The Global Work Force Crisis in the IT Industry

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Abstract

The rapid growth of Information Technology deepens the global work force crisis. The Information Technology Association of America (ITAA) reports a shortage of 346,000 IT professionals. It is estimated that the shortage of the IT specialists in Europe will increase to 1,200,000 by the year 2002. In response to crisis, the IT industry runs certification programs at an enormous scale. The university sector tries to expand its courses and become more responsive to industry needs.

Introduction

The rapid growth of Information Technology deepens the global work force crisis. The insufficient pool of computer and software engineers, networking experts, programmers and system analysts becomes even more serious in view of the frequent replacement of hardware and software systems by more advanced products. Analysts predict that industrial success of the new network operating system — Windows 2000 — will be seriously hampered by shortages of qualified users.

The US Commerce Department estimates that 1.6 million new positions will be required by the year 2006. The Information Technology Association of America (ITAA) reports a shortage of 346,000 IT professionals.

A 1998 report to the European Council[1] — entitled *Job Opportunities in the Information Society: Exploiting the potential of the Information Revolution* — points out that the Information Technology has become one the greatest and fastest growing sectors of the European Community. According to the report, European consumers and businesses spent more on Information Technology products and services than on cars, steel and airplanes

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combined.

The growth puts an enormous strain on the job market with 500,000 unfilled vacancies. It is estimated that the shortage of the IT specialists in Europe will increase to 1,200,000 by the year 2002.

Another study, by International Data Corporation and Microsoft, puts an even higher figure for the year 2002 as being 1.6 million[2]. According to the study the skills shortage has a detrimental effect on the European economy causing:

- Rising salaries costs by as much as 60% pa
- Deferred projects
- Productivity losses caused by the lack of proper IT support.

Industry Response to the Crisis

In Australia, the IT industry initiated creation of the Information Technology and Telecommunications Skills Institute. The Institute will become a vital link between industry and the education institutions. It will collect information on industry skill requirements helping universities and technical colleges to make their courses more relevant.

In the US, corporate universities play an increased role in solving the problem of skill shortage. Although the use of the term *university* for what are basically corporate training centres is disputable, nobody can question their significance in the rapidly changing education sector. In the US alone, there are more than 1600 corporate universities, 90% of which are offering training through Internet or videoconferencing replacing conventional classrooms[3]. A prominent example is *Motorola University* offering courses not restricted to Information Technology[4].

In Germany, the crisis has prompted the Federal Government to consider a new legislation granting a work permit to 30,000 IT professionals from countries outside the European Community.

The Information Technology industry promotes actively a huge range of certification programs. Programs, such as Microsoft Certified Software Engineer, Master Certified Novell

2) http://www.microsoft.com/train_cert/itcr/internat.htm
3) http://www.cio.com/archive/webbusiness
4) http://mu.motorola.com

Engineer, or Cisco Certified Internetworking Expert are respected qualifications providing an objective evidence of practical skills directly applicable to the need of industry. Programs' requirements are identical in all parts of the world solving one of the fundamental problems of staff mobility — recognition of overseas qualifications.

Industry Certification Programs

Information Technology is a truly global industry dominated by powerful international corporations such as Microsoft, IBM, Intel, Motorola... The very nature of the industry promotes globalisation as hardware and software systems require little adjustments to local markets.

As might be expected the certification programs are truly international qualifications with unified objectives and examinations, identical articulation paths, and standard course delivery modes. For instance, a person interested in the Certified Novell Engineer (CNE) qualification can contact a training information centre located in as many as 52 countries and regions.

For the more advanced option — the new Certified Directory Engineer program — a prospective student can choose a training and testing centre located in 11 countries of three continents.

Some courses are offered in various languages. For example, Novell course *801 Service and Support* in network-related hardware can be taken in:

- Chinese (traditional version)
- Chinese (simplified version)
- English
- French
- German
- Korean
- Portuguese (Brazilian version)
- Spanish.

Similarly, the Microsoft Corporation has established a worldwide network of training and certification centres in Africa, Asia, Europe, Latin America, North America and the South Pacific. In Europe alone, such centres are to be found in 18 countries.

An important attribute of certification programs is flexible delivery of teaching material. Options include:

- Instructor-led classrooms
- Web-based training
- Computer-based training using CD-ROMs
- Video-based training.

In addition, the comprehensive books and study guides are regularly updated by corporate and independent publishers such as Microsoft Press, Novell Press or SYBEX.

Students prepared to set up their own computer network at home, in order to gain the required hands-on experience, are offered discounted prices on hardware and software products.

Information Technology certification programs benefit both employers and individuals. Benefits to employers include:

- Objective method of assessing skills related to specific IT products
- Introducing employees to the latest technologies
- Productivity increase
- Improved support quality
- Reduced system downtime
- Improved system security

Benefits to individuals:

- International recognition of qualifications
- Expert skills in areas of high demand
- Promotions and higher salaries
- Access to secure web sites with technical information
- Opportunity to move into a new specialty.

Certification programs are not only updated more frequently than typical university curricula but new programs are introduced concurrently with product releases, such as voice

communications over IP (Internet Protocol) or Windows 2000.

Certifications are not valid for an indefinite period. From time to time, certification providers *retire* exams and require the certification holders to take replacement exams. The scheme reacts to the introduction of new hardware or software systems ensuring the relevance of the certification programs to the industry. For example, the Microsoft Corporation will retire 11 examinations this year[5]:

- Implementing and Supporting Microsoft Windows NT Workstation 3.51
- Implementing and Supporting Microsoft Windows NT Server 3.51
- Internetworking Microsoft TCP/IP on Microsoft Windows NT (3.5–3.51)
- Networking Essentials
- Internetworking with Microsoft TCP/IP on Microsoft Windows NT 4.0
- Implementing and Supporting Microsoft Windows 95
- Implementing and Supporting Microsoft Windows NT Server 4.0
- Implementing and Supporting Microsoft Windows NT Server 4.0 in the Enterprise
- Implementing and Supporting Microsoft Windows NT Workstation 4.0
- Implementing and Supporting Microsoft Internet Information Server 3.0 and Microsoft Index Server 1.1
- Implementing and Supporting Microsoft Internet Information Server 4.0.

To keep certifications current, individuals will be required to pass replacement examinations in 2001.

Listed below is a sample of the huge spectrum of certification programs in computing and related areas offered by companies and professional associations[6]:

3Com
Master of Network Science

Adaptec
Adaptec Certified Engineer

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5) http://www.microsoft.com/mcp/examinfo/retired.htm
6) http://www.certifiedcomputerpro.com

American Society for Quality:

Software Quality Engineer

Cisco

Cisco Certified Design Associate

Cisco Certified Network Associate

Cisco Certified Design Professional

Cisco Certified Network Professional

Cisco Certified Internetwork Expert (Routing/Switching, ISP Dial, SNA/IP Integration)

Compaq

Compaq Associate Accredited Systems Engineer

Compaq Accredited Systems Engineer

Compaq Master Accredited Systems Engineer

IBM

IBM Certified Specialist — Web Server for RS/6000

IBM Certified Advanced Technical Expert — RS/6000 AIX

IBM Certified for e-business — Solution Designer

IBM Certified Specialist — ATM

IBM Certified Specialist — Workgroup Switch

IBM Certified Specialist — 2210/2212/2216 Routers

IBM Certified Solutions Expert — SecureWay Firewall for Windows NT

plus 90 other professional certification programs[7].

Intel Corporation

Intel Certified Integration Specialist

Intel Certified Solutions Consultant

Linux Professional Institute

Linux Professional Institute Certified

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7) http://ibm.com/education/certify/certs

Microsoft

Microsoft Office User Specialist

Microsoft Certified Professional

Microsoft Certified Professional + Internet

Microsoft Certified Professional + Site Builder

Microsoft Certified Solutions Developer

Microsoft Certified Systems Engineer

Microsoft Certified Systems Engineer + Internet

Microsoft Certified Trainer

Microsoft Sales Specialist

Nortel

Certified Network Architect

Certified Design Expert

Certified Support Expert

Certified Account Specialist

Certified Design Specialist

Certified Support Specialist

Novell

Certified Internet Professional

Certified Novell Administrator

Certified Novell Engineer

Certified Novell Instructor

Certified Novell Salesperson

Master Certified Novell Engineer

Certified Directory Engineer.

The great success of the IT certification programs is reflected not only by the enormous choice of courses but also by their popularity with over one million IT professionals having earned various qualifications including[8]:

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8) http://www.certexpo.com/million.asp

- 570.000 Microsoft Certified Professionals
- 168,000 Certified Novell Engineers
- 351,000 Certified Novell Administrators.

University Sector Response to the Crisis

The industry effort is supported by individual universities or university consortia offering course over the Internet. The *Open Learning Australia* consortium is a joint venture of:

- Curtin University of Technology
- Griffith University
- Macquarie University
- Monash University
- Royal Melbourne University of Technology
- Swinburne University of Technology
- The University of Queensland
- University of South Australia.

Undergraduate courses in Information Technology of the consortium include [9]:

- Information Technology
- Computer Systems and Networks
- Software Engineering Analysis and Design
- Data Communications and Computer Networks.

National course accreditation bodies, such as The Accreditation Board for Engineering and Technology (ABET) in the USt or The Institution of Engineers, Australia contribute to the internationalization of IT courses. While allowing course diversity and flexibility, they attempt to create an international system of accreditation. The Washington Accord, signed by Australia, Canada, Hong Kong, Ireland, New Zealand, the United Kingdom and the US, is an example of mutual recognition of courses at the professional level[10].

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9) http://www.ola.edu.au
10) http://www.abet.org/intac/washaccd.html

New Courses in Computer Systems and Computer Networks

Edith Cowan University, apart from offering conventional courses in Computer/Commu-nications/Electronic/Software Engineering, Computer Science, Information Science and Interactive Multimedia Technology, is running a cluster of new, competency-based courses in computer systems and computer networks which are significantly different. Course develop-ment was based on the following underlining principles:

- The courses are elective rather than core components of our degrees
- Emphasis is on practical skills such as system installation and maintenance, trouble-shooting, principles of good workshop practice; a dedicated laboratory gives every student the opportunity of hands-on experience
- The courses are modified each semester to reflect the unprecedented progress in computer systems and networks
- The course will respond to the changing job market in Information Technology.

A significant percentage of students has considerable industrial experience. Such students provide valuable feedback on the course suitability for the IT profession. The newest additions to our courses are:

- Computer Systems Management
- Network Design and Management.

Lecture topics include not only the technical aspects of computing and networking but also:

- Health and safety regulations
- Job opportunities in computer systems and networks.

The objective of the last topic is to improve students' job application skills. Usually, an industry leader or representative from a professional association is invited to present the lecture.

Conclusions

The global work force crisis in the Information Technology deepens, forcing governments, the industry and the university sector to act.

Governments are forced into loosening visa restrictions for the IT professionals, the industry runs successful certification programs on an enormous scale, universities try to expand their courses and become more responsive to industry needs.

The conventional university sector is challenged today by a global scheme of industry certification programs, corporate universities and courses offered by professional institutions. Huge resources of the IT industry lead to the development of respected qualifications which are perceived by employers and individuals as an attractive alternative to university degrees. Universities, however, can compete with IT industry certification programs providing they:

- Accelerate their effort, in close cooperation with relevant accreditation bodies, at international recognition of degrees
- Improve responsiveness to the IT industry needs by updating their curricula more frequently and including practical skills
- Offer the same degree of flexible course delivery
- Consider articulation paths between their awards and industry certification programs
- Have a closer look at course quality control.

Acknowledgment

11) Kuczborski, W., A New Approach to Courses in Computer Systems and Computer Networks. Proc. 3rd UICEE Annual Conference on Engineering Education, Hobart, Australia, (2000).

12) Kuczborski, W., Can Universities Compete with IT Industry Certification Programs? Proc. 2nd UICEE Global Congress on Engineering Education, Wismar, Germany (2000).

13) Kuczborski, W., A Competency-based Course in Network Design and Management. Proc. 2nd UICEE Global Congress on Engineering Education, Wismar, Germany (2000).