Factors influencing the Pursuit of IT Certifications

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ABSTRACT

This quantitative study attempted to understand the factors that influence students at the large university in south-eastern United States to pursue Information Technology (IT) certification. The study investigated the problem of determining the factors that influence college students to pursue IT certification along with their academic degree and thereby increase their chances of gaining employment and increasing completion rates for the college resulting in increased state funding. This influence may lead to higher job placement after graduation resulting in an increase in completion rates for each college. The results showed that 91.7% of the respondents were inclined to take the certification exam if it means job security. Of all the participants, 88.4% indicated that they would take the certification exam if their future job requires it. A statistically significant difference was found between students' rank and their perception on the statement "Schools prepare me for the certification exam." A statistically significant difference was also found between students' GPA and their perception on the statement "I am inclined to take the certification exam if I get reimbursed for my testing fee after passing the test." The goal of the study was to provide information that can be used to improve students' perceptions of the importance of certifications as well as to identify and address weaknesses in curriculum and/or interaction with students that can be addressed to improve students' perceptions related to the importance of certificates. It also created a foundation for administrators and instructors in IT programs throughout the educational system to influence students in pursuing IT certification.

Keywords: Information Technology, Certifications, Information Technology Majors, Certificates

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Introduction

Certifications such as those for accounting (CPA), law, (Bar Exam), human resources (PHR®, SPHR®, HRCI®), Microsoft Certified Solutions Expert (MCSE), and Information Technology certifications such as CompTIA A+, CompTIA IT Fundamentals, and CompTIA Network+ are only few of the thousands of certifications available to certify competence in specific technical areas. In many fields, such a law and accounting, a certificate or license can be a requirement for employment. In other instances, potential employers might consider certificates when they interview potential employees. If the perceived value of certificates is real, and research suggest it is (Certification Program Satisfaction Study, 2012)[1], then why aren't more students and graduates of educational programs taking these certification tests?

These certificates serve many purposes: for potential employers they indicate that an applicant has demonstrated competence in industry-standard content and skills; for students, certificates indicates that their educational experience has given them the content and skills demanded by business; and for the educational institution, certificates indicate that the curriculum is relevant and current. Nevertheless, many students completing an educational program and receiving a degree do not take the tests for these certificates.

Should I become certified in my career field? Do certifications matter anymore? Am I fully prepared to pass the certification test? Why do I need a certificate when I have graduated from an accredited institution with a degree in one of the many technology areas? Students in the Information Technology (IT) field face these questions throughout their junior and senior years. In some circumstances, a professional certification can make all the difference between landing a job or not being considered for it at all. In other instances, there may not be a definitive answer. It is true that not all certifications are created equally. Some certifications require that individuals study hard and pass a test, others require that they have years of experience in a specific field before they can even apply to be considered (considered for what?). For students getting their start in IT, is it worthwhile pursuing base-level certifications such as the ones offered by the Computing Technology Industry Association (CompTIA), a non-profit trade association, which issues vendor-neutral professional certifications for the information technology industry. The three most popular CompTIA certifications are A+, Network+ and Security+. These certificates certify that the individuals holding certificates have a working knowledge of technology concepts, and are recognized by public and private sectors worldwide. The A+ certificate is designed for people like IT graduates who are seeking a career in help desk management, support centers, PC sales, or technicians; and it tests a candidate's knowledge of PC and laptop hardware, software installation, maintenance and configuration. The A+ certificate also tests a candidate's understanding of basic networking, troubleshooting and security skills, which serve as a springboard for CompTIA networking certificate, Network+, or a security certificate, Security+, or certificates offered by other organizations.

When recent college graduates look for employment, having a high GPA, relevant course work and/or experience are among the ways they will stand out among other applicants in the competitive job market. Having an IT certificate in their chosen field of work may not necessarily mean a guarantee of employment, but it will certainly give them an advantage when hiring managers look at their resumes. In a study conducted by CompTIA, the findings revealed that:

- 64% of IT hiring managers rated certifications as having extremely high or high value when rating the expertise of candidates;

- 89% of IT hiring managers expressed that IT certifications help confirm subject matter knowledge and expertise;
- 86% of hiring managers indicate IT certifications are a high or medium priority during the candidate evaluation process. (Employer Perception of IT Training and Certification, 2011)[2].

Microsoft reports that 91 percent of hiring managers consider certification as a part of their hiring criteria, and certified new hires reach full productivity 40% faster than their peers (Certification Program Satisfaction Study, 2012)[1]. Individuals who become IT certified also earn higher salaries. As of February 2015, the entry-level Desktop Support Technician with no certifications was advertised at $47,000 annually, while an A+ certified individual for the same position was advertised in the $50,000 plus range (A+ Certified, 2017)[3].

Literature Review

Theoretical framework

In search for a theoretical model to explain students' thought process and/or behaviors whether or not to obtain professional certifications Self Determination Theory (SDT) by Edward Deci stood out by claiming that "humans are inherently proactive with their potential and mastering their inner forces, humans have inherent tendency toward growth development, and optimal development and actions don't happen automatically. (Deci, 1971)[4]" Central to SDT are three psychological aspects, Autonomy, Competence, and Relatedness that need to be attained to foster well-being. The first two aspects are self-explanatory whereas relatedness is referred to as the feeling of being valued and cared for (Deci, 1991)[4] . Porter and Lawler (1968)[5] introduced the concepts of intrinsic and extrinsic motivation, as the former is the natural and inherent drive to seek out challenges and new possibilities while the later comes from external sources and inputs. One example of extrinsic motivation might come from an employer willing to pay for the certification or offer a bonus for obtaining the certification. Deci (1971)[4] showed that the introduction of an extrinsic reward, money, tended to decrease the subjects' intrinsic motivation. On the contrary, Pritchard, Campbell & Campbell (1977)[6] countered Deci's claim and found that the introduction of an extrinsic reward, also money, led to an increase in intrinsic motivation to complete the task. On a much more general ground, Gagne & Deci (2005)[7] pointed out that autonomy and intrinsic motivation are good predictors of one's success whereas an extrinsic force can have a damaging effect on one's motivation for completing a required task.

In addition, Human Capital Theory (HCT) is based on the assumption that individuals will act in their own self-interest. Lester & Dwyer (2012)[8] noted a strong perception between getting certification and individual-level career benefits. They also noticed that individuals seeking certification are more motivated than their counterparts who are interested in pursuing one as the former demonstrated a strong desire to more challenge to their job and view certification as a means to gain additional knowledge.

Shifting Landscape

Globalization and the shifting job markets have been influencing the demand for professional certification as well as employers perceived benefits of certification. There are a great number of factors that contribute to rise and role of professional certification. The changes in the workforce over the past few decades especially globalization and technology have altered the job market. As companies look for competitive advantages via expanding to global markets and the competition for jobs increases fueling the demand of certification as a means of displaying competencies. Certification can help ensuring current skills and knowledge and often leads to a credential recognizing the achievement of the qualifications (Barnhart, 1997)[9]. Hamm and Early (1994)[10] noted that a well-developed certification program is one that can provide to the public as it establishes the organization as the standard setting body for competence in a

particular discipline. However, as Brennan (2017)[11] stated, certifications that measure knowledge, skills and competencies can help an individual standout to an employer. Unfortunately, there has been a shortage of college and university-level education programs focus on the importance of getting certified in their major area of study.

Quality indicators and certification in other fields than IT

Certification continues to grow in many professions as each seeks to be able to effectively compare and contract various employee backgrounds and select the best candidates.

The Cheng and Lin (2011)[12] study concluded that university students who seek and earn a

business certificate have higher internal motivation than external motivation. Specifically, effort & cost to seek the examination, responsibility for consequences, and reward were all significant predictors of attitude towards the examination. The authors also determined that external 29 motivations had little impact on student attitudes towards the certificate examinations.

In a survey by the Project Management Institute, respondents expressed the main reasons for pursuing certification was to further their knowledge and to advance their careers (Abraham & Boetticher, 2006)[13]. Respondents in this survey also indicated an expectation that certification would positively impact their earning power but over one-third of them experienced no improvement in earning power (Abraham & Boetticher, 2006)[13].

Professional certifications can provide a common baseline for this challenge (Abraham & Boetticher, 2006)[13]. One of the newest professional certifications programs seeks to formally certify lawyers as Legal Project Managers. The need for this certification arose from law firms moving away from the billable hour and project management became the key to profitability (Hassett & Mathur, 2010)[14]. They

acknowledge that this certification will differ substantially from general project management certifications but that law firms and clients are looking for standards (Hassett & Mathur, 2010)[14].

Timpka, Nordqvist, Festin, & Lindqvist (2012)[15] discussed that certifications and other factors to show how important safety is can improve chances for a promotion. Certifications and safety programs can help underlie the importance of keeping individuals safe. Agreements between political parties concerning safety promotion was seen to promote sustainability. Safety-promotion programs can help show high-risk actions and how people can prevent injury in a work environment. Certifications and safety programs are beneficial to the employer and employee of a work environment.

Burivalova, Hua, Koh, Garcia & Putz (2017)[16] indicated that forest certifications promote to sustain and keep forest alive. These certification work with the goals of individuals to not only use and find lumber, but also keep the forest alive. The goal of these certifications is to sustain timber production and environmental protection. The issue that can be found with these certifications is the potentials and limitations of trying to synthesize existing knowledge.

U.S. Government Accountability Office (GAO) (2018)[17] discusses how the Social Security Administration relies heavily on IT. It talks about how changes were brought out for incremental development and software licenses within IT management policies. These changes affect the IT department due to the need that certifications could help with finding a job within this workforce. Information security, project management, and even general certifications could help with the improvement of theses policies. These changes were implemented in order to reduce duplication and achieve cost savings. The fact that IT security plays an important role in many organizations shows how valuable and how important a security certification is and even how important an IT

security managers position is. Many organizations are creating new positions to keep their organizations secure and safe. There is a lot of risk when it comes to security and one mistake can cause a lot of problems legally, financially, and even politically.

Purpose of the Study

The focus of this research was the Information Technology field and students enrolled in Informational Technology Services (ITS) program at a large university in the southeastern region of the United States.

Faculty in the university play a multi-faceted role in their day-to-day interactions with the students. Apart from conveying knowledge, and providing a rich educational experience, another crucial part of their work is to mentor students by making the connection between their educational experience and the real world of work. Despite better employment opportunities and higher earning potentials that certifications can bring, less than 3% of total graduates with a bachelor's degree in IT also had at least one certification in their field. Instructors offering technical courses such as Computer Repair and Maintenance, Data Networks, and Network Security are faced with a dilemma as they are unable to make IT certification an exit requirement for the students because of legal and academic rules and policies. With that being said, what influences students' perceptions of IT certifications, and why aren't more students taking these tests to become certified. The findings of this study provide information that can be used to improve students' perceptions of the importance of certifications as well as to identify and address weaknesses in curriculum and/or interaction with students that can be addressed to improve students' perceptions related to the importance of certificates.

Statement of the Problem

The problem of the study reported in this article is: What factors influence students' perception of IT certification. A secondary problem was to identify demographic factors that might be related to students' perception of IT certifications.

Research Questions

Two research questions were developed to guide the study:

1. What are the students' perceptions of pursuing IT certifications before they graduate?
2. Do meaningful relationships exist among students' demographics and their perception of pursuing IT certifications before they graduate?

Population

A total of 86 students met the requirement of being two years or less from graduation and enrolled in an IT program that offered the opportunity for certification in 2019 at the large university in south-eastern United States. All of these students agreed to participate and completed the survey.

Methodology

The researcher and research assistant designed and developed the survey instrument for data collection. A self-reported questionnaire, with items on the instrument evaluated on a five-point scale ranging from one, strongly disagree to five, strongly agree, was developed based on the factors identified via the review of literature, expert opinions, and feedback provided by the students and a panel of experts. In order establish the content validity of the instrument, the researchers presented it to a panel of experts who reviewed the survey for things such as unclear instructions, confusing, ambiguous or repetitive items, complexity or difficult sentence structure, appropriate content, and items that needed to be added, revised or deleted. Based on the constructive feedback received from the reviewers, the initial instrument was revised.

The final instrument included 27 items. To establish the reliability of the survey instrument, the researchers employ a test/retest method using 15 students. These students were not included as part of the study. The participants in the pilot test completed the survey twice, with

one week between the first and second administration of the instrument. The internal consistency of the instrument was established using Cronbach's alpha, α = .87.

The survey was available online for a period of one week, and two reminders were sent to students during the week to remind them to complete the survey. Participation was voluntary, and participants were able to withdraw any time without penalty. Individual participant data was kept confidential.

Data Analyses

The data were analyze using summary descriptive statistics, ANOVA, and correlations.

Research Question 1

Research Question 1 was: What are the students' perceptions of pursuing IT certifications before they graduate?

The overall mean and rank order for the items on the instrument are shown in Table 1. The items that the students rated as 1 and 2 were the statements: *I am inclined to take the certification exams if it means job security* and *I am inclined to take the certification exams if my (future) job requires it*.

Table 1 Overall Mean and Rank Order for Instrument Items

No.	Statement	Mean	Interpretation	Rank
1	I know what CompTia A+ certification is.	3.47	N	18
2	I know what CompTia Network+ certification is.	3.40	N	19
3	I know what CompTia Security + certification is.	3.33	N	20
4	I know what CompTia IT Fundamentals certification is.	3.14	N	26
5	I am inclined to take the certification exams if my university records show that I am IT certified.	4.10	A	8
6	I am inclined to take the certification exams if I can substitute the required course(s) with my certification.	4.19	A	6
7	I am inclined to take the certification exams if it looks good on resume.	4.45	SA	3
8	I am inclined to take the certification exams if my (future) job requires it.	4.57	SA	2
9	I am inclined to take the certification exams if it means job security.	4.60	SA	1
10	I am inclined to take the certification exams if I get reimbursed for my testing fee after passing the test.	4.40	SA	5
11	The student and/or professional organization I belong to encourages me to pursue IT certifications.	3.56	A	16
12	To keep current, I believe it is crucial to renew my certification(s) every 3-5 years.	3.88	A	11
13	I take pleasure in being certified, and it has nothing to do with an external reward.	3.88	A	12
14	I look good in other students' eyes if I am IT certified.	4.00	A	9
15	I am inclined to take the certification exams just to show that I can do it.	3.76	A	14
16	I am inclined to take the certification exams because of my love for working with IT.	4.00	A	10
17	If I have the time, I will take the certification tests.	4.43	SA	4
18	I can pay for the certification exams out of my own pocket.	3.50	A	17
19	Exam locations is a major concern for me to get certified in IT.	3.27	N	22
20	I would rather take one large (consolidated) IT certification exam than taking different ones separately, such as A+, Network+, Security+, Server+, etc.	3.15	N	25
21	There are personal conflicts that stop me from taking the certification tests.	2.74	N	27
22	I am more determined to take the certification tests when I am told that I will fail.	3.31	N	21
23	I believe that I have the ability to pass the certification exams.	4.12	A	7
24	I believe that I am prepared for the certification exams.	3.26	N	23
25	Schools prepare me for the certification exams.	3.61	A	15
26	I believe experience in IT is worth more than certifications.	3.88	A	13
27	Schools promote the importance of getting certified.	3.17	N	24

The scale shown in Table 2 was used to interpret the responses to the items on the instrument.

The participants strongly agreed with five items on the instrument as shown in Table 3.

Table 2 Interpretation of Likert Scale

Value	Interpretation
4.4 - 5.0	SA, Strongly Agree
3.5 - 4.3	A, Agree
2.7 - 3.4	N, Neutral
1.9 - 2.6	D, Disagree
1.0 - 1.8	SD, Strongly Disagree

Table 3 Strong Agreed with Instrument Items

No.	Statement	Mean	Interpretation
9	I am inclined to take the certification exams if it means job security.	4.60	SA
8	I am inclined to take the certification exams if my (future) job requires it.	4.57	SA
7	I am inclined to take the certification exams if it looks good on resume.	4.45	SA
17	If I have the time, I will take the certification tests.	4.43	SA
10	I am inclined to take the certification exams if I get reimbursed for my testing fee after passing the test.	4.40	SA

The descriptive data showed that 91.7% of the respondents were inclined to take the certification exam if it meant job security; 88.4**%** of the respondents were inclined to take the certification exam if their future job required it; and 86**%** of the respondents were inclined to take the certification exam if it looked good on their resumes. In addition, 88.4**%** of the respondents were inclined to take the certification exam if they were reimbursed for their testing fee after passing the test, and 86.1% of the respondents were inclined to take the certification exam if they had the time.

The participants did not have a positive response to the following items on the survey as shown in Table 4.

Table 4 Neutral with Instrument Items

No.	Question	Mean	Interpretation
1	I know what CompTia A+ certification is.	3.47	N
2	I know what CompTia Network+ certification is.	3.40	N
3	I know what CompTia Security + certification is.	3.33	N
22	I am more determined to take the certification tests when I am told that I will fail.	3.31	N
19	Exam locations is a major concern for me to get certified in IT.	3.27	N
24	I believe that I am prepared for the certification exams.	3.26	N
27	Schools promote the importance of getting certified.	3.17	N
20	I would rather take one large (consolidated) IT certification exam than taking different ones separately, s	3.15	N
4	I know what CompTia IT Fundamentals certification is.	3.14	N
21	There are personal conflicts that stop me from taking the certification tests.	2.74	N

The descriptive data showed that a large number of students are not familiar with the CompTIA certificates. Only 53.5% of the respondents were familiar with the CompTIA A+ and Network+ certifications; 48.9% of the respondents were familiar with CompTIA Security+ certification; and only 40**%** of the respondents were familiar with the CompTIA IT Fundamentals certification.

A majority of the respondents, 73.5%, believed they had the ability to pass the certification exam, and 67.4% of the respondents indicated they would take the exams if their university records showed that they are IT certified. It is important to note, however, that 72.1% of the respondents believed experience in IT is worth more than certifications. Students would be inclined to take the certification tests if getting and maintaining a job depended on it. They also indicated that time and the cost of taking these tests were concerns.

Research Question 2

Research Question 2 was: Do meaningful relationships exist among students' demographics and their perception of pursuing IT certifications before they graduate?

The demographic factors analyzed included gender, class rank, and GPA.

Gender

As anticipated, the researchers found no differences based on participants' gender. The gender breakdown, as shown in Table 5,

indicates that most of the participants, 81% were male. This is similar to the gender breakdown of the total population of students enrolled in ITS programs. Based on gender, no differences were found for any of the 27 items on the instruments on the instruments.

Table 5 Gender

Gender	Mean	N	Std. Deviation
Male	3.37	70	1.44
Female	3.88	16	0.83
Total	3.47	86	1.35

Class Rank

Of 43 students who participated in the study, 64 were seniors, as shown in Table 6. Based on class rank, the participants differed on their perception for only one question, Question 25, *Schools prepare me for the certification exams.* Table 7 shows the Anova results, and Table 8 shows the Tukey post hoc test results.

Table 6 Class Rank

Rank	N
Senior	64
Junior	18
Sophomore	4

Table 7 ANOVA based on Class Rank

Q25		Sum of Squares	df	Mean Squre	F	Sig.
	Between Groups	6.73	2	3.37	4.12	0.02
	Within Groups	31.02	82	0.82		
	Total	37.76	84			

Table 8 Tukey Post Hoc Test

Dependent Variable	(I) Rank	(J) Rank	Differenc	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Q25	Sophomore	Junior	0.28	0.71	0.92	-1.44	2.00
		Senior	1.13	0.66	0.21	-0.48	2.74
	Junior	Sophomore	-0.28	0.71	0.92	-2.00	1.44
		Senior	.86*	0.34	0.04	0.02	1.69
	Senior	Sophomore	-1.13	0.66	0.21	-2.74	0.48
		Junior	-.86*	0.34	0.04	-1.69	-0.02

* The mean difference is significant at the 0.05 level.

Sophomores were significantly more positive about the statement, *Schools prepare me for the certification exams,* than junior or seniors as shown in the mean scores in Table 9. For every item on the instrument, sophomores had the most positive response followed by junior and

seniors. However, this finding is limited in the sense that the majority of the participants, 74% were seniors, 21% were juniors, and only .05% were sophomores. This association merits additional research before any definitive relationship is made.

Table 9

Tukey HSD a,b

Rank	N	Subset for alpha = 0.05
		1
Senior	64	3.37
Junior	18	4.22
Sophomore	4	4.50
Sig.		0.15

GPA

When participants were grouped based on GPA, the was a significant difference among the groups for 9 of the 27 items on the instrument. The participants were divided into 4 groups based on GPA as shown in Table 10.

Table 10 Number of Participants Based on GPA

Rank	N
2.00 - 2.49	16
2.50 - 2.99	40
3.00 - 3.49	14
3.50 - 4.00	16

Based on GPA the responses were significantly different for items 1, 2, 3, 4, 5, 6, 7, 10 and 17. Refer to Table 11. The Post Hoc test (Appendix 1) revealed that in all instances of significant difference, students with higher GPAs were more positive about the statements than students with lower GPAs. For these participants, the higher their GPAs, the more positive their responses were to statements on the instrument related to industry certifications.

Summary of Findings

Overall, the participants agreed or strongly agreed with 19 of the 27 items on the instrument used to measure their perceptions of industry certification exams. The descriptive data showed that the respondents were inclined to take the certification exam if it meant job security, their future job required it or if it looked good on their resumes. They also indicated the cost of the exams and the time at which the exams were given influenced their decisions to take the exams.

The participants believed they had the ability to pass the certification exams and would take the exams if their university records showed that they are IT certified. It is important to note; however, the majority of the participants believed experience in IT is worth more than certifications.

The demographic factors of gender and class rank had little impact on participants' perceptions of industry certifications. GPA did have an impact on students' perceptions of industry certifications; generally students with higher GPAs had more positive perceptions of industry certifications than students with lower GPAs.

Table 11 ANOVA based on GPA

		Sum of Squares	df	Mean Square	F	Sig.
Q1	Between Groups	17.408	3	5.803	3.817	0.017
	Within Groups	59.29	81	1.52		
	Total	76.70	84			
Q2	Between Groups	20.28	3	6.76	4.54	0.01
	Within Groups	58.00	81	1.49		
	Total	78.28	84			
Q3	Between Groups	22.62	3	7.54	5.43	0.00
	Within Groups	52.72	81	1.39		
	Total	75.33	84			
Q4	Between Groups	22.74	3	7.58	5.43	0.00
	Within Groups	54.43	81	1.40		
	Total	77.16	84			
Q5	Between Groups	6.66	3	2.22	3.29	0.03
	Within Groups	24.95	81	0.67		
	Total	31.61	84			
Q6	Between Groups	6.48	3	2.16	2.93	0.05
	Within Groups	28.00	81	0.74		
	Total	34.48	84			
Q7	Between Groups	5.03	3	1.68	4.15	0.01
	Within Groups	15.37	81	0.41		
	Total	20.41	84			
Q10	Between Groups	8.13	3	2.71	6.45	0.00
	Within Groups	15.99	81	0.42		
	Total	24.12	84			
Q17	Between Groups	5.29	3	1.76	4.46	0.01
	Within Groups	15.00	81	0.40		
	Total	20.29	84			

Conclusions and Recommendations

The review of the literature supports the value of industry-related certifications. The University and department studied offered ITS graduates the opportunity to take certifications exams available for various areas of information technology; however, the exams are not required, and less than 3% of the graduates actually take these exams. In addition, the content of required technical classes are aligned with industry standards; and discussion of industry certifications is included in course content. The department believes these certifications are valuable, and would like all students to take the exams for these certifications.

The findings of this study showed that a large number of students were not familiar with the CompTIA certificates, ranging from a low of .40% to a high of 55% for the various certification areas; and students indicated the exam times and cost were a major concern.

The department has not been successful in informing students about the value of the exams and the impact they might have when seeking a job in the related areas. If the department wants to improve this situation, it will need to provide students with more information about these

certifications in classes, on its web site, on displays through the department facilities and classrooms, and during the one-to-one advising contacts with students. The department could also provide practice exam experiences in classes, through free workshops, and through on-line tutorials and practice exams.

The cost and time schedule for these certifications was cited by students as additional reasons they do not take these certification exams. This is in contrast to Lester & Dwyer's study proposing that the costs of the exam would not be a big enough deterrent to stop pursuit of certification (2011)[8]. The department determines when these exams are available, and could easily create a schedule more suitable to students' schedules. The department could assist students in paying part or all of the cost of the exams with funds from course fees. Grant funds could also be sought to defer the cost of these exams.

In this study students' GPA had an impact on participants' perception of the value of IT certifications. Students with higher GPAs had more positive perceptions of these certifications than students with lower GPAs. Even though in Lester & Dwyer's 2011[8] study, they authors found most certified individuals reported that certification only helped them to a limited extent in career-related outcomes except marketability. The finding of this study echoed their claim. It is good that the higher achieving students see value in these exams, but the value of these exams could be even more important for students with lower GPAs. The review of the literature indicated that hiring managers consider these certifications when selecting an individual for a job. Having the certification could help a student with a lower GPAs in getting a job over a student with a higher GPA, but no certification.

Finally, it appears that the department and faculty need to do a better job in explaining the value of these certifications to students. They need to become vested in this goal if they want to increase the number of students taking these

exams from 3% to the goal of 100%. Adding IT certification to students' academic record might encourage more students to take the Information Technology certification exams. Students' academic records would only show exams passed, and would not include a record of the numbers of attempts to pass the exam or any exams not passed.

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Appendix 1 – TUKEY HSD Test for Participants Based on GPA

Dependent Variable	(I) GPA	(J) GPA	Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Q1	2.00-2.49	2.50-2.99	-0.33	0.52	0.92	-1.71	1.06
		3.00-3.49	-0.55	0.64	0.82	-2.27	1.16
		3.50-4.00	-1.88*	0.62	0.02	-3.53	-0.22
	2.50-2.99	2.00-2.49	0.33	0.52	0.92	-1.06	1.71
		3.00-3.49	-0.23	0.54	0.97	-1.68	1.22
		3.50-4.00	-1.55*	0.52	0.02	-2.93	-0.17
	3.00-3.49	2.00-2.49	0.55	0.64	0.82	-1.16	2.27
		2.50-2.99	0.23	0.54	0.97	-1.22	1.68
		3.50-4.00	-1.32	0.64	0.18	-3.03	0.39
	3.50-4.00	2.00-2.49	1.88*	0.62	0.02	0.22	3.53
		2.50-2.99	1.55*	0.52	0.02	0.17	2.93
		3.00-3.49	1.32	0.64	0.18	-0.39	3.03
Q2	2.00-2.49	2.50-2.99	-0.58	0.51	0.68	-1.94	0.79
		3.00-3.49	-0.66	0.63	0.72	-2.35	1.03
		3.50-4.00	-2.130*	0.61	0.01	-3.76	-0.49
	2.50-2.99	2.00-2.49	0.58	0.51	0.68	-0.79	1.94
		3.00-3.49	-0.09	0.54	1.00	-1.52	1.35
		3.50-4.00	-1.55*	0.51	0.02	-2.92	-0.18
	3.00-3.49	2.00-2.49	0.66	0.63	0.72	-1.03	2.35
		2.50-2.99	0.09	0.54	1.00	-1.35	1.52
		3.50-4.00	-1.46	0.63	0.11	-3.16	0.23
	3.50-4.00	2.00-2.49	2.13*	0.61	0.01	0.49	3.76
		2.50-2.99	1.55*	0.51	0.02	0.18	2.92
		3.00-3.49	1.46	0.63	0.11	-0.23	3.16
Q3	2.00-2.49	2.50-2.99	-0.61	0.50	0.62	-1.94	0.73
		3.00-3.49	-0.79	0.61	0.58	-2.42	0.85
		3.50-4.00	-2.25*	0.59	0.00	-3.83	-0.67
	2.50-2.99	2.00-2.49	0.61	0.50	0.62	-0.73	1.94
		3.00-3.49	-0.18	0.52	0.99	-1.58	1.22
		3.50-4.00	-1.64*	0.50	0.01	-2.98	-0.31
	3.00-3.49	2.00-2.49	0.79	0.61	0.58	-0.85	2.42
		2.50-2.99	0.18	0.52	0.99	-1.22	1.58
		3.50-4.00	-1.46	0.61	0.09	-3.10	0.17
	3.50-4.00	2.00-2.49	2.25*	0.59	0.00	0.67	3.83
		2.50-2.99	1.64*	0.50	0.01	0.31	2.98
		3.00-3.49	1.46	0.61	0.09	-0.17	3.10

Dependent Variable	(I) GPA	(J) GPA	Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Q4	2.00-2.49	2.50-2.99	-0.35	0.49	0.89	-1.68	0.98
		3.00-3.49	-0.5	0.61	0.85	-2.14	1.14
		3.50-4.00	-2.13*	0.59	0.01	-3.71	-0.54
	2.50-2.99	2.00-2.49	0.35	0.49	0.89	-0.98	1.68
		3.00-3.49	-0.15	0.52	0.99	-1.54	1.24
		3.50-4.00	-1.78*	0.49	0.01	-3.10	-0.45
	3.00-3.49	2.00-2.49	0.50	0.61	0.85	-1.14	2.14
		2.50-2.99	0.15	0.52	0.99	-1.24	1.54
		3.50-4.00	-1.63	0.61	0.05	-3.27	0.02
	3.50-4.00	2.00-2.49	2.13*	0.59	0.01	0.54	3.71
		2.50-2.99	1.780*	0.49	0.01	0.45	3.10
		3.00-3.49	1.63	0.61	0.05	-0.02	3.27
Q5	2.00-2.49	2.50-2.99	0.25	0.36	0.90	-0.73	1.22
		3.00-3.49	0.43	0.44	0.76	-0.75	1.61
		3.50-4.00	-0.73	0.43	0.33	-1.88	0.41
	2.50-2.99	2.00-2.49	-0.25	0.36	0.90	-1.22	0.73
		3.00-3.49	0.18	0.36	0.96	-0.80	1.16
		3.50-4.00	-.98*	0.35	0.04	-1.91	-0.05
	3.00-3.49	2.00-2.49	-0.43	0.44	0.76	-1.61	0.75
		2.50-2.99	-0.18	0.36	0.96	-1.16	0.80
		3.50-4.00	-1.16*	0.43	0.05	-2.30	-0.02
	3.50-4.00	2.00-2.49	0.73	0.43	0.33	-0.41	1.88
		2.50-2.99	.98*	0.35	0.04	0.05	1.91
		3.00-3.49	1.16*	0.43	0.05	0.02	2.30
Q6	2.00-2.49	2.50-2.99	-0.01	0.38	1.00	-1.02	1.01
		3.00-3.49	0.57	0.46	0.60	-0.66	1.80
		3.50-4.00	-0.73	0.44	0.37	-1.93	0.46
	2.50-2.99	2.00-2.49	0.01	0.38	1.00	-1.01	1.02
		3.00-3.49	0.58	0.38	0.43	-0.43	1.59
		3.50-4.00	-0.73	0.36	0.20	-1.69	0.24
	3.00-3.49	2.00-2.49	-0.57	0.46	0.60	-1.80	0.66
		2.50-2.99	-0.57	0.38	0.43	-1.59	0.43
		3.50-4.00	-1.30*	0.44	0.03	-2.50	-0.11
	3.50-4.00	2.00-2.49	0.73	0.44	0.37	-0.46	1.93
		2.50-2.99	0.73	0.36	0.20	-0.24	1.69
		3.00-3.49	1.30*	0.44	0.03	0.11	2.50

Dependent Variable	(I) GPA	(J) GPA	Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Q7	2.00-2.49	2.50-2.99	0.17	0.28	0.93	-0.58	0.92
		3.00-3.49	0.71	0.34	0.17	-0.20	1.63
		3.50-4.00	-0.43	0.33	0.57	-1.31	0.46
	2.50-2.99	2.00-2.49	-0.17	0.28	0.93	-0.92	0.58
		3.00-3.49	0.54	0.28	0.23	-0.21	1.29
		3.50-4.00	-0.6	0.27	0.13	-1.31	0.11
	3.00-3.49	2.00-2.49	-0.71	0.34	0.17	-1.63	0.20
		2.50-2.99	-0.54	0.28	0.23	-1.29	0.21
		3.50-4.00	-1.14*	0.33	0.01	-2.03	-0.26
	3.50-4.00	2.00-2.49	0.42857	0.33	0.57	-0.46	1.31
		2.50-2.99	0.6	0.27	0.13	-0.11	1.31
		3.00-3.49	1.14*	0.33	0.01	0.26	2.03
Q10	2.00-2.49	2.50-2.99	-.84*	0.28	0.03	-1.61	-0.08
		3.00-3.49	0.14286	0.35	0.98	-0.79	1.07
		3.50-4.00	-0.89286	0.34	0.05	-1.79	0.01
	2.50-2.99	2.00-2.49	.84*	0.28	0.03	0.08	1.61
		3.00-3.49	.99*	0.28	0.01	0.22	1.75
		3.50-4.00	-0.05	0.27	1.00	-0.78	0.68
	3.00-3.49	2.00-2.49	-0.14286	0.35	0.98	-1.07	0.79
		2.50-2.99	-.99*	0.28	0.01	-1.75	-0.22
		3.50-4.00	-1.04*	0.34	0.02	-1.94	-0.13
	3.50-4.00	2.00-2.49	0.89286	0.34	0.05	-0.01	1.79
		2.50-2.99	0.05	0.27	1.00	-0.68	0.78
		3.00-3.49	1.04*	0.34	0.02	0.13	1.94
Q17	2.00-2.49	2.50-2.99	-0.5	0.28	0.28	-1.24	0.24
		3.00-3.49	0	0.34	1.00	-0.90	0.90
		3.50-4.00	-1.00*	0.33	0.02	-1.87	-0.13
	2.50-2.99	2.00-2.49	0.5	0.28	0.28	-0.24	1.24
		3.00-3.49	0.5	0.28	0.28	-0.24	1.24
		3.50-4.00	-0.5	0.26	0.24	-1.21	0.21
	3.00-3.49	2.00-2.49	0	0.34	1.00	-0.90	0.90
		2.50-2.99	-0.5	0.28	0.28	-1.24	0.24
		3.50-4.00	-1.00*	0.33	0.02	-1.87	-0.13
	3.50-4.00	2.00-2.49	1.00*	0.33	0.02	0.13	1.87
		2.50-2.99	0.5	0.26	0.24	-0.21	1.21
		3.00-3.49	1.00*	0.33	0.02	0.13	1.87