

GETTING STUDENTS CERTIFIED: A STUDY OF CERTIFICATION PASS RATES IN INFORMATION TECHNOLOGY DEGREE PROGRAMS

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Abstract

Students pursuing Information Technology (IT) degrees in college not only need to acquire the targeted degree, but also acquire numerous certifications. We have found that IT certification first time pass rates among students in our IT related degree programs tend to be quite low. Additionally, in order to pass these challenging exams, supplemental material must be utilized by the students in addition to the program curriculum. This study investigates the IT certification pass-rate of students enrolled in, or recently graduated from, IT programs in North Carolina Universities and Community Colleges. A survey instrument is used to identify the study methods and techniques found to be most useful by students who have passed certification exams. The strategies of the newly certified students are exposed for possible integration into our current information technology curriculums and to enhance instructional material. The results garnered from this study can be applied to aid information technology programs by increasing the certification pass-rate and potentially securing career objectives while adding value to new graduates.

Introduction

Feedback from department advisory boards and industry partners supports the need for IT graduates to have a certification to complement their degree, thus demonstrating their higher learning capabilities and willingness to make extra efforts to increase their value to the IT workforce. A degree in information technology validates that a student has met the minimal criteria set forth by the industry; however, certification acquisition sets the student above the competition.

The undergraduate degree program in Information and Computer Technology at East Carolina University requires that all students attempt the CCNA certification exam as a degree requirement. This is accomplished by making the exam a course requirement for our ICTN 2158 Computer Network Technology course. Students do not have to pass the certification exam, but do have to attempt it. Students are encouraged to attempt other certification exams such as; Red Hat RHCSA, RHCT, Security +, A+ and Microsoft MCP as part of their professional and technical development, but these are optional and not required as part of the degree program.

From the perspective of Graduate students in the Masters of Science in Networking Technology program, who are instructors in information technology classes, it has been observed that the undergraduate students are progressing satisfactorily through the institution's information

technology curriculum; however, the pass-rate for certification exams is unsatisfactorily low - under 5% for first time takers.

This study seeks to identify the successful study methods of students who are obtaining an IT certification. Once identified, these methods can be shared with the faculty and students to increase the pass rates among future ICT students. First, a review of the recent studies found in the literature. Next, the methodology of the study and survey instrument used is discussed. Finally, the results and the conclusions of the study are discussed, along with future work and suggestive ideas for implementation into IT-related curriculum.

Research questions

- What is the current first time pass-rate of students attempting certification?
- What study methods and are used by students to successfully pass IT certifications?
- What specific materials are used by students to successfully pass IT certifications?

Literature Review and Previous Studies

Historical Background

The need for certifications was first explored in the early 1980's by the Society for Technical Communications (STC) [1]. Robert Digiovannie conducted a study in 1982 that indicated a support for certification programs [1]. The first IT certification was established by Novell in 1989, due to an absence of qualified individuals [2].

Early certification exams focused on a demonstration of knowledge of the selected field primarily by the use of multiple-choice questions. Today, however, it is common for certification exams to test knowledge, insights, and skills through the use of case studies, simulations, and open-ended questions and incorporating communication, projection management, and business skills [3]. Furthermore, certifications are transitioning from a national recognition to an international one as standards are becoming more global [3]. IT certifications are available through a profession, trade, or industry associations and are typically divided into two categories: vendor-neutral and vendor specific certifications [2].

Importance of Certifications

Among the vast degrees offered in post secondary schools, the majority of obtainable professional certifications, an estimated over 1000, reside in the area of Information Technology [4]. As of 2010, over 6.5 million people had obtained an IT related certification [5]. The degree title itself suggests a dynamic realm of change with numerous focuses in computer hardware, networking, security, virtualization, and server platforms, among many others. As a student seeking these degrees, an extreme level of importance and emphasis is advocated for certification acquisition to accommodate their degree prior to graduation. For this reason, certification is becoming the cornerstone for identifying those that have obtained an advanced level of knowledge and expertise within a specific area [5]. Evidence has shown, IT professionals who

have obtained a certification improve many career objectives such as candidate marketability, increased salary, and promotion aspects [2].

The values of an IT certification are numerous and the attainment of an IT certification indicates that an individual has obtained a high level of expertise in his or her field. In addition, the certification encompasses them in an extensive network and support system within the certification granting organization, and can increase their salary range [6]. Emphasizing the importance of IT certifications, in 2008, several leading industries, such as Hewlett-Packard, CompTIA, IBM and Microsoft formed the Information Technology Certification Council (ITCC) [5].

Not only do certifications increase the chances of job acquisition, but it also, increases pay. Students benefit financially from holding IT certification because “employers relate certification to evidence of skill and reward persons with those skills” [7]. A survey conducted amongst 700 networking professionals concluded that after certification acquisition, 40 percent earned more pay and increased an average of 10 percent [8].

“A certification is one element of the total picture of a person’s competency. It is indicative that the person has made an extra effort to test his or her knowledge” [9]. Louis Guy was quoted to say, “Credentials are tools that can be very helpful in judging quickly the credibility of someone we don’t know.” [10].

Getting Statistics from Vendors and the Web

Pass-rate statistics from vendors such as Cisco and VUE were aggressively pursued throughout the study, however this information is tightly held and not made available to the public for privacy reasons.

A review of Internet IT forums yielded only inaccurate approximations of pass-rates. Comptia’s A+ pass-rate has been unofficially declared 30 percent [11]. “Right now the CCNA has failure rate for the first time attempt at 95 percent,” [12] was gathered from a Cisco forum. RedHat’s RHCE certification was given a rating of first-time passing at 47 percent [13]. Again, these are only unofficial statistics, but the ambiguity of their information provides even more justification and motivation for this study.

Study Methods

There are many certification preparation methods available to students and individuals choosing to become certified. However, there are few studies that have focused on the study methods or educational strategy [14]. A theme, which is emphasized to students and professionals that desired to become certified, is “to be well prepared” [15]. Certification candidates report spending an average of 20 or more hours preparing through various methods such as self-paced studying, training courses, workshops, online tutorials, practice exams, or other formats [16]. Self-paced learning is the preferred method of information technology professionals [16]. A small study was conducted in which 24% of the respondents preferred to study independently or through the use of a one-time preparatory course [17].

Methodology

Although there has been a behavior study to gauge the student's perceptions of the importance of obtaining certifications [2], a study of the perceptions of an employers' qualitative weight of certification in regards to hiring [18], and a study of becoming certified or not certified leading to career growth [4], a review of the extant literature has not revealed a study of the study habits of successfully passers of IT certifications. In order to gauge these study attributes a survey instrument was used to collect the relevant data from students who are enrolled in, or recently graduated from information technology degree programs at colleges and universities in North Carolina. This paper will focus on the first phase of the study, where our home campus, East Carolina University's IT programs will be surveyed. Obtaining Institutional Review Board (IRB) approval from the remaining university and community college campuses is currently in progress. Results of this larger sample size will be presented in a follow up paper.

Survey Procedure

An electronic survey was created using East Carolina University's Qualtrics survey system, which was distributed via email to the target population. The survey consists of 13 questions to identify respondent demographics and specific study habits. A copy of the survey questions is appended at the end of the paper. The survey was first sent via email to an East Carolina Technology Systems administrator who forwarded it to 438 information technology students. The survey period was for two weeks with a follow up email reminder at the end of the first week. A list of contacts who would distribute the survey at each of the 58 North Carolina Community Colleges and 17 State Universities was compiled so that once approval from institutional review boards is granted, the survey can be distributed.

Approval Procedures

Since this study did involve the study of human subjects using a survey instrument; approval was required from our Institutional Review Board (IRB). East Carolina University also required an approval from the Institutional Planning, Assessment, and Research department (IPAR) prior to conducting the survey on campus. IPAR governs the survey load sent out to students, to avoid students becoming over-surveyed by competing surveys and/or fatigued. Additionally, IPAR reviews surveys for functionality and strategy to assist researchers to get the most beneficial data.

Findings and Results

After the first week of the survey period, a total of 63 responses were collected from a total of 438 possible certification exam takers. Since most certification exams require a re-certification every 3 years, the survey would not allow a respondent to finish if no certification attempts were taken within this time. Of these respondents, 71 percent had taken a certification exam in the last 3 years, therefore eliminating 20 of the respondents from data analysis and leaving a total of 43 valid survey responses for a response rate of 9.8%.

The targeted population of the survey was graduate and undergraduate students. Table 1 shows the current academic status of respondents. Of the respondents, the undergraduates attempted 86

certification exams and had a pass rate of 81 percent. Graduate students and Masters degree holders attempted 19 total exams and had a 100 percent pass rate.

Table 1: Academic Status

Academic Status	# of Respondents	%
Graduate Student	5	11.63%
Graduated with Masters Degree	1	2.33%
Undergraduate Student	37	86.04%
Graduated with Bachelors Degree	0	0%
Total	43	100.00%

Pass Rates

Table 2 shows the first-time and ultimate pass rate percentages for attempted certifications. The table highlights first-time pass rates and in all cases, the respondent achieved certification in no more than 2 attempts. The certifications listed in table 2 reflect those that the ICT course curriculum at ECU is focused. An “Other” category was provided to gather unlisted certifications.

Table 2: Certification Passing Rates.

Certification	Responses	Pass Percentage	First-time Pass Rates
Comptia A+	12	100%	89%*
Comptia Network+	9	100%	100%
Comptia Security+	8	75%	100%
CCENT (Cisco Certified Entry Network Technician)	9	100%	88%*
CCNA (Cisco Certified Network Assc)	27	85%	42.11%*
CCNP (Cisco Certified Network Prof)	9	100%	100%
RHCSA(Red Hat Certified System Administrator)	7	20%	100%
RHCE (RedHat Certified Engineer)	2	0%	0%
VCA (VMware Certified Assc.)	0	0%	0%
VCP (VMware Certified Prof.)	2	100%	0%
MCSA (Microsoft Certified Solutions Assc)	1	0%	0%
MCSE (Microsoft Certified Solutions Expert)	1	100%	0%
MCITP (Microsoft Certified Information Technology Professional)	0	0%	0%
CISSP (Certified Information Systems Security Professional)	1	100%	100%
Other (IC3, CCNA Security, CCNA Voice, etc)	17	94%	76%*
Total	105		

*Of these individuals who did pass, no more than 2 attempts were required.

Study Duration

The respondents were asked to provide study time duration in preparing for each certification. The two questions asked were; (1) How many weeks did you begin preparing and (2) how many hours per week did you study. The average and max weeks of preparation are shown in figure 1 and hours per week of study are shown in figure 2 of the most reported eight certifications from the survey data.

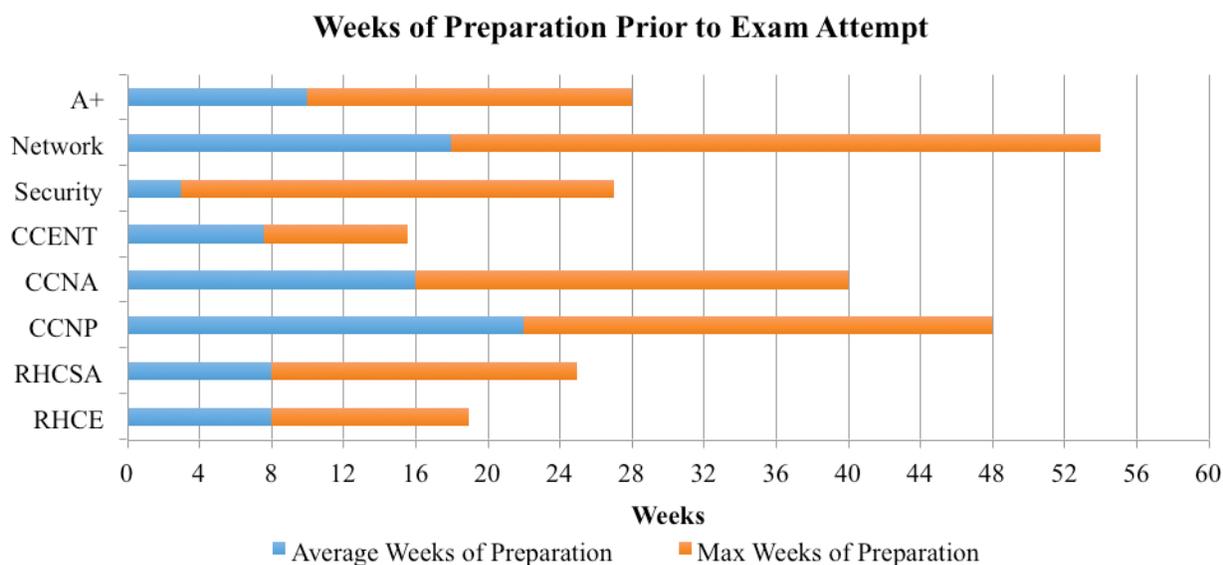


Figure 1: Weeks of Preparation

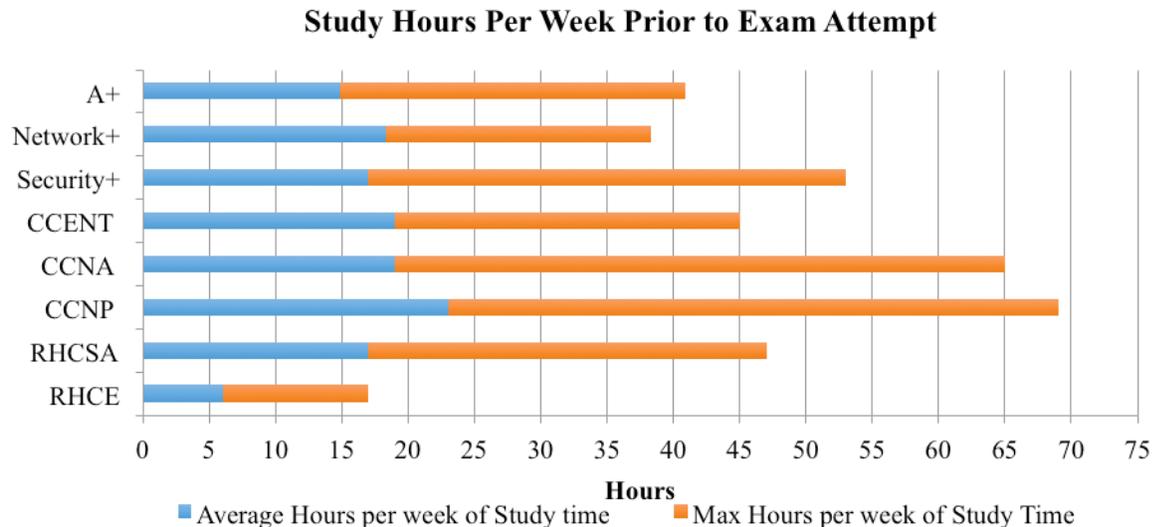


Figure 2: Hours per Week of Study

Materials Used

Respondents were asked to rate the importance of study materials and its effectiveness to pass the certification exam. These responses include all certifications and are not specific to a particular certification. Observation of the data shows Certification Manuals as the most utilized study material to assist in passing certification exams (see Fig. 3-9). The least effective study material was Live Seminars and Trainings, such as IT certification boot camps. Figure 10 shows a relational chart of the most important materials.

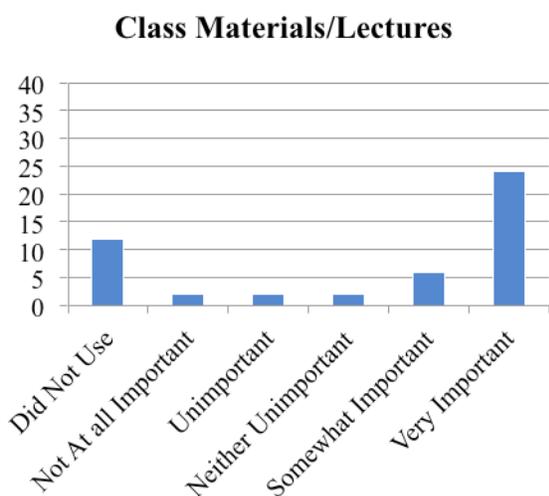


Fig. 3: Study Method 1

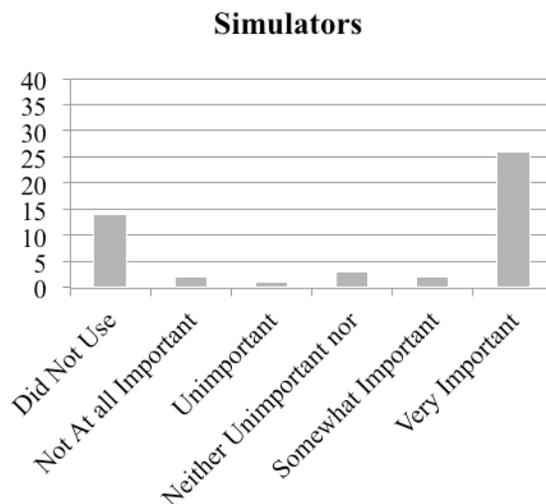


Fig. 4: Study Method 2

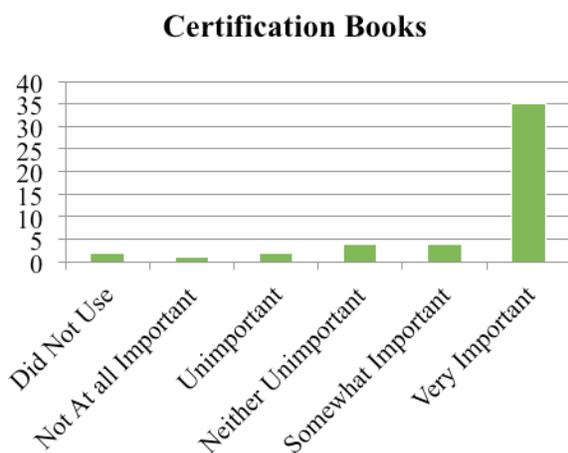


Fig. 5: Study Method 3

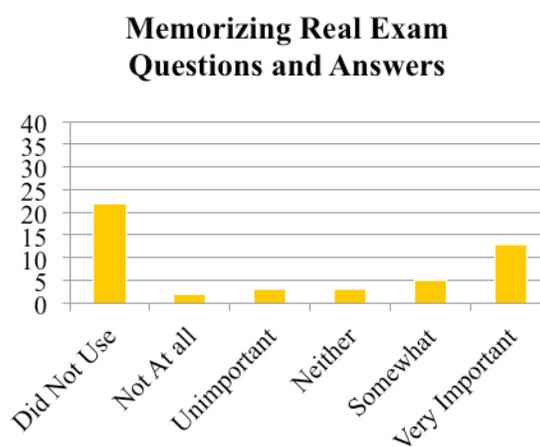


Fig. 6: Study Method 4

Online Practice Tests

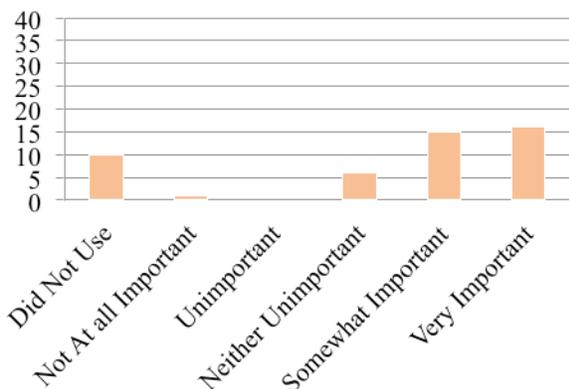


Fig. 7: Study Method 5

Online Training Videos

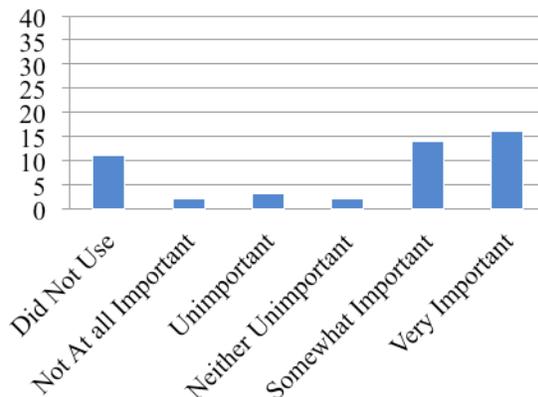


Fig. 8: Study Method 6

Live Seminars/Trainings

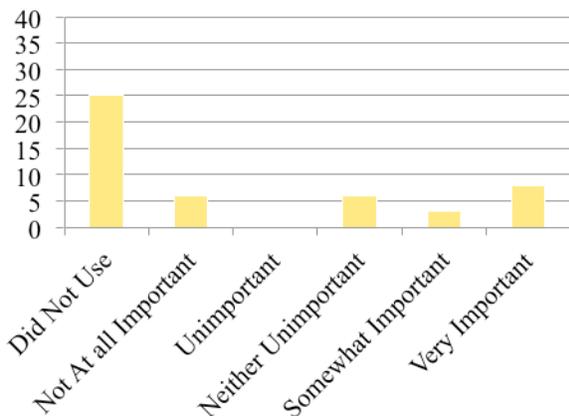


Fig. 9: Study Method 7

Most Important Materials to Prepare

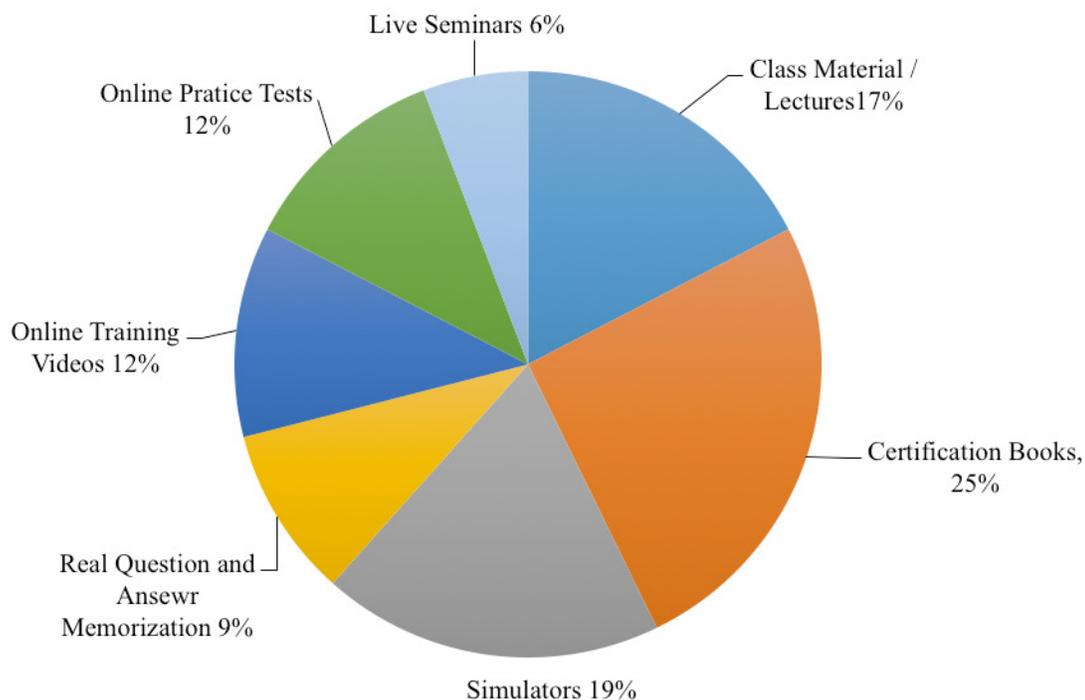


Fig. 10: Relational chart of most important study materials.

Motivation for Certification Acquisition

Respondents were asked to rate the importance of the motives they sought to become certified. The following motives were rated in order of overall importance (see Table 3). Obtaining certification for personal knowledge ranked first in this study amongst IT students, followed by academic requirement. The options related to jobs, pay, and promotion ranked low amongst students, which is understandable as it is not as relevant as a graduated IT professional in the workforce.

Motive	Importance Rating
Personal Knowledge	15.93%
Academic Requirement	15.27%
Hiring Necessity	14.66%
Increase in Pay	13.84%
Advised by Peers to Obtain	13.48%
Job Promotion	13.45%
Current Job Position Requirement	13.37%

Table 3. Motivation and Importance to take certifications.

Respondent Feedback

The responses from the survey respondents provided insight to preparing for certification exams. The following quotes were submitted by those recently certified:

“Immerse yourself in the material prior to the exam. Also try teaching the material to someone else. If you can teach it then you truly know it. In regards to dumps, they are useful to get a feel for what the exam is going to be like, how the questions are going to be worded, and it’s important that you know what to expect. If I had known these things then I may have passed on my first attempt. That being said don’t memorize the questions because if you do you’re setting yourself up for failure.”

“The single most important helpful method for me was to create a virtual machine for each of the covered OS’s as of the time of my test taking (Win 7, Win Vista, Win XP), and explore the differences for routine administrative commands. I also made flash cards - I do that with every Cert exam.”

“Decided to take the Sec+ last minute to qualify for lifetime status. Used brain dumps for the first time and actually think they hurt more than helped saw very little correlation.”

“While most people look at brain dumps to just memorize the tests, I wasn’t happy with doing such a thing. I did use some brain dumps, but only to see what I needed to go back and study. Before taking the test, I actually knew what I was doing, not just what the right answer should be. Also, the amount of time I put down really isn’t accurate, I studied the whole time I was in CCNA 3 and 4 and read the CCNA book by Todd Lammler 3 times and answering all questions and doing all the labs in every chapter. I still failed the first time, sadly the sims count for way too large a portion of your grade in it, so I failed by about 20 points because I completely failed the ACL sim. Don’t wait, and be prepared to actually do hands on, not just answer questions.”

Analysis and Conclusions

After reviewing the results, it is difficult to make a decision of exactly how long a student should begin studying for certification exams with such limited responses. The data has been filtered to display the hours per week and total to give a good summation of hours a student should study prior to the exam date. Among all certifications, the responses indicate an average of 18 hours per week and approximately 14 weeks of preparation to insure passing.

Student interviews prior to this study lead us to presuppose that the dominating method used by students to pass IT certifications was to memorize the real questions and answers in “brain dumps”. However, the results of the study do not support this supposition, rather they indicate that certification manual, simulators, and lectures were reported as aiding the students the most. The preparation time and total hours per week studied were quantified at an average of 250 hours of study time beginning around 14 weeks prior to taking the exams. Offering this quantified observation to future students wishing to pass certification exams will give them a realistic idea of how long they should expect to study.

At East Carolina University, our ICT curriculum requires an attempt at the CCNA certification prior to exiting the class, accounting for 26 percent of the overall 105 responses. From a brief interview of the Cisco Curriculum coordinator in our department, the approximate pass rate for students in the ICTN 2158 Computer Network Technology class attempting the CCNA certification exam for the first time was under 5 percent. Since our survey results indicate a pass rate of 42 percent, it seems likely that the majority of the respondents are disproportionately skewed to those that passed exams; hence the relatively small response rate to the survey.

Lessons Learned

One major barrier in this study was the need to gain IRB approval at each University and Community College campus where the survey is to be deployed. Three methods are available to gain approval at these institutions: (1) The other institution would honor ECU's IRB approval letter, (2) enter into an inter-institutional agreement with the other institution, or (3) obtain separate approval from the IRB associated with the other institution. As institutions grant us approval will be deploy our survey and those institutions and update our data analysis.

Future Work

The survey responses received thus far reflect only the scope of our own institution, East Carolina University. The full study will expand to include all campuses in the North Carolina University and Community College systems. Once IRB approval is granted from the other institutions, the survey instrument will be distributed to the students and recent graduates of these institutions, which will provide the data to depict a better picture of the study habits of those taking certification exams.

One of the limitations of this study is that it collects data only from institutions of higher education in North Carolina. Much more data could be collected in a follow-on study conducted on a national or even international scale. This would require significantly more logistical coordination. New and streamlined methodologies would surely need to be devised and refined for such an endeavor.

References

- [1] Turner, R.K. and K.T. Rainey, "Certification in Technical Communication," *Technical Communication Quarterly*, **13**(2), 211-234, (2004).
- [2] Randall, M.H. and C.J. Zirkle, "Information Technology Student-Based Certification in Formal Education Settings: Who Benefits and What is Needed," *Journal of Information Technology Education*, **4**, 287-306, (2005).
- [3] Coes, G. and K. Schotanus, "Certification: Who Dares?," *IT Professional*, **11**(3), 50-52, (2009).
- [4] Rowe, J., "IT Certifications: Lessons from Other Industries," *Certification Magazine*, (2003).
- [5] Hunsinger, D.S. and M.A. Smith, "Factors that Influence Information Systems Undergraduates to Pursue IT Certification," *Journal of Information Technology Education*, **7**, 247-265, (2008).
- [6] Pierson, L., M.N. Frolick, and L. Chen, "Emerging issues in IT certification," *The Journal of Computer Information Systems*, **42**(1), 17, (2001).
- [7] Ray, C.M. and R. McCoy, "Why certification in information systems?," *Information Technology, Learning, and Performance Journal*, **18**(1), 1, (2000).
- [8] Bort, J., "Will IT certs get you jobs and raises? Survey says yes," *Networkworld*. (2011).
- [9] Whited, J., "Selecting from the Alphabet Soup of Information Certifications., *Information Management*, **47**(2), 22-26. (2013).
- [10] Adams, P.S., et al., "Professional Certification," *Professional Safety*, **49**(12), 26-37, (2004).
- [11] Answers, Y. "CompTia A+ computer technician exams are "not difficult" yet the pass rate is only 30%? What?" Available from: <http://answers.yahoo.com/question/index?qid=20100709193055AAlliDp>, (2009).
- [12] Cisco Learning Network Forum, "What is an average attempts to pass CCENT, CCNA, CCNP, & CCIE individually?," Available from: <https://learningnetwork.cisco.com/thread/33357>, (2011).
- [13] "RHCE tips | My experience part 2 – Taking the course and exam," Available from: <http://www.azhowto.com/rhce-tips-my-experience-part-2-taking-the-course-and-exam/>, (2010).
- [14] Huang, T., "Motivation-Oriented Teaching Model for Certification Education," *International Educational Studies*, **6**(2), 84-95, (2013).
- [15] Frantz, R., "Preparation and Training," *IEEE Communications Magazine*, (2010).
- [16] "MeasureUp Increases Certification Preparation Offerings by Releasing New e-Learning Products," *PR Newswire*, (2001).
- [17] Funderburk, A., "Information Technology Certified Computer Professional Certification: Should Four-Institutions Embrace It?," *Information Technology, Learning, and Performance Journal*, **23**(2), 31-37. (2005).
- [18] Wierschem, D., G. Zhang, and C.R. Johnston, "Information Technology Certification Value: An Initial Response from Employers," *Journal of International Technology and Information Management*, **19**(4), 89-IV, (2010).

APPENDIX A: Certification Survey

1. Have you taken any IT-related certification exams in the last 3 years?
2. Are you a student or have you recently graduated in the last 18 months?
3. Please indicate your current status.
4. Were attempting IT certification(s) required as part of your degree program?
5. Please select from the lists of certifications you have passed or NOT passed.

The following series of questions are asked on each certification listed in #5 by the respondent.

- Did you pass the ___ Cert?
 - How many attempts did it take to pass the ___ certification?
 - How many weeks before taking the ___ did you begin studying?
 - How many hours a week did you study for: ___?
 - During preparation for the ___ certification, please rate the material(s) and its importance for you to pass. (Likert Scale 1-5 of Importance)
 - Please comment on the overall certification exam experience and any recommended study habits for:___.
6. In general, why did you choose to attempt IT certification? Please rate the importance of the following reasons to become certified? (Likert Scale 1-5 of Importance)
 7. What is your OVERALL opinion of IT related certifications in the workforce?