

TRACER STUDY OF BS COMPUTER ENGINEERING
GRADUATES OF LYCEUM OF THE PHILIPPINES
UNIVERSITY

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ABSTRACT

This tracer study is intended to assess the present employment status of the Computer Engineering graduates and the relevance of curriculum, knowledge, skills, work values and school related factors to their job placement. Descriptive type of research method was used in the study with 175 computer engineering graduates served as respondents. Results showed that majority of the Computer Engineering graduates are gainfully employed with present positions related to course completed and had obtained their first job within 1 to 6 months in local manufacturing firms as walk in applicants. Mathematics is considered the most relevant among the general education subjects and Microsoft Office Application, Computer Troubleshooting/ Maintenance and Computer Programming are the three most relevant professional subjects to their present employment. Information Technology and communication skills were deemed to be the most useful competencies learned by the graduates from LPU and the work related values such as perseverance and hard work have also greatly contributed to their job placement.

Keywords: Computer Engineering, Employability, Work Values, Curriculum, Information Technology

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Introduction

Academic institutions of higher learning are constantly generating graduates who are capable of applying technology and knowledge-based information to the nature and demands of their work environment. The demand in computer knowledge prompted the Lyceum of the Philippines University to offer Computer Engineering program in 1996 to provide education that is beyond the basic learning as well as experiences in computer to the technologically inclined youth of Batangas and other neighboring towns in the region.

Computer Engineering is a five-year course which begins with the two-year general engineering curriculum, which is a necessary foundation of the student in preparation for professional work. It covers subjects that are heavy on the basics of computer science, hardware and software to give the students the proficiency as well as confidence with the computer. It provides the background of concepts and methodologies that are fundamental to the analysis, design and utilization of systems concerned with the process of computation, communication and control or combinations thereof [1].

The Computer Engineering program provides a student the ability to apply his academic and technical know-how in real life situations. At the end of the course, the students should have the capability to initiate within himself any endeavor that would promote social, economic and financial significance to the country and the appreciation of the role of computer engineers for national development [1].

As a response to the needs of professional education in computer engineering, society and industries, academic institutions must provide an updated curriculum; modern facilities and equipment; efficient student services; responsive organization and administration; and educators must possess effective teaching techniques and strategies to ensure and maximize the learning of the students. Graduates had that much opportunity to develop their employability skills like communication, leadership and problem solving [2] from the university. The concept of employability requires focusing on four main dimensions: the dimension relating to the skills and competences that make an individual potentially employable, that focused on the motivation to find a job, the one

related to social, economic and cultural determining factors, and the last dimension comprising the diverse effects on work-related, personal, economic, health-related and unemployment effects. [3]

Values education in engineering is an effective way to sow the seeds of humanity in the young brains in order to enable them to grow as real professionals and multifaceted personalities who could live meaningful lives and serve the long run interests of mankind in general [4]. Therefore, developing the work values and other skills of the students plays a vital role in reshaping the character of the graduates. Identifying its great contribution to their employment would also guide the College on how to integrate values aside from skills in the curriculum. Competitive graduates in the job market often depend on strong curriculum of the program [5].

The results of this study contributed to the improvement of the college, in such a manner that it will be more responsive to the needs of its public and community. Its effectiveness should be monitored periodically to ensure its continued relevance. The competence of the school program can be gauged by the occupational opportunities presented to the graduates, their present positions and the nature of the jobs they obtained immediately after graduation.

This tracer study intended to assess the relevance of the BSCoE curriculum, knowledge and skills acquired by the graduates for their employment; identify the personal and professional characteristics and job placement of the Computer Engineering graduates and the school-related factors associated with their employment. Because it is a part of the mission of Lyceum of the Philippines University in Batangas City through College of Engineering to provide the students an equal and appropriate application of knowledge and skills that will be well-suited to the graduates' future employment. The findings of the study will serve as the bases for the researchers to improve, update or enhance the Computer Engineering curriculum to make it more responsive to the needs of the industries.

Materials and Method

This tracer study used the descriptive research design and total population of the graduates as respondents. There were 194 Computer Engineering Graduates from 2005 to 2009 but only 175

responded in the given survey questionnaires and 90 percent retrieval rating was obtained. Questionnaire was the main instrument used in this study. The questionnaire consists of four parts: respondents' profile, job placement of the respondents and relevance of school related factors to the job placement of the respondents, skills developed by LPU and work – related values.

The Lyceum Research Center provided the survey questionnaire to be used for this study. This research focused on the relevance of curriculum, faculty, instruction and laboratories to the job placement of the respondents because these are the variables revealed with somehow significant relevance to their job placement. The skills developed by LPU and work-related values are also being looked into by the use of researcher-made questions. The questionnaire was validated by the research experts and Research Director of Lyceum of the Philippines University. The researchers used electronic mail or e-mail in sending the questionnaires. It was the most convenient and fastest way of sending notes, letters and messages through Internet. Most of the graduate respondents were using computers in their offices or companies which meant that it was easier to communicate with them in asking their participation as respondents of the study. Percentage, weighted and rank were the statistical tools used in the study.

Results and Discussion

There are 140 or 80 percent presently employed Computer Engineering graduates from 2005 – 2009 out of 175 surveyed respondents from the time of data gathering. Twenty (25) respondents or 14 percent are not presently employed while 10 respondents or 6 percent are never employed since their graduation due to their family concerns which decided them not to find a job with 10 respondents or 29 percent, followed by no job opportunity and lack of work experience with 8 respondents each.

Information is costly, which means that finding a job always takes time. There are always some people moving out of their parents' home, looking for their first job, getting out of the military, or finishing school. Those people will be unemployed for a while they are searching for a job and there's no way to prevent it. According to reference [6], that's the natural rate of unemployment. Additionally, if a person looks for a job, but discovers his skills don't match

what employers are looking for and stops his job search to get retrained, it is considered as structural unemployment. Five (5) of them or 14 percent, did not look for a job while advance or further study and health-related reason are the causes of the four (4) presently unemployed graduates. However, the result signifies that majority Computer Engineering graduates of Lyceum of the Philippines University in Batangas City are employable because of the Information Technology skills, knowledge and right work values possessed by the graduates. The result of this employability is also relevant to the linkages with other institutions and On-the-Job Training. For the status of 140 presently employed graduates, 97 graduates or 69 percent already attained their regular or permanent status while 38 of them or 27 percent are still contractual, two (2) respondents are temporary and 3 respondents are self-employed.

In terms of nature of employment, 96 or 69 percent of the surveyed graduates are gainfully employed which means they are enjoying the regular status or full time job and their job held is related to technology and computer engineering. Forty-one (41) of the graduates or 29 percent are underemployed wherein their jobs are not related to their field of specialization while 3 respondents or 2 percent are self employed which means that they are working for oneself maybe from one's own profession or business.

Present occupation of the Computer Engineering Graduates Based on the Philippine Standard Occupational Classification

Almost one-third of the surveyed graduates are employed as professionals in manufacturing and communication while 26 percent are Technicians and Associate Professionals, 12 or 9 percent are Plant and machine Operators and Assemblers, Laborers and Unskilled Workers, 7 percent are Officials of Government and Special-Interest Organizations, Corporate Executives, Managers, Managing Proprietors and Supervisors, another 7 percent are working as Clerks.

The least number of respondents are working as Trades and Related Workers, with Special Occupation and Service Workers and Shop and Market Sales Workers. Business firms need a lot of computer literates to operate their business well. Being computer literate is to know

how the computer functions and operates. As of 2005, people having basic computer skills are considered very important assets in developed countries [7]. Computer literacy helps to increase workers value especially when they are trained at a higher level of computer skills such as programming, web development, hardware maintenance, program development, database management, network administration, and many other related skills.

Graduates' Place of work, major line of company business where the Graduates are Employed, first job after college and reasons for staying on the job

Majority of the graduates are employed in manufacturing industries, Transport Storage and Communication, and others are working in other community, social and personal service activities, and engaged in the construction firm. It is not surprising to note that majority of the BS Computer Engineering graduates are employed in manufacturing firms because this is where they were trained. Technical skills in computer are necessary to operate high powered machines. Communication companies are also suited for computer engineers.

Majority of the Computer Engineering graduates with 81 percent are employed locally while 19 percent are employed abroad. Sixty – one respondents or 44 percent answered that their current job is also their first job after graduation while 70 or 50 percent of the respondents said that this is not their first job. Some manufacturing firms only allow employees to stay at work for five months to minimize the number of their regular employees who would receive company benefits which have financial impact on the part of the employers.

Salaries and benefits is the foremost reason of the graduates for staying on the job followed by career challenge; the tasks they are engaged in are related to their special skill; related to course or program of study and proximity of their work place to residence. The least number of respondents answered peer and family influence are their reasons for staying on the job. Graduates are enjoying and they are gaining new knowledge and skills such as new computer programming languages, computer aided design software, new features of Windows Operating System and operation of Electronic equipment from their present job are the reasons specified by the least group of respondents.

Graduates' Length of Job Search and Reasons for Accepting the Job

Majority of the respondents with 81 or 49 percent acquired their first job within 1 to 6 months followed by 40 respondents or 24 percent with less than a month and 19 of them or 12 percent obtained their job within 7 to 11 months. Thirteen or 8 percent of the graduates got employed within 1 year to less than 2 years and the least percentage with 12 respondents or 7 percent acquired it within 2 to less than 3 years. Majority of the respondents who have searched their jobs for almost 2 years answered that while they are waiting for work abroad, they undergo first extensive trainings in Mechatronics and other short courses related to company safety in which the programs run for almost 6 months to one year plus couple of months for processing the application abroad. Challenging tasks make engineers move and motivate themselves to accept the job and work really hard to achieve their goal of receiving high salary, benefits, incentives and rewards from the company. The respondents were really trying their best effort to keep their pockets full right after graduation. They do not want to stay longer unemployed due to costly daily expenses as indicated by the length of their job search of 1 to 6 months.

Career challenge deemed to be the foremost reason of the respondents for accepting the job followed by salaries and benefits and their job is related to special skills they possessed. Engineers are mostly liked to be challenged due to the nature of the challenging subjects they took in college like several mathematics subjects with natural and physical science applications. Their experiences as students mould them to be inspired and motivated to think logically and critically to make a substantial output from the problems presented to them during class discussions. These characteristics shaped their attitude that needs to be challenged professionally.

Graduates' length and means of job searching

The graduate-respondents acquired their first jobs as walk-in applicants according to 36 percent of the respondents followed by recommended by someone and information from friends with 25 percent and 13 percent, respectively. Nine (9) percent answered that they responded to

advertisements while 6 percent obtained their job through family business and another 6 percent were products of Job Fair or Public Employment Service while few of the graduates were absorbed as employees from their OJT and products of school's job placement arrangement.

More than one-third of the graduate-respondents obtained their current job for almost 1 to 6 months followed by 7 to 11 months according to 31 percent and 14 percent obtained their jobs for less than a month while 9 percent and 4 percent answered 1 year to less than 2 years and 3 years to less than 4 years, respectively. Only 4 percent have obtained their present job for 2 years to less than 3 years. It is worthy to note that after graduation, the respondents were already trying to start their career by looking for possible jobs within 6 months to 11 months. This is because they really wanted to apply what they have learned from the university and reap the fruit of their labor. While there are only few of them have searched for possible job within the span of more than two years which most of them reasoned out that family concerns are the major cause of unemployment.

Graduates' Job Level Position and Initial Gross Monthly Earnings

For the job level position of the respondents on their first job, 47 percent obtained rank or clerical position followed by professional, technical or supervisory with 41 percent while 4 percent of them were self-employed. In terms of their job level position for their present job, 58 percent of the respondents acquired professional, technical or supervisory position while 30 percent with rank and clerical and 3 percent are self-employed. Nobody entered with managerial or executive position in the first and present jobs of the graduates due to their least accumulated number of years work experience related in the field of computer, IT and engineering. Since this study covered the graduates from 2005 – 2009 wherein majority of them have less than 5 years of experience because of at least 6 months duration of their job search. Most of the managers are required to have at least 5 years in their field of specialization. Majority of the respondents in terms of their present job have professional or supervisory positions because of their previous company experience which provide them an edge to have higher position.

Majority of the respondents or 36 percent have initial Gross Monthly Earning in the First Job ranging from Php10,000.00 to less than Php15,000.00 followed by the 29 percent receiving Php5,000.00 to less than Php10,000.00 and 15 percent having P15,000.00 to less than P20,000.00. The least number of respondents are receiving below Php5,000 with 7 percent while 4 percent are receiving P 20,000.00 to less than P25,000.00. It is really a good start for the majority of the respondents to earn more than Php10,000.00 in a month with professional, technical or supervisory position and also some of the clerical positions also earned within the same salary bracket. Nobody among the graduates is earning more than P25,000.00 per month due to length of their company service as employees.

Graduates' Competencies learned in college that they find very useful in their first job

According to 70 percent of the respondents, Information technology skills deemed to be the most useful competencies learned by the graduates from LPU in their first job followed by communication skills and problem solving skills with 59 percent and 55 percent of the total surveyed respondents, respectively. Information technology skill is very useful to their employment according to the graduates because this is very important to make the business profitable. The ability to keep up with the competition in regards to information technology training is vital to a company's survival. Slow business operations, inadequate trained employees, and dissatisfied customers can be the consequences of outdated knowledge in information management systems [8].

Communication skills are very useful in the dynamic business world today, communication skills can make the difference between business success and business failure. Today's global marketplace is a market of many cultures, languages, customs and traditions. Businesses both large and small are conducting massive numbers of sales with economic powerhouses on the Internet as well as the sales office every day. The importance of good customer service and good communication skills will continue to be the hallmark of companies that succeed instead of fail [9].

Almost half of them considered problem solving skills to be one of the useful competencies learned in college as well as critical thinking skills. These are being utilized by the

respondents in answering the demands and challenges of the day-to-day activities on their respective work places. It is always necessary to develop these skills to boost their self-confidence and resourcefulness that would make them successful in dealing and giving answers to company problems.

Half of the surveyed respondents answered that human relation skills also found useful in their first job. A favorable peer relationship underscores the importance of camaraderie that brings about harmonious interactions among co-workers and immediate superiors in a work environment which also built upon a solid rock of openness and trust, active cooperation and healthy interdependence, and tested over a period of time of commitment and accountability [10]. However, entrepreneurship skill was considered the least useful among the listed indicators because this was not emphasized in the old curriculum of BS Computer Engineering. Therefore, it is suggested to include Entrepreneurship in the new curriculum of BS Computer Engineering.

Work – related values contributed in meeting the demands of the present employment of the graduates

The respondents considered the following work-related values with very much contribution to their replacement are: perseverance and hard work, honesty and love for truth, love for God, professional integrity, supportiveness, punctuality, efficiency and courage. Perseverance is important in the continuity of regular tasks or ideas in spite of several complications or difficulties. It is being able to bear difficulties calmly without complaint. It is a commitment, endurance, patient and hard work. In other words if happiness ranks superior than wealth, a person should not persist in making money in many ways which may become the reason for personal unhappiness [11].

Employed graduates are now getting involved in an environment which needs hard working professionals who are committed to serve the company whatever policy or condition might the employers have. Perseverance or determination of the graduates to reach their dreams served as their strong foundation and stepping stone to get employed and earn a living not only for themselves but also for their family. For these graduates, hard work and perseverance are two

important work values that should possess by the future computer engineers along with the other values mentioned. It is one of the core values being instilled by the LPU professors to their students which significantly contribute to the future employment of the graduates.

Obedience of the students to their professors helped them build a strong character of complying with the requirements and demands of their immediate superiors. Unity of their ideas to keep their team working is another mind-setting which let them prove that they are really qualified in the position while their creativity and innovativeness brought them up to stand out among the employees who have the necessary skills but never discovered their talents, ingenuity and resourcefulness. Loving is also showing their care for co-workers through giving their words of concern and sympathy while their leadership always takes them to become winners.

Fairness and justice, tolerance and nationalism were considered the least work-related values which contributed much to their job placement. They can't find nationalism as very important to their job placement because most of them are employed in private companies and industries. The work – related values of the respondents were contributed much to their job placement.

Relevance of the Curriculum to the Job Placement of Graduates

Mathematics is considered the most relevant to their job placement among the general education subjects followed by languages and natural sciences Likewise, Mathematical thinking is a very significant factor in a modern society as a habit of mind for its usage at the workplace, business and finance; and for personal decision-making. Mathematics is essential for the prosperity of a nation in providing devices for comprehending science, engineering, technology and other related subjects. It is a very important tool in public decision-making and for involvement in the knowledge economy. Mathematics provides students with great and powerful ways to describe analyze and transform the world. It has the power to create moments of pleasure and wonder for all students when they solve a problem for the very first time, discover a better solution, or observe hidden links [12].

Languages come next after mathematics in terms of its relevance to the job placement because communication skill is indeed necessary to make the employers believe that they really possessed the right qualifications the company is in need of. Likewise, science subjects are considered slightly relevant because of the nature of the task of the graduates in manufacturing industries which do not directly require much of physical and natural science applications.

Microsoft Office Application is the most relevant and useful to the job placement of the respondents followed by Computer Troubleshooting/ Maintenance, Computer Programming, Data Communications/CISCO Networking and Computer System Architecture. Microsoft office application is no doubt one of the most useful programs in all Windows Application and everybody must be kept abreast with the new innovation being done by Microsoft. Simple word processing, power point presentation and use of spreadsheet must be taught to the students with mastery because all business correspondence and reports of companies used these applications. Therefore, the students enrolled in Introduction to Information Technology must be given enough time to spend in laboratory to further enhance their skills in using these basic applications.

Meanwhile, Engineering Management, Control Systems, Software Engineering/ Development and Electronics/Electricity were also perceived to be relevant. Microprocessor System, Engineering Economy and Logic Circuit and Switching Theory were considered the least relevant to their job placement. Logic Circuit and Switching Theory is considered the least because of the nature of the tasks performed by the respondents do not directly require them to apply this subject but unconsciously, this logic circuit and switching theory is also part of their everyday operation of the machines.

Proposed Program

The proposed program focused on developing the students' capability to obtain jobs related to Computer Engineering. The College of Engineering is strengthening its programs of curricular offerings and activities to meet the standard of growing industries of engineering and technology. With the support of faculty members and administration, the proposed program

would be realized to further enhance the employability and productivity of the Computer Engineering graduates.

The proposed program aimed to enhance the computer programming and troubleshooting skills of the students through getting them involved in seminars and workshops on Java, Visual FoxPro and SQL programming languages as well as web development seminars.

Curriculum developers of the college also encouraged to integrate Methods of Research in the existing curriculum of Computer Engineering especially in Software Engineering subject. It is also suggested to incorporate Adobe Photoshop, Pagemaker, and other business subjects like marketing or entrepreneurship in the curriculum to have them at least idea on how to put up their own business after graduation because only few graduates are engaging into business while applying their skills and knowledge they learned from engineering.

The program also aimed to improve the teaching strategies and development of personal and professional quality of the teachers through the aid of faculty development seminars conducted by the university and the department; and finishing graduate studies. Continuing satisfaction of the students through faculty consultation hour, availability of computer books and magazines and other engineering related readings in the library and installation of updated computer programs in the laboratories are also suggested in the program.

Continuing enrichment of relationship between the administration and students is also included in the proposal. Enhancing the research and community extension awareness of the student are also the focused of the program through allowing the students to participate more often in the community extension projects of the department and allowing them to join the research festival of the university and participate in the seminars being conducted by the Research Center.

Development of the work values and skills of the students would also be enhanced through attending leadership trainings and national youth conferences. Students must be given time to search job opportunities using the internet and job data bases. On-the-job trainings of the

students must be related to the course being completed to answer their needs of unemployment due to lack of work experience. Sustaining and enhancing the employability rating of the graduates through conducting pre – employment examination and interview, attending job expo would also help the students find their way going to the top of the corporate ladder by strengthening their foundation during college.

Conclusion and Recommendation

The employment rate of Computer Engineering from 2005 – 2009 of LPU is considered employable and this study aimed to propose a program that would enhance the future employment ratings of its graduates. In this way, the College of Engineering must strengthen their services and focus on the quality of instruction with the support of research and community extension.

The Department Chairman of Computer Engineering must regularly update once a year the status of their graduates and ask for possible curriculum enhancement programs they could offer to the College. Students must learn to be motivated to work hard and persevere to whatever task and project assigned to them to develop their sense of responsibility and leadership. Computer Engineering students should attend supplemental oral and written communication trainings to enhance their social interactions with all levels of professional community. Work skills and values of the engineering students must be further emphasized in the application of the curriculum. Faculty Members teaching Mathematics must develop the students' habit of solving major problems related to real life situations that would also enhance their way of solving life's problem through applying critical and logical thinking.

Understanding and appreciation of natural science subjects must be strengthened by the General Education Faculty Members in order to apply this knowledge in scientific research and development of companies through involving the engineering graduates in scientific research seminar or developing a research project that would stimulate their interest to engage in discovering new facts. LPU Alumni Office must reinforce its linkages with manufacturing industries for them to join the Job Expo being conducted by the University before the school year ends. The proposed program must be tried and implemented.

References

- [1] College of Engineering Brochure (2010), "Program Objectives", Lyceum of the Philippines University, Batangas City.
- [2] Othman, H., Buntat, Y., Sulaiman, A., Salleh, B.M., Herawan, T. (2010). Applied Mathematics cans Enhance Employability Skills Through PBL, *Procedia Social and Behavioral Sciences*, 8: 332–337.
- [3] Rivera, M. D. A. Gallego, L. V., Álvarez, M.A., Inchaurtieta, A. M. Albizuri, I.E., de Eulate, C. Y. Á. (2012). Perceived Employability and Competence Development, *Procedia - Social and Behavioral Sciences*, 69(24), 1191-1197
- [4] Kapadia, P.V & Joshi, B. M. (2008), 'Value education in Engineering Curricula: An urgent need', *International Conference of Ethics and Human Values in Engineering (ECEHVE)*.
- [5] Ahmad, K. Zainal, N.F.A., Idris, S. & Rahmat, M. (2011). Relationship between employability and program outcomes achievement, *Procedia - Social and Behavioral Sciences*, 59 : 254 – 263, doi: 10.1016/j.sbspro.2012.09.273
- [6] Bromley, Ray (2007), "Why we have unemployment", url: <http://www.raybromley.com/notes/unemployment.html>, date retrieved: October 24, 2010.
- [7] Why is Computer Literacy important? url: <http://www.knowswwhy.com/why-is-computer-literacy-important/> date retrieved: October 23, 2010.
- [8] Glenn, S. (n.d), Importance of Training in Information Technology, available online: http://www.ehow.com/about_6116188_importance-training-information-technology.html
- [9] Jock, F. (2010). The importance of communication skills in businesses, available online: <http://www.helium.com/items/1224659-communications-skills-in-business>.
- [10] Carballo, Leni R., (2003), *Keeping in Touch: A Workbook in Human Relations Development*, Manila.
- [11] Campbell, Stephen (2007), "Importance of Perseverance", <http://www.articlesbase.com/self-improvement-articles/importance-of-perseverance-255488.html>, date retrieved: October 25, 2010.
- [12] Fleming, Michelle (2010), "Importance Of Mathematics", <http://www.articlezones.com/society/education/importance-of-mathematics.html>, date retrieved: October 22, 2010.