

Transition from Study to Employment: A Graduate Tracer to Enhance Effectiveness of the Computer Science Program Curricula

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Asia Pacific Journal of
Management and
Sustainable Development
Vol. 11 No. 2, pp. 41-47
September 2023
ISSN: 2782-9332 (Print)

Abstract – Graduate tracer studies are motivated by the need for more information on the transition of students from university to the labor market. Lyceum of the Philippines University – Batangas (LPU-B) has increasingly offered a wide spectrum of higher education courses that provide students with the necessary tools enabling them to develop employability skills, heighten own awareness of these skills and improve their ability to articulate them. The Bachelor of Science in Computer Science program prepares students to be IT professionals and researchers who are proficient in designing and developing computing solutions. The program is being offered by the College of Computer Studies of Lyceum of the Philippines University – Batangas and it includes specialization tracks: Game Development, Mobile Application Development and Data Science. The college has produced graduates who have fared well in the business sector, as evidenced by previous tracer studies. The study intended to determine employment data; assess the work-related values gained by graduates; and provide a means to enhance the relevance of present course offerings. BSCS graduates are qualified for employment in various sectors of the business industry and do well in terms of getting full-time employment after graduation. Respondents consider “Perseverance and Hard Work”, “Courage” and “Obedience to Superior” as top 3 choices for work-related values gained that are most relevant in their line of work. An action plan has been designed and proposed to continuously enhance the relevance of course offerings of the BSCS program, thus ensuring the high employability of its graduates.

Keywords – Computer science, Employability, Graduate tracer, Tracer study

Cite this article as: Ramos, M. C. M. (2023). Transition from Study to Employment: A Graduate Tracer to Enhance Effectiveness of the Computer Science Program Curricula. *Asia Pacific Journal of Management and Sustainable Development*, 11(2), 41-47

INTRODUCTION

Graduate tracer studies have come to represent one of the key approaches for enhancing study programme effectiveness in contemporary higher education. Graduate tracer studies are motivated by the need for more information on the transitions of students from university to the labor market. Every academic institution's goal is to produce competent and highly qualified graduates that can eventually be competitive in a local and global arena. A graduate tracer study is a very powerful tool that can provide valuable information for evaluating the whereabouts and performance of the graduates in the workplace [1].

Gines [2] defines a tracer study as an assessment tool where the “impact on target groups is traced back to specific elements of a project or programme so that effective and ineffective project components may be defined.” Further, Schomburg [3] shares that graduate survey results are important for “analysis of relationship between higher education and work.” Moreover, Millington [4] states that “they provide quantitative structural data on employment and career, the character of work and related competencies, and information on the professional orientation, and experiences of their graduates. Additionally, the collected data is an important indicator of the quality of higher education. In the Philippines, the Commission on Higher Education requires all HEIs to conduct a tracer study and is equally reflected as one of the required documents by any higher education accrediting body. By conducting a survey on the cohort of graduates from a specific institution, profession, discipline, level of education, their employment characteristics, competencies, and skills development, and have a comparative analysis, the information gained from these can be used by the graduate’s alma mater and other education stakeholders for curriculum development and other emerging reforms”.

Verona [5] defined a tracer study as a method which is basically envisioned to trace graduates of an

academic institution, to provide feedback mechanism of the graduates and their alma mater. This establishes the connection of the quality of graduates of universities and colleges molded by their standards of curriculum and instruction imposed by Commission on Higher Education (CHED) on them [6]. A tracer study is very important in nation building. It is conducted to understand graduates' capabilities in helping the country in the human resource aspect [7]. Moreover, it constitutes one form of empirical study which provides valuable information for evaluating the results of the education and training of a certain institution of higher learning [8].

Employability upon graduation and over the long term is, understandably, the major priority for most University students. Over the past five decades or so Lyceum of the Philippines University – Batangas (LPU-B) has increasingly offered a wide spectrum of higher education courses that provide students with the necessary tools enabling them to develop their employability skills, to heighten their own awareness of these skills and to improve their ability to articulate them. These skills, once acquired, need to be honed throughout one's working life, being put into practice not only in job searching and during interviews but also in personal development planning and in making the most of work experience opportunities. There is no doubt that a student's lifelong learning capability and therefore his/her employability are enhanced through their university experience. The core mission of LPU-B continues to be the creation of an open space of higher learning within a life-long perspective. This is based on equity of access and should be seen as an opportunity for individual development, allowing all those capable of benefiting from higher education to integrate better into the global knowledge society [9].

Information technology is a highly evolving field, continuous monitoring of the needs of the business sector is a must to ensure that program curricula is relevant. The effectivity of the BSCS program curricula is determined by the readiness of its graduates to face the challenges in the workplace. Graduates are the ultimate products of higher educational institutions. They move in every part of the world to showcase their competencies and skills and be contributive in the development of every nation. They are now part of the work force who contributes to the success of every organization leading towards a common goal [10].

In response to the needs of professional education in Computer Science, academic institutions must provide a relevant curriculum; modern equipment

and facilities; efficient student services; responsive organization and administration; and its educators must possess effective teaching techniques and strategies to ensure and maximize the learning of the students. The Bachelor of Science in Computer Science program prepares students to be IT professionals and researchers who are proficient in designing and developing computing solutions. The program is being offered by the College of Computer Studies of Lyceum of the Philippines University – Batangas and it includes specialization tracks: Game Development, Mobile Application Development and Data Science. The college has produced graduates who have fared well in the business sector, as evidenced by previous tracer studies. Since the use of a computer and the employment of its processes is a necessity in most businesses, BSCS graduates could easily be placed in any endeavoring and successful business establishments.

OBJECTIVES OF THE STUDY

This study aimed to track the BSCS graduates of the College of Computer Studies from SY 2015-2016 to SY 2018-2019. Specifically, the study intends to determine employment data; assess the work-related values gained by graduates; and provide a means to enhance the relevance of present course offerings based on the findings of the study.

MATERIALS AND METHODS

Research Design

This study utilized the quantitative descriptive research design. Descriptive research is a quantitative research method that attempts to collect quantifiable information for statistical analysis of the population sample. It is a popular market research tool that allows researchers to collect and describe the demographic segment's nature. This study covered the employment status and job experiences of the graduates. It is, in part, a curricular program evaluation if the graduates had effectively achieved the goal of their respective degree programs. Moreover, policy implications and recommendations identified were necessary for curricular improvement in the university.

Research Respondents

The respondents of the study are the graduates of Bachelor of Science in Computer Science (BSCS) batches 2016-2019. The total number of graduates is 92. A total of 68 out of the 92 or 73.91 percent of graduates participated in the study. Records as to the number of

BSCS graduates per school year were requested and obtained from the LPU-Batangas Registrar's Office.

of the study. Protection of the privacy of research participants was ensured.

RESULTS AND DISCUSSION

Using generally accepted statistical tools and principles, this part discusses the results from the collected data using survey. The study attempted to investigate the employment status of Bachelor of Science in Computer Science graduates of batches 2016-2019.

Table 1
Distribution of Graduates and Respondents per Batch

Batches 2016-2019			
School Year of Graduation	Number of Graduates	Number of Respondents	Percentage (%)
2015-2016	25	21	22.83
2016-2017	28	22	23.91
2017-2018	15	11	11.95
2018-2019	24	14	15.22
TOTAL	92	68	73.91%

Materials and Data

Personal data such as alumni names, physical addresses, electronic mail addresses and telephone/cellular phone numbers of the BSCS graduates of batches 2016-2019 were obtained from the Quality Assurance Office.

Data Gathering Procedure

The researcher created a group chat (GC) in Facebook Messenger to inform the alumni of latest developments in their alma mater and to discuss the relevance of a tracer study. A link was then sent for the inputting of tracing details of the alumni.

Data Analysis

Data were classified, tabulated, and ranked for analysis. Statistical tools were used in the interpretation of data that were acquired from the survey. Frequency and percentage for employment data; weighted mean and rank for work related values.

A scale of 1 to 5 will be used with 1 as the lowest and 5 as the highest. The responses will be given equivalent weights and corresponding verbal description as follows:

Weight	Scale Range	Verbal Interpretation
5	4.50-5.00	Very Relevant
4	3.50-4.49	Relevant
3	2.50-3.49	Moderately Relevant
2	1.50-2.49	Slightly Relevant
1	1.00-1.49	Not Relevant

Ethical Consideration

No pressure or intimidation whatsoever to answer the tracer questionnaire was imparted to the respondents. Full consent was obtained from the participants prior to the study. Respondents were informed of the objectives

Table 2.
Employment Data

Are you presently employed?	Frequency	Percentage (%)
YES	48	71%
Present Employment Status		
Regular or Permanent	37	77%
Contractual	9	19%
Self-employed	2	4%
Nature of Employment		
Gainfully Employed	46	96%
Self-employed	2	4%
Reasons for Staying on the Job		
Salaries & Benefits	16	33%
Career Challenge	18	38%
Related to Special Skill	13	27%
Related to Course or Program of Study	12	25%
Proximity to Residence	8	17%
Peer Influence	8	17%
Family Influence	10	21%
How long did it take you to land your first job?		
Less than a Month	6	12.5%
1 to 6 Months	31	65%
7 to 11 Months	2	4%
1 year to less than 2 years	6	12.5%
2 years to less than 3 years	2	4%
3 years to less than 4 years	1	2%
What were your reasons for accepting the job?		
Salaries and Benefits	28	58%
Career Challenge	13	27%
Related to Special Skills	3	6%
Proximity to Residence	4	8%
How long before you found your current/present job?		
Less than a month	15	31%
1 to 6 months	23	48%
7 to 11 months	5	10%
1 year to less than 2 years	3	6%
2 years to less than 3 years	2	4%
What competencies learned in college did you find very useful in your first job?		
Communication Skills	44	92%
Human Relations Skills	29	60%
Entrepreneurial Skills	20	42%
Information Technology Skills	43	90%
Problem Solving Skills	37	77%
Critical Thinking Skills	26	54%
Course Related Skills	19	40%

Table 2 presents the employment data of respondents. Results show that 48 of the 68 (71%) traced alumni are employed. Majority (37 or 77%) of the employed are in a Regular or Permanent work status, 9 are Contractual and 2 are Self-Employed. 46 of the 48 alumni are Gainfully Employed and 2 are Self-Employed. 24 of the 92 (26.08%) graduates were not able to accomplish the questionnaire. Reasons for this probably are: (1) contact information not active/valid anymore (2) some of the respondents were too busy at the time (3) some do not care at all. Thus, only the 68 out of the 92 (73.91%) graduates were used as respondents of the study.

Graduates of the BSCS program are qualified for employment in various sectors of the business industry. The advent of computerization, the use of computers and

its processes enable BSCS graduates to acquire jobs from a greater number of business categories. 18 or 38% stayed on their jobs due to the challenge of the career. 16 or 33% stayed due to salaries and benefits. 13 or 27% stayed due the special skill that the job requires. Computer Science is a hard discipline to learn because of the program’s constructive nature. One needs to be motivated and devoted to the craft. Computer Science is a challenging career since it deals with a great degree of problem-solving skills and logical analysis. One should also possess the knowledge and skills to develop computerized systems, mobile applications, computer games, web sites, etc [11]. A Computer Science graduate is an artist whose canvas may be a smartphone or PC display and whose paints and brushes are programming languages and development environments. In the United States, the Bureau of Labor Statistics expects Computer & Information Technology (IT) jobs to grow 12% by 2028. In Australia, the number of Software and Application Programmers is expected to grow from 121,300 to 146,800 by 2023. Immigration.ca, states that “qualified Software Engineers are being hired by Canadian employers as quickly as they become available.” In the Philippines, the average salary for a computer programmer is ₱200,219. For a systems analyst it is ₱481,392 [12].

Computer Science students do well in terms of getting full-time employment after graduation. In the case of BSCS graduates of batches 2016-2019, 31 or 65% were able to acquire a job 1-6 months after graduation. Based on the 2017 statistics, code.org announced that there were nearly 500,000 computing job openings in the United States, and fewer than 64,000 Computer Science students graduated into the workforce [13]. Employment in computer and information technology occupations is projected to grow 11 percent from 2019 to 2029, much faster than the average for all occupations. These occupations are projected to add about 531,200 new jobs. Demand for these workers will stem from greater emphasis on cloud computing, the collection and storage of big data, and information security [14]. For the BSCS graduates’ first job – their major reason for staying is due to salaries and benefits (58%) with career challenge (27%) only secondary. 48% were able to acquire their first job 1-6 months after graduation.

For the competencies learned in college that the alumni found to be useful in their line of work, 44 or 92% considered “Communication Skills” and 43 or 90% chose “Information Technology Skills”. Oral communication skills are crucial, and candidates are

expected to improve this soft skills proficiency in order to gain a competitive advantage in the job market. The efficacy of interpersonal communication contributes significantly to improved workforce performance and overall organizational productivity. It increases the number of positions available for hire, allowing for speedy advancement [15]. Changing work practices have increased demands for information technology (IT) skills within non-IT professions. Many employers want experience in desktop publishing, spreadsheets, and Internet skills, in addition to the 'traditional' areas of file management, word processing and databases [16]. “Information Technology Skills” rank closely with “Communication Skills” since Computer Science graduates’ specializations are categorized under such. Respondents ranked “Course-Related Skills” as the least among learned competencies useful in their first job. Compared to other skills mentioned in the employed GTS, the term “Course-Related Skills” tends to be vague and mostly referring to a general idea. Most survey forms/questionnaire for tracer studies included the following skills only – Communication Skills, Human-Relations Skills, Entrepreneurial Skills, Information Technology Skills, Problem Solving and Critical Thinking Skills.

Table 3.
Work-Related Values Gained

Work-Related Values	Weighted Mean	Verbal Interpretation	Rank
1. Love for God	4.12	Relevant	6
2. Honesty and Love for Truth	4.00	Relevant	7
3. Punctuality	4.18	Relevant	5
4. Obedience to Superior	4.52	Very Relevant	3
5. Perseverance and Hard Work	4.88	Very Relevant	1
6. Creativity and Innovativeness	3.98	Relevant	8
7. Courage	4.72	Very Relevant	2
8. Professional Integrity	3.84	Relevant	10
9. Love for Co-workers and Others	3.67	Relevant	11
10. Unity	3.38	Moderately Relevant	16
11. Fairness and Justice	3.45	Moderately Relevant	15
12. Leadership	3.56	Relevant	12
13. Tolerance	3.50	Relevant	13
14. Efficiency	3.47	Moderately Relevant	14
15. Supportiveness	3.85	Relevant	9
16. Perseverance	4.49	Relevant	4
17. Nationalism	3.24	Moderately Relevant	17
Composite Mean	3.93	Relevant	

Legend: 4.50 – 5.00 = Very Relevant; 3.50 – 4.49 = Relevant; 2.50 – 3.49 = Moderately Relevant; 1.50 – 2.49 = Slightly Relevant; 1.00 – 1.49 = Not Relevant

Table 3 presents the work-related values gained. Results show that “Perseverance and Hard Work” with a weighted mean of 4.88 is very relevant to the work ethic required from the alumni. Secondary is “Courage” with a weighted mean of 4.72 followed by “Obedience to Superior” with a weighted mean of 4.52. Society does not always recognize the virtue of working hard. Making a difference requires dedication. History shows when it comes to success, it is perseverance and a good work ethic that counts. Many people got where they are not because they were the most talented, but because they did

not give up. These people changed the world [17]. Courage is considered as very relevant to job placement. Being efficient and possessing courage to speak up and answer questions indicates competence to handle the challenge of meeting the requirements and responsibilities of the position. “Obedience to Superior” indicates understanding clear instructions. Following directions is important primarily to those beginning to learn the task and adopting to new environment [18].

“Fairness and Justice” with a weighted mean of 3.45, “Unity” with a weighted mean of 3.38 and “Nationalism” with a weighted mean of 3.24 are the three lowest ranking with a verbal interpretation of “Relevant”. An aspect of quality in higher education is the quality of the outcomes achieved. Higher education adds value by developing job-related skills and competencies [19]. Nationalism is not considered as a work-related value since most of the respondents are working in private companies and industries. Within Europe, and, indeed, globally, for many people a renewed significance is being attached to their national identities. Although ongoing tendencies of re-nationalization and national protectionism are observable in many countries worldwide, management research and organization studies have largely overlooked this phenomenon until now. While previous research on origin-based exclusion in the workplace has primarily focused on “culture” and “race”, work-related research tends to center on the political concept of “nationality” [20].

The “economic miracle” of South Korea has been well documented by many scholars, but most studies have focused on the cooperative relations between the state and entrepreneurial elites. To date there has been no comprehensive sociological study as to how workers in South Korea were “ideologically” mobilized and motivated to commit their labor power to the process of industrialization. To redress the imbalance, the article written by Kim et al. [21] offers an analysis of the role of Confucianism and nationalism in the state-sponsored ideology of work in South Korea during its economic boom of the 1960s and 1970s. It is argued here that both the workers' voluntary participation in industrial work and the harmony in the workplace, which were two of the most essential factors in the nation's remarkable economic success during the 1960s and 1970s, were intimately linked to a new ideology of work and entrepreneurship which combined nationalism and pro-growth Confucian precepts. A composite mean of 3.93 which is verbally interpreted as “Relevant” indicates that work-values

acquired from the BSCS program of LPU-Batangas are relevant to employability and work ethics required from the graduates.

Table 4.
Proposed Action Plan to Enhance Relevance of Course Offerings of the BSCS Program

KEY RESULT AREAS	OBJECTIVES	STRATEGIES	PERSONS RESPONSIBLE	OUTCOMES
Employability	To be at par with the needs and requirements of the business sector.	Continuous monitoring and development of the BSCS Program Curriculum & Course Plan.	Dean, Department Chair, Professors	A highly relevant BSC program curriculum
	To produce intellectual and well-trained graduates ready to meet the demands of the cyber sector.	Continuous developmental trainings for faculty members / exposure to various developments in the IT industry.		Intellectual and well-trained BSCS graduates
		Continuous enhancement of students' communication skills through intensified instruction to boost confidence in both oral and written platforms.		

CONCLUSION AND RECOMMENDATION

Based on the findings of the study, the following conclusions are drawn: Majority were able to acquire a job 1-6 months after graduation and are employed in a regular or permanent work status. Graduates are qualified for employment in various sectors of the business industry and do well in terms of getting full-time employment after graduation. The university has productively attained its goal of developing manpower which provides leadership and skills in addressing the employment needs not only locally but in the international market as well. Respondents consider “Perseverance and Hard Work”, “Courage” and “Obedience to Superior” as top 3 choices for work-related values gained that are most relevant in their line of work. An action plan may be designed and implemented to continuously enhance the relevance of course offerings of the BSCS program, thus ensuring the high employability of its graduates.

Dean and the Department Chair may consistently seek the advice of the alumni regarding the latest software applications, trends and techniques being utilized by the industries to incorporate in the curriculum. The university may strengthen its job placement programs and send email/messages regarding job opportunities to unemployed graduates. To the LPU Management, it may continue to work together with industry professionals to equip future graduates with the

appropriate skills needed for success in the workplace. To the College of Computer Studies, students may be subjected to values formation seminars so that “Perseverance and Hard Work”, “Courage” and “Obedience to Superior” will be molded into their personalities. Relevant trainings may be provided so as teachers will be guided on the integration of these values to students. To the College of Computer Studies and future researchers, it is recommended that a tracer study of its graduates be conducted annually to determine possible curriculum and syllabi enhancements to reflect only relevant and updated information. To the LPU Management, the proposed action plan may be implemented and evaluated for further utilization of the results of this study.

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