
Relevance of CCNA for students working in Industry

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Abstract

Cisco network certifications are gaining popularity among ICT students due to an increasing demand for these qualifications by industry employers. The aim of this paper is to determine how useful CCNA knowledge, skills and the qualification itself are to the ICT industry. There was a specific focus on roles relating to telecommunications/networking. Students of a New Zealand Polytechnic working in this industry and studying CCNA were interviewed to evaluate which aspects of the course related to their employment. Data was obtained about the relevance that interviewees felt the course had for them, for new employees and for their employers. Relevant comments by participants about the course structure, course content and possible benefits to their career are also included.

Keywords

Networking, Telecommunications, Cisco, CCNA, Education

Introduction

Networking is one of the four core subject areas taught in the School of IT at the Waikato Institute of Technology (Wintec). Along with general networking modules, the four Cisco Certified Network Associate

(CCNA1 – CCNA4) modules are taught in the Bachelor of IT and in the two Diplomas in ICT (levels 5 and 6) programmes. The CCNA courses prepare students for an external exam which, when passed, gives students the CCNA qualification. The school also offers these courses to the public in the form of evening classes from 5-9pm. People working in the ICT industry have been consistently enrolling in these classes since their inception in 2001.

Preparing students for employment is an important goal of NZ Institutes of Technologies and Polytechnics (ITPs). The authors surmised that the students who also work in industry have a body of experience that could help in understanding and evaluating how well the course is aligned with industry needs. This paper investigates which aspects of the CCNA course are, and are not, used by these students in their employment. Aside from those that directly relate to their job, there may be skills and knowledge taught in CCNA that are transferable to other aspects of their work. These are also investigated.

It is possible that interview participants had previously learned some aspects covered by CCNA through on-the-job training, other courses, or work experience. These aspects are included in this research as the course is also taught to many students who have not worked in industry nor been exposed to the aforementioned training.

It is important to note that all the people interviewed were employed in Hamilton, so results are geographically localised. However, it could also be indicative of what is happening around New Zealand as 32% of those interviewed work in a major multi-

national telecommunications company and there are a variety of roles included (Table 2). This research could be further extended to include people from different parts of New Zealand, or other countries, to discover whether there is a variation to the results and conclusions in this paper.

Rationale for this Study

The authors wanted to ascertain how well aligned the CCNA course is to industry needs. The curriculum course content and assessments are set by Cisco and accessed online, therefore limiting the theory and practical skills that can be taught. Despite these limits there is some flexibility, where instructors may use this research to emphasise topics that are discovered to be widely used by industry in their classes. This would be taught in conjunction with the rest of the material required for students to succeed in the course. The intention behind 'going the extra mile' in this way is to provide more awareness to full-time students of what is happening in industry and thus further help in their preparation for employment. Cisco may also find this study useful when designing the next version of the course and it may help when evaluating other general networking courses.

Literature Review

Cisco and Microsoft are considered to be industry leaders in vendor-specific ICT certification (McGill & Dixon 2004). Unlike some professions (e.g. accounting and legal), ICT does not have a profession-wide certification. However there are professional bodies (NZ Computer Society 2009, IEEE Computer society 2009) and vendor-specific certification is very highly regarded

(Jovanovic & Bentley & Stein & Nikakis 2006) by key stakeholders including; employers, educational institutes and students (Robertson & Corbett, 2004; McGill & Dixon 2004; Gutierrez & Tawa 2003).

While the authors were unable to find any research that specifically addresses the questions raised in this paper, they discovered research that discusses student feedback on the CCNA course itself (Gutierrez & Tawa 2003), as well as a wider context where views on multiple ICT certifications including CCNA were sought after (White & Carew 2006, McGill & Dixon 2004).

The work by McGill & Dixon (2004) investigates "student perceptions of the benefits and risks of having ICT certification", of which some students who participated were working in industry. Their focus is different to this paper. It also surveyed a different range of students and included several certifications.

Others highlight issues of integrating ICT certifications in tertiary education (Jovanovic, Bentley, Stein & Nikakis, 2006; Robertson & Corbett, 2004, Gutierrez & Tawa, 2003; Koxinieć & Dixon, 2002; White & Carew 2006), as well as a host of possible risks of ICT certifications. Examples are; the on-going debate about how appropriate they are for an academic environment like universities (Koxinieć & Dixon, 2002; Jovanovic, Bentley, Stein, & Nikakis, 2006; Hitchcock, 2007), and the concern about unbiased neutral groups for course design and assessment (McGill & Dixon, 2004). Despite all this, there clearly appears to be a positive movement towards including ICT certifications in tertiary education (Koxinieć & Dixon, 2002; Hitchcock, 2007; McGill & Dixon, 2004; Robertson & Corbett, 2004, White & Carew, 2006; Gutierrez & Tawa, 2003).

Effects of certification on salaries and possible advantages to potential employees are not the main focus of this paper, but are included. Interviewees are asked about career progression and their perception of benefits to potential employees.

Rajendran (2007) analysed a variety of telecommunication job advertisements and discovered that a significant number of employers indicate that it is required/beneficial for applicants to have Cisco knowledge and skills. Though not specifically mentioned in that paper, Cisco certifications were requested in many of the Cisco related job advertisements. McGill & Dixon (2004) recognise that "Certification is perceived as an important factor in achieving employment" and also notes that "increasing numbers of job advertisements specify a preference for those holding certifications." This is supported by the TechRepublic (2009) report that states: "67% of hiring managers believe that certifications impact the salaries of potential employees".

Method

Interviews were the selected tool to obtain data. Approval to proceed was first obtained from the Wintec Ethics Committee and each participant gave an informed consent. Students who matched the criteria below were identified from the school's database and two pilot interviews were conducted to ensure questions were relevant and useful.

Interviews were conducted (Oct 2009 - Feb 2010) with people who had completed CCNA3 or CCNA4 since 2006 and who were currently working in the telecommunications industry. CCNA3 was chosen as a

minimum criterion for those selected for the interview because by this stage they would have been taught three quarters of the CCNA material and be in a position to relate it to their work.

During the process the authors found that interviews were an excellent tool for this study. It gave them a thorough understanding of each participant's role and tasks within their organisations. It also gave insight into their feelings and perceptions. Although the format and main questions were the same across all interviews, it was found that each interview was quite unique and needed to be slightly tailored to each participant.

Some participants changed jobs between studying for CCNA and the time of the interview. If both jobs were in the telecommunications field then each job was treated independently and two sets of data (data samples) were obtained in these cases. If the participant was working in the telecommunications industry but changed to another field, then data was collected for their telecommunications role only.

When each interview was completed, the participants were emailed the notes taken and given an opportunity to modify the recorded responses.

Results

Employers ranged from large multi-national corporations to small businesses. There were 18 participants (16 males and 2 females) and 22 data samples in total. There were 4 (22%) participants that worked in more than one role during the time when they studied the course and the interview. One

participant was self-taught and all others studied for their CCNA at Wintec. There were no participants that moved out of the telecommunications field at any time. One person gained employment after they completed the course, another part way through the course and one was working part-time. Everyone else was working full-time while simultaneously studying the course. Interestingly, the participant who was self-taught was the only one observed to have needed multiple attempts at the external exam to pass.

Company	Number of Data Samples
A	7 (32%)
B	6 (27%)
C	3 (14%)
Other	6 (27%)

Table 1: Participant Employer Distribution

Role	Number of Data Samples
Network Helpdesk Officer	5
Network support Engineer	4 (2 Incident Management Specialists)
Systems Engineer	3
IT Technician	3
Systems/Network Administrator	2
Other	5

Table 2: Participant Employment Role Titles

Participants largely (73%) came from 3 companies (table 1). Seventeen (94%) had completed all four modules. Five (28%) of these had passed the external exam, 6 (33%) were planning to take it within a year,

leaving 38% who had no immediate plans to attempt the exam.

Participants were asked to rank the importance of CCNA knowledge and skills in their current role on a scale of 1-5 (Not Important – Vital). The average was: 3.4. Participants were asked to rank the importance of CCNA knowledge and skills for a new employee joining their team (i.e. doing the same job) on the same scale. The average was: 3.6.

Eleven (50%) samples ranked CCNA knowledge and skills to be more important for a new employee than it was for themselves. Eight (36.4%) considered it to be of equal importance for new employees and themselves.

Fourteen (78%) of participants indicated that their management highly recommended staff to study the CCNA course, and only one (5.5%) felt that it was a requirement for some roles in their organisation.

Although not specifically asked, ten (56%) participants felt that the CCNA course is of benefit to personal career progression. i.e. helpful if they were applying for another role or moving to a different company in the future.

The course appears to cover all details relevant to Cisco devices encountered in industry. However 4 (22%) mentioned other devices (e.g. Cisco Adaptive Security Appliances 5520/5510 and Cisco Call Manager for Voice over IP) that are not part of the CCNA course.

Relationship between Cisco course topics and industry usage:

Table 3 indicates (in the number of data samples) which aspects of CCNA are directly used in their employment, and which were considered transferable.

CCNA Course Topic	Directly Used	Transferable
Network Communication Principles	19 (86%)	19 (86%)
Cabling a Network	14 (64%)	19 (86%)
Design Network: Subnetting	5 (23%)	10 (45%)
Design Network: Physical Layout	5 (23%)	7 (32%)
Routing Protocols	4 (18%)	5 (23%)
Routing Table Analysis	3 (14%)	6 (27%)
Access Control Lists (ACLs)	4 (18%)	10 (45%)
Network Switch Principles: STP	8 (36%)	7 (32%)
Network Switch Principles: Port Security	9 (41%)	7 (32%)
Virtual Local Area Networks (VLANs)	8 (36%)	8 (36%)
Wireless Local Area Networks (WLANs)	7 (32%)	8 (36%)
Wide Area Networks (ISDN)	3 (14%)	4 (18%)
Wide Area Networks (Frame Relay)	2 (9%)	2 (9%)
Wide Area Networks (Point-to-Point Protocol)	3 (14%)	4(18%)

Table 3: The number of data samples for each CCNA course topic

Eight (36%) indicated that learning how to configure/program Cisco routers and switches helped when configuring equipment from other vendors, another transferable skill.

Some other vendor equipment mentioned included: Alcatel-Lucent switches/routers (28%), Juniper routers (17%) and Allied Telesyn switches (11%). There was also mention of Riverstone routers, Hewlett Packard and Nortel switches.

As well as topics specifically included in the interview, 45% of participants added troubleshooting techniques to the list of acquired course skills used. Three (17%) also add the concept of redundancy, where one uses extra network links/components to ensure reliability.

Results Analysis

As the majority of those interviewed (94%) had completed all four CCNA modules, there is a sound comparison of industry requirements and course content. Although only a small number (28%) had actually taken the CCNA external exam, when this is combined with those that were planning to do so in the next year (giving a total of 61%), it shows that there is a desire to obtain the qualification. Many of those who were not planning to take the exam felt they just needed the knowledge and skills from the courses and would only take the exam if they were applying for another job.

As indicated in Table 3, the course topics that were most considered to be directly used in industry were; Network Communication Principles (e.g. the process of sending and receiving packets, Transmission Control Protocol, Open System Interconnection model etc) and Cabling a Network. Network Switch Principles, VLANs, WLANs and Equipment Configuration also scored highly.

The most relevant transferable skills were; Network Communication Principles and Cabling a Network. ACLs, Subnetting, WLANs and Network Switch Principles are also notable. As mentioned, troubleshooting techniques were added by participants (45%) as another transferable skill. It is suspected that if this was specifically included in all interviews, this figure may have been somewhat higher.

Participants largely (86.4%) perceived that it was of greater/equal importance for new employees to have CCNA knowledge and skills compared to themselves. This is in line with the literature, where Cisco "Certification is perceived as an important factor in achieving employment" (McGill & Dixon, 2004).

Participants, when asked about the value of CCNA for career progression, responded that they believed it was useful in their personal career, as 56% felt it was of benefit if they were to apply for another role. Many (78%) indicated that the qualification itself is not a management requirement for senior roles, but stated there was a strong recommendation by their managers for staff to study CCNA. In fact, the only person who started working part-way through the course related that one reason his new employer hired him was because he was studying towards a CCNA qualification.

Common participant sentiments are as follows. Fifty percent mentioned the hierarchical nature of their companies e.g. when Level 1 Helpdesk Officers discover network faults, they would attempt to resolve it or pass the fault on to a higher level engineer or third party vendor. It appears that the course was useful in such cases, as it gave a thorough understanding of IP networking which helped when resolving issues or when giving specific details to the higher level engineer/vendor, thus saving time and money.

Two participants (11%) worked on a mobile network, and both mentioned that they work in the same room as people from other divisions of their organisations (e.g. IP and Transport Layer Engineers). So it was

useful to have knowledge of the different aspects of telecommunications provided by the course.

Two people (11%) felt the course was too long (it takes 2 years at Wintec - one semester per course) for students who also work in industry. Another stated that initially he thought it was a long course, but then realised that the length was actually perfect as it helped ensure the course material was thoroughly understood. It should be noted that those who were critical about the length of the course studied the older version of CCNA (version 3). This version requires students to complete each of the four courses consecutively. With the new 'Exploration' version, CCNA 2 and 3 can be studied simultaneously by those who wish to complete it in a shorter timeframe and are willing to undertake the higher workload. The speed of delivery was also noted as an integration issue in the literature (Koziniec & Dixon, 2002).

All participants commented positively on the course content. There was one Transport Layer Engineer who felt the course was very good, but recommends that some basics on Pleisochronous Digital Hierarchy (PDH) and Synchronous Digital Hierarchy (SDH) would be good for those working with the transport layer.

There are also specific comments of interest. One interviewee, who worked in a small business, mentioned a client who specifically asked for an engineer with Cisco certification. As there was no one at the time in the organisation that was CCNA certified, the company did not get the contract.

Literature suggests that having ICT certifications relate to salary gains, such as a higher base pay or higher average pay premium (TechRepublic, 2009; McGill & Dixon, 2004; Lamont, 2006). Yet there is no evidence of this relationship found in this study. Although 78% of

participants indicated that it is highly recommended by management for employees to take the CCNA course/exam, there was only one that felt it was a requirement.

Conclusions

As a result of interviewing students who studied CCNA and also working in the ICT industry, the authors conclude that the CCNA course has a strong relevance to this industry in the Hamilton/Waikato region and is considered to be of importance to people in their career. It is also perceived to be of high value to new employees, for personal career progression and by employers. The CCNA course was highly recommended by employers rather than being a requirement.

There does appear to be a desire (61%) for people to get the CCNA certification by sitting an external exam, though few of the participants who completed all four CCNA modules (28%) went the 'extra mile' and actually took the exam. Further research could be done with a larger sample size to see the validity of this proposition.

All participants were very positive about the course structure and content. The course topics that were considered to be most directly related to their jobs were; Network Communications Principles, Cabling a Network and Troubleshooting Techniques. Network Switch Principles, VLANs and WLANs also scored highly. Network Communications Principles, Cabling a Network, ACLs, Subnetting and Equipment Configuration were considered transferable skills.

The number of transferable skills and range of knowledge identified by the participants indicates that despite the vendor-specific nature of the course, it is also sufficiently generic to be useful to those working in a variety of ICT organisations and telecommunications/networking roles.

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