DEGREE-BASED IT CERTIFICATION PROGRAMS: A COMPARATIVE ANALYSIS OF PERCEPTIONS OF STUDENTS FROM THE UNITED STATES AND NIGERIA

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ABSTRACT

This paper examines students' perceptions towards information technology (IT) certification related undergraduate programs. Three such programs are focused on: degree-based IT certification programs (DBC), degree-based IT internships (DBI), and degree-based IT certification programs with internship (DBCI). Two sets of student data, one from a university in the U.S. and the other from a university in Nigeria, were collected and analyzed to determine if the students' views towards these three programs differ in terms of expected program benefits, program viability, and students' employability. The results provide empirical evidence that in general, the students from the U.S. showed more enthusiasm for degree-based IT certification program with internship and more willingness to pay for such a program than did the Nigeria students. On the other hand, the students from Nigeria appeared to support more strongly the degree-based IT certification program, even though such a program would be less affordable to them than to the students from the U.S.

Keywords: Undergraduate IT programs, IT certifications, IT internship

INTRODUCTION

This paper investigates students' perceptions towards three information-technology (IT) related undergraduate programs: (1) degree-based IT certification program (DBC), (2) degree-based IT internship (DBI), and (3) degree-based IT certification program with internship (DBCI). DBC is the integration of industry recognized IT certifications into a traditional IT baccalaureate degree program, DBI is the integration of supervised internship into a traditional IT baccalaureate degree program, and DBCI is the integration of industry recognized IT certifications along with supervised internship into a traditional IT baccalaureate degree program. The paper focuses on students' views towards these programs in terms of expected program benefits, program viability, and student employability.

Our inquiry is motivated by the lack of studies on perceptions of university students with IT related majors regarding the impact of IT certifications on their job market competitiveness. A number of studies on IT certifications either deal with the benefits of IT certifications with reference to developed countries or the benefits of non-IT certification with regards to developing countries. Some other studies simply examined IT certification and internship. For instances, a study by Ray and McCoy [10] indicates that IT certification provides clear measurement of specific abilities, improved competence, increased productivity, better morale, increased loyalty, increased credibility, increased self-confidence, more empowerment, higher salaries/sign-on bonus, and promotions. Other studies reveal that internship experience may not be enough to give IT students the opportunity to be hired because the criteria of filtering good

candidates now include IT certifications [1, 2, 5, 6, 7, 14, 15]. On the contrary, Henry et al [4] argue that employers frequently deploy internship as filtering devices because most graduating students lack real world practical hands-on experience, which makes it difficult for potential employers to do thorough evaluations. Stanton [12] noted the acquisition of new skills, relevant work experience, networking opportunities, and hands-on application of theories as some of the benefits of internship. Johnston [5] takes it further by arguing that individuals with both certification and internship are most valuable to organizations.

It appears that researchers are not in agreement on the criteria used by recruiters and/or potential employers to evaluate graduating students. This disagreement may have implications for students considering IT careers and for higher educational institutions' administrators designing IT curricula. Consequently, it is imperative that empirical studies be conducted from the perspective of students to understand their views towards IT certification related undergraduate programs and to examine the viability of implementing these programs. This paper deals with one of such studies. The primary research questions that guide this study are: how do students from developed and developing countries perceive the program benefits, program viability, and student employability associated with DBC, DBI, and DBCI?

HYPOTHESES

Expected Program Benefits

The literature has identified several benefits associated with IT certification and internship, such as gaining technical skills, providing tools for communicating with co-workers and customers, facilitating hands-on application of learned theories and independent validation of technical skills, increased credibility, opportunities for demonstrating learned technical skills, empowerment, higher salaries and sign-on bonus, promotions, acquisition of new skills, relevant work experience, and networking opportunities [4, 6, 8, 10, 11, 12, 13]. Senno [11] suggests that that a certification would differentiate one's resume from others, prove one's commitment to a career in IT, show ability to learn, and demonstrate one's expertise in a specific area. Robinson [as cited in 6] adds that a certification could help develop a credible presence on resumes and in the office. This study investigates the perceptions of students on the expected program benefits of DBC, DBI, and DBCI. The related hypotheses are:

H1a: Students from developed countries perceive differences in the program benefits associated with DBC, DBI, and DBCI.

H1b: Students from developing countries perceive differences in the program benefits associated with DBC, DBI, and DBCI.

Program Viability

Over the past two decades, the number of certifications and the demand for certified IT professionals have been on the rise worldwide and it is rapidly becoming common for employers and job recruiters to expect IT professionals to be certified [2, 7, 8, 13]. Martinez [8] indicates that Microsoft and Novell created programs to bring certification into the classroom of higher educational institutions (hereafter referred to as higher eds). These programs allow students to follow the same curriculum in use at licensed business centers that prepare IT certification

examinations. They are also less expensive and can be integrated into the traditional academic programs. However, many higher eds are not aware of the existence of such programs. Those who are aware of such programs are slow in adopting them. This slow pace of adoption is expected to continue because higher eds are relatively weak in teaching up-to-date technical skills [13]. Martinez [9] indicates that some partnerships were formed between certification sponsors and higher eds, which resulted in the establishment of laboratories to provide students the needed critical components that were missing in the curriculum, such as hands-on experience on the latest hardware and software. Unfortunately, many of the partnerships and programs have not survived [8].

These developments have led to academicians, students, and practitioners debating whether higher eds ought to implement a degree-based IT certification program [1]. This debate is fueled partly by the fact that a degree or credits from higher eds are not required before taking any of the IT certification exams. These unraveling events have made it necessary to investigate whether students perceive differences in the program viability associated with DBC, DBI, and DBCI. This leads to the second set of hypotheses:

H2a: Students from developed countries perceive differences in the program viability of DBC, DBI, and DBCI.

H2b: Students from developing countries perceive differences in the program viability of DBC, DBI, and DBCI.

Employability

A search for sites on World Wide Web that cater to IT professional looking for jobs revealed that over 1000 positions either require or desire applicants with a certification without requiring them to have a baccalaureate degree [9]. Ray and McCoy [10] observe that certification has become a quick answer for a skeptical interviewer looking for evidence to establish an applicant's ability to perform. Foster [2] posits that the acquisition of certification(s) is the best way for IT staffers to market themselves, while Steen [13] argues that certification is the primary way to quantify technical skills. Studies also indicate that IT professionals with certification command higher salary than their non-certified counterparts [5, 7, 8, 14]. This is because employers perceive employees with certification to be more competent and productive than their non-certified counterparts [7, 8]. The issue then is whether students perceive differences among DBC, DBI, and DBCI in terms of helping enhance employability. This leads to the third set of hypotheses:

H3a: Students from developed countries perceive differences in the employability associated with DBC, DBI, and DBCI.

H3b: Students from developing countries perceive differences in the employability associated with DBC, DBI, and DBCI.

METHODS

The questionnaire for this study was developed based on the current literature. It was then pre-tested among some academicians and students specializing in IT at a university in the U.S. The final questionnaire included five sections: (1) expected program benefits, (2) program viability, (3) employability, (4) student demographic information, and (5) open comments. Except for the demographic questions and open comments, all other questions were measured using the Likert

5-point scale, where a 1 rating indicated strongly disagreement, and a 5 rating indicated strongly agreement. Two groups of students were selected, one from a university in the U.S. and the other from a university in Nigeria, and data were collected to test the three sets of hypotheses discussed in the previous section. The univariate t test, analysis of variance (ANOVA), and Tukey's honestly significant difference (HSD) method were used [3].

RESULTS

The data were collected in 2002. A total of 410 questionnaires were sent out. The final usable responses were 191, giving a response rate of 47%. Among the 191 students who responded, about 53% were from the U.S. and 47% were from Nigeria. All the students were either juniors or seniors, and more than 85% were at the age of 23 or younger. Most of the students did not hold any IT certifications.

The first set of hypotheses focuses on the students' perceptions towards program benefits associated with DBC, DBI, and DBCI. The program benefits were measured by seven items. The corresponding means, standard deviations, and the test results are presented in Table 1.

Table 1: Results of Test for Perceived Program Benefits

a: Perceived program benefits by the U.S. students (n=101)					
	DBC (A)	**DBI (B)**	**DBCI (C)**	**Overall model F-statistics**	**Post Hoc Analysis****
	Mean (SD)	**Mean (SD)**	**Mean (SD)**		
Opportunity for demonstrating learned skills	4.00 (1.35)	3.10 (1.51)	4.90 (0.30)	58.6*	C > A > B
Effective tools to communicate w/ co-workers	4.72 (0.85)	2.05 (1.39)	4.18 (0.41)	214.6*	A > C > B
Hands-on application of learned theories	3.56 (1.42)	2.86 (1.41)	4.19 (0.39)	32.2*	C > A > B
Effective way to gain new technical skills	4.92 (0.34)	1.47 (0.67)	4.70 (0.46)	1462.6*	A > C > B
Independent validation technical skills	4.97 (0.17)	1.30 (0.90)	4.95 (0.22)	1527.3*	A, C > B
Opportunity for higher salary & sign-on bonus	4.93 (0.26)	2.43 (1.41)	4.93 (0.26)	299.3*	A, C > B
Opportunity to work abroad	1.59 (0.97)	4.45 (1.08)	4.55 (1.01)	271.7*	B, C > A
b: Perceived program benefits by the Nigeria students (n=90)					
	DBC (A)	**DBI (B)**	**DBCI (C)**	**Overall model F-statistics**	**Post Hoc Analysis****
	Mean (SD)	**Mean (SD)**	**Mean (SD)**		
Opportunity for demonstrating learned skills	4.49 (0.89)	3.17 (1.45)	4.13 (0.34)	42.1*	A > C > B
Effective tools to communicate w/ co-workers	4.51 (0.94)	2.39 (1.62)	4.19 (0.39)	96.5*	A, C > B
Hands-on application of learned theories	3.96 (0.54)	3.00 (1.42)	4.29 (0.46)	48.0*	C > A > B
Effective way to gain new technical skills	4.86 (0.44)	3.31 (1.23)	4.10 (0.30)	89.3*	A > C > B
Independent validation technical skills	4.84 (0.36)	1.86 (0.35)	4.37 (0.48)	1412.9*	A > C > B
Opportunity for higher salary & sign-on bonus	4.16 (0.36)	2.66 (1.46)	4.17 (0.37)	84.6*	A, C > B
Opportunity to work abroad	4.18 (0.38)	1.83 (0.37)	4.12 (0.49)	909.0*	A, C > B

*: p-value <= 0.001. Therefore, the means are not equal
**: Tukey's HSD test was used and $\alpha = 0.05$.

Overall, both groups of the students appeared to perceive that a degree-based IT certification program, either with or without internship, would provide higher benefits than does a degree-based IT internship program. Thus, the data provide some empirical evidence for H1a (Table 1a) and H1b (Table 1b) that students from developed and developing countries will perceive differences in the program benefits associated with DBC, DBI, and DBCI.

The second set of hypotheses focuses on the students' perceptions towards the program viability of DBC, DBI, and DBCI. The program viability was measured by three items. The corresponding means, standards deviations, and the test results are presented in Table 2.

Table 2: Results of Test for Perceived Program Viability

a: Perceived program viability by the U.S. (n=101)

	DBC (A)	DBI (B)	DBCI (C)	Overall Model F-Statistics	Post Hoc Analysis**
	Mean (SD)	Mean (SD)	Mean (SD)		
Affordability	3.20 (0.96)	4.01 (0.36)	3.15 (1.90)	15.2*	A, B > C
Need of program implementation	3.60 (1.50)	3.05 (1.85)	4.77 (0.69)	38.1*	C > A > B
Students' willingness to pay	4.77 (0.79)	2.71 (1.61)	3.12 (1.82)	55.2*	A > B, C

b: Perceived program viability by the Nigeria students (n=90)

	DBC (A)	DBI (B)	DBCI (C)	Overall Model F-Statistics	Post Hoc Analysis**
	Mean (SD)	Mean (SD)	Mean (SD)		
Affordability	2.89 (1.16)	4.08 (0.58)	2.83 (0.96)	51.2*	B > A, C
Need of program implementation	3.94 (1.28)	2.96 (1.07)	3.51 (1.33)	14.7*	A > C > B
Students' willingness to pay	3.33 (1.05)	2.74 (1.43)	3.07 (1.64)	4.0*	A > B, C

*: p-value <= 0.001. Therefore, the means are not equal
**: Tukey's HSD test was used and $\alpha = 0.05$.

Table 2a reports the test results for Hypothesis 2a that students from developed countries will perceive differences in the program viability associated with DBC, DBI, and DBCI. The students from the U.S. appeared to agree that DBC and DBI are more affordable than DBCI. However, they ranked DBCI the highest in terms of the need to implement the program, and then DBC followed by DBI, suggesting that the students from the U.S. consider a higher value of a degree-based program with IT certification than that of an internship program. This observation is further reinforced by the fact that the U.S. students indicated more willingness to pay for DBC than for DBI. Overall, the data provide evidence for H2a.

Table 2b reports the test results for Hypothesis 2b that students from developing countries will perceive differences in the program viability associated with DBC, DBI, and DBCI. The students from Nigeria appeared to agree that DBI is more affordable than DBC or DBCI. They also ranked DBC the highest in terms of the need to implement the program, and then DBCI followed by DBI. Further, although the Nigeria students considered DBC to be less affordable than DBI, they indicated more willingness to pay for this type of program. Overall, the data provide evidence for H2b.

The third set of hypotheses focuses on the perceived student employability associated with DBC, DBI, and DBCI. Student employability in this study was measured by three items. The corresponding means, standards deviations, and the test results are presented in Table 3. In general, both groups of the students appeared to perceive DBCI to be the best among the three programs in helping generate employability, and they perceived no significant difference between DBC and DBI on this issue. Thus, H3a and H3b that students from developed and developing countries will perceive differences in the student employability associated with DBC, DBI, and DBCI were partially supported (see Table 3a and 3b).

Table 3: Results of Test for Perceived Student Employability

a: Perceived student employability by the U.S. students (n=101)					
	DBC (A)	**DBI (B)**	**DBCI (C)**	**Overall Model F-Statistics (p-value)**	**Post Hoc Analysis***
	Mean (SD)	**Mean (SD)**	**Mean (SD)**		
Generating interviews	3.22 (1.69)	3.65 (1.84)	4.98 (0.14)	40.92 (0.000)	C > A, B
Giving competitive job advantages	3.12 (1.91)	3.01 (1.23)	4.88 (0.43)	62.35 (0.000)	C > A, B
Enabling one to gain employment	2.91 (1.17)	2.93 (1.36)	4.90 (0.39)	117.98(0.000)	C > A, B
b: Perceived student employability by the Nigeria student (n=90)					
	DBC (A)	**DBI (B)**	**DBCI (C)**	**Overall Model F-Statistics (p-value)**	**Post Hoc Analysis**
	Mean (SD)	**Mean (SD)**	**Mean (SD)**		
Generating interviews	3.19 (1.66)	3.59 (1.84)	4.82 (0.38)	31.06 (0.000)	C > A, B
Giving competitive job advantages	3.38 (1.81)	3.02 (1.01)	4.87 (0.34)	58.47 (0.000)	C > A, B
Enabling one to gain employment	3.29 (1.29)	2.84 (1.36)	4.90 (0.30)	87.18 (0.000)	C > A > B
*: Tukey's HSD test was used and $\alpha = 0.05$.					

ANALYSIS OF OPEN QUESTIONS

In order to gain a deeper understanding about how and why the U.S. and Nigeria students perceive the impact of IT certifications differently, we further analyzed the discussion of the major factors indicated by respondents to be responsible for their pursuit of IT certifications. The factors identified based on the feedback from the open questions in the survey include: (a) work abroad, (b) external validation, (c) better employment, (d) latest technologies, and (e) higher salary.

While 51% of the U. S. students indicated that better employment is the main factor influencing their quest for certification, 49% of the Nigeria students revealed that external validation of their degree is the most influencing factor. This observation may be supported by the general perception in many countries. Educational systems in developing countries are often viewed as weak or inferior to their counterparts in developed countries. Consequently, students from developing countries may seek to acquire internationally recognized certifications to remove any doubts regarding the perceived weakness or inequality of the education they obtain in their own countries.

Further, about 30% the Nigeria students indicated that their pursuing of IT certifications is to get a visa to work abroad while only 1 % of the U. S. students identified work abroad as one of the factors. One can infer from this finding that while internship is the enabler in western countries, certification is the enabler in developing nations with regard to working abroad by students, hence the interest in certification.

CONCLUSION

This study investigated students' perceptions towards three IT certification related undergraduate programs. We believe that the results from this study provide useful information for the students who are considering IT careers and for the higher educational institutions which are considering making IT certifications an integral part of their IT related undergraduate programs and moving their programs from the "traditional approach" to a "mainstream job market demand approach."

This study was conducted based on the two groups of students, one from a university in the U.S. and the other from a university in Nigeria. Thus, any conclusion with regard to the students from developed and developing countries must be tentative. It would be of interest to compare the findings of this study with those from different population frames, such as students from different universities in the U.S. and Nigeria or students from other developed and developing countries.

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