the skills and knowledge to work in industry with little or no training. Those international students studying IT courses shared a common opinion that the degree should focus on moulding them to obtain a job in industry and if incorporating vendor-based curriculum is the way to go, then it would be welcomed.

Based on this survey, it can be concluded that vendor-based curriculum is not considered appropriate at the postgraduate level.

Academics' Viewpoints

There are advantages and disadvantages to the incorporation of vendor-based courses into the university curriculum [6][7]. Key issues that must be considered include: the need for instructor training, academic level of the material, vendor neutrality, equipment costs, curriculum ownership, vendor certification standards, etc.

It should be noted that some vendor curriculum mandate that instructors within the university must have the appropriate vendor-based qualification. Without this, the vendor-based

curriculum cannot be offered. Koziniec and Dixon indicate the problems associated with only one qualified staff member who then elects to leave.

The authors also interviewed a professor of IT at one university in Western Australia. According to his view, a good degree offered at any level of study should be balanced, which implies that it should offer units that provide theoretical knowledge and practical skills. He expressed the opinion that units that have substantial vendor-based course content should be offered only as elective units and not as core units, which would give students the freedom to choose units of their interest. He concluded that, in order to provide a degree that would help students obtain employment, a compromise has to be made and offering vendor-based courses is a good option.

This opinion is shared by Yoran, cited by Blacharski,

If you take a networking essentials exam, you don't learn networking essentials, you learn Microsoft's view of networking essentials ... [and that] ... the academic approach is a much purer one [8].

Yoran suggests that vendor-specific certification provides an understanding of a specific piece of proprietary technology and this is often what employers want. However, in the long term, single vendor-specific certification may limit career advancement options.

Australian Information Industry Association (AIIA)

According to the Australian Information Industry Association (AIIA) on Australian higher education, the Information and Communication Technology (ICT) industry relies on Australian universities for its growth [9]. The AIIA has also noted the increase in student enrolments in ICT-based courses, stating:

In Australia, the growth in enrolments in ICT has been even more dramatic, both in ICT courses and ICT units of study. Student enrolments in ICT courses have risen 8.5 per cent per annum over the past decade, and enrolments in ICT units of study have risen almost 5 per cent each year over the period.

The AIIA supports the incorporation of vendor-based courses into university curriculum and note such courses are recognised internationally. However they note that higher education curriculum should be flexible and meet the demands of industry, students, and should incorporate emerging technologies. The AIIA suggest that the higher education curriculum should focus on delivering fundamental concepts that will develop the potential to learn new concepts at a faster pace as strong background knowledge is already obtained.

Opinions of Employers on Certifications

Eberhardt, cited by Gilhooly, has suggested that it is not important to be certified, but a certification proves that an employee can go above and beyond [10]. Foote, cited by Gilhooly, notes that IT professionals holding certifications earn bonuses 13% of base pay. In conclusion, Gilhooly suggests that certifications are considered as a means to evaluate an applicant and that they are used as selection criteria to screen candidates. However, a candidate with certifications and no experience

does not stand much of a chance. This opinion is also shared by Fage, Agosta, Merchant, Foltz and Barnes, who commented that:

By seeking to hire vendor certified employees, a company can assure itself that not only has it found a person skilled in networking, but also it has hired a person skilled in the specific products the company uses ... Employers recognize that certifications, like university degrees, do not guarantee a level of knowledge, experience, or performance; rather they establish a baseline for comparison [11].

According to Rice, cited by Hoffman,

I do think certifications are an important factor to consider when hiring, but one of many factors one would consider when making a hiring decision [12].

CERTIFIED PROFESSIONALS: STATISTICS

The *Career Journal* expressed a different opinion about certifications and justified their debate by pointing out the growing numbers of certificate holders, the cost of obtaining a certification and the return on investment from the certifications. Accordingly, a survey by a company called 101 Communications has shown that, as of July 2002, there were 1.3 million certified Microsoft professionals, 789,364 MCPs and 462,878 MCSEs. The salary for certified professionals is not as attractive as it used to be. MCP magazine salary survey revealed that the average salary for MCPs has dropped from US\$53,400 in 2001 to US\$52,000 in 2002 and that MCSEs certified in Windows 2000 earn US\$53,700, which is a drop from US\$67,100.

One of the most recognised certifications from Cisco is the CCIE. As per information released in tcpmag.com, professionals who are CCIE certified earned an average of US\$99,000 in 2002, which is a decline from US\$115,402 in 2000. Other Cisco certified professionals also faced a salary drop. It was concluded that, for a good career, it is essential that the aspirant seek knowledge by enrolling in an associate degree rather than paper credentials [13].

WHO VALIDATES THE IT CERTIFICATIONS?

Within the university sector, awards are typically accredited by professional bodies, such as the ACM and Australian Computer Society. However, while there are various certifications available in the IT education market, there are no global organisations that endorse them. The certifications offered by Microsoft or Cisco, which dominate the IT world, are not endorsed by any organisation. This was referred to in an article that discussed the advantages and disadvantages of IT certifications, affirming that *There is absolutely NO industry-wide quality control on the curriculum that vendors use for their certifications.*

It was also stated that there are curricula for instructor-led courses that lead to a major certification that does not prepare students for the certification examinations that follow; furthermore, the vendor charges students high tuitions for inadequate content. It was cited as an example that TCP/IP and networking technologies have similar introductory material

covered by Novell, Prosoft, Cisco, Microsoft and Sun [14]. It was suggested that a vendor neutral body should come forward to rank the certifications, and this organisation should be the one that everyone respects.

CONCLUSIONS

From the findings, it has been demonstrated that undergraduate students and industry associations overwhelmingly support incorporating vendor-based courses in university education. Employers validate certifications and consider them as a good supplement to an IT degree.

Both academics and postgraduate students have endorsed these opinions and, furthermore, believe that courses should be designed with equal emphasis on theory and practical concepts. The practical component should emphasise a specific vendor, thus assisting students to sit certificate examinations.

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