



Tracer Study of Bs in Mathematics Graduates (2001 – 2015) of the College of Science, University of Eastern Philippines

Mary Jane B. Calpa^{1,2}, Ida E. Esquierdo^{1,2} and Olga D. Unay^{1,2*}

¹Department of Mathematics, College of Science, Philippines.

²University Research and Development Services, University of Eastern Philippines, University Town, Catarman, Northern Samar 6400, Philippines.

Authors' contributions

This work was carried out in collaboration among all authors. Author ODU designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author IEE managed the analyses of the study and author MJBC managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/ARJOM/2021/v17i1130263

Editor(s):

(1) Dr. Nikolaos D. Bagis, Aristotle University of Thessaloniki, Greece.

Reviewers:

(1) Eman Hassan Ouda, University of Technology, Iraq.

(2) Sumaira Saleem Akhtar, Abbottabad University of Science and Technology, Pakistan.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/65385>

Received: 02 December 2020

Accepted: 07 February 2021

Published: 23 February 2021

Original Research Article

Abstract

A descriptive research was conducted to trace the whereabouts of the graduates of Bachelor of Science in Mathematics of the College of Science, University of Eastern Philippines. The study determined the employability of the graduates from the first batch of 2001 up to 2015. It determined the graduates who are employed whether related or not to their course; what type of jobs they have; what kind of skills they learned; and how much they earned from their jobs. Majority of the respondents are gainfully employed. Most of them are on contractual basis and are working in the Philippines. From the 110 graduates, 91 are employed while no data were gathered for the 19 graduates. Majority are professionals working as teachers in the secondary and tertiary level. Problem solving skills is most useful in their personal and professional growth. The teacher-student relationship is most rated that contributes to the degree they finished at the College of Science.

Keywords: BS mathematics graduates; employability; tracer.

*Corresponding author: E-mail: ounay2873@gmail.com;

1 Introduction

Tracer study is an approach which is widely being used in most organization especially in the educational institution to track and to keep record of their students once they have graduated from the institution. Its aim is to evaluate one's progress up to the time s/he gets a job. This study assessed the availability and quality of graduates. It is developed to answer the change in industry and corporate world by integrating the objectives of the higher education institutions with the labor market. It constitutes an important tool for educational planners, as they can provide valuable information for evaluating the results of the higher education and training institutions. This information may be used for minimizing any possible deficits in a given educational program in terms of content, delivery and relevance and for further development of the institution in the context of quality assurance. The tracer study will benefit every institution most because it will help them to know what the status of their products is after graduating from their institution.

According to Harald Schomburg, tracer study is defined as study to trace graduates of higher education institute. "*Graduate Surveys*", "*Alumni Researches*", "*Graduate career tracking*" or "*Follow-up Study*" are the other terms for it. Instead of just evaluating the length of study, length of thesis writing time, GPA, and waiting time until the first job is obtained, this study assesses the availability and quality of graduates. It traces what field the graduates work -match/mismatch, graduates' first income - among the indicators of the graduates' quality, and the most important: stakeholder perception about the graduates. It also traces what competencies graduates use most in their work so it can provide information for evaluation of higher education (curriculum improvement, for instance). The keyword for the result of this study is "benchmarking according the needs of the universities – not rankings" [1].

Graduate tracer studies are one form of empirical study that can appropriately provide valuable information for evaluating the results of the education and training of a specific institution of higher education. It can collect essential information concerning the employment profile of graduates, their undergraduate experience, the first and current jobs of graduates, and the relevance of their educational background and skills required in their job. Graduate tracer study can also collect data on the relevance of the curriculum and graduates' level of satisfaction of their academic preparation [2].

Mubuuke, A., Businge, F. and Kiguli-Malwadde (2014 as cited in Kalaw, 2019) noted that tracer surveys are studies that gather feedback from graduates of an educational institution to monitor their achievements and progress in their career and give policy bodies' vital information on key issues [3]. The general objective of tracer surveys is to evaluate medium to long-term impact of education programmes. More concrete objectives include improving the education and training content and study conditions, improving the transition of graduates from education to the labour market, and to better matching the supply of skills with the demand for them [4].

After 15 years a new type of tracer study emerged: more individual institutions of education are conducting tracer studies, sometimes in close cooperation with other institutions of education (network approach). Feedback for curriculum development and other aspects of improving study conditions and provisions is often the most important aspect of such institutional tracer studies. Information about job search, employment conditions and work are taken as signals of the labour market chances of graduates from different study programmes of special interest is the horizontal link between education and work [5].

In a developing nation like the Philippines, graduating in a higher education is mostly regarded as an investment and as a means of improving the status of an individual in the family. Filipino parents sacrifice a lot for the education of their children. Some parents especially the middle-income class in the society engage in loans, sometimes selling some of their properties and even engaging in debts. Working students are currently among the trends in Philippine education.

Employability of graduates is one of the measures of Higher Education Institutions to ensure that the quality of education they provide is suitable to the needs of the industry [6]. 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 [7].

Mathematics has been referred to as the Queen of the Sciences by Carl Friedrich Gauss, one of the most brilliant mathematicians of all time [8]. It is a universal discipline with a rich, diverse and dynamic theory that spans a wide range of applications. Mathematics was borne out of the need to systematically solve real problems. It continues to evolve today because the abstractions generated for solving these problems lead not only to their applications in everyday life but also to further expansions of the abstractions. Mathematics can be divided into two branches, pure and applied mathematics. Pure mathematics involves the study of structures, their components and the relationships among them. Applied mathematics relates mathematical knowledge to other disciplines. Consequently, the undergraduate major in mathematics and applied mathematics can be a vital and engaging part of the preparation for many careers and for a well-informed and responsive citizenship [9].

The Bachelor of Science in Mathematics Program was designed for students interested to study mathematics as a science of logical reasoning. The program serves as a training ground for students to develop problem-solving skills, and to have a solid foundation in mathematics and its application in the different fields such as industry and research. Moreover, it was envisioned to produce competent professionals in the academe, government, and the corporate world with high level of analytical and logical abilities.

The objectives of the Program reflect the goal of the College of Science of producing competent graduates imbued with the scientific attitudes, are able to think critically and systematically, and promote the advancement of science and technology through research. It should be noted that all activities inside and out of the classroom are anchored on these objectives.

To achieve the same, the curriculum adheres to the Policies, Standards, and Guidelines (PSGs) for the BS Mathematics Program which is embodied in CHED Memorandum Order (CMO). To strengthen the curriculum, the students are required to conduct undergraduate research on topics that are in the research agenda of the College and are of interest to the student.

This study primarily determined the employability of the graduates of Bachelor of Science in Mathematics from 2001-2015. Specifically, it sought to determine the graduates who are employed whether related or not to their course, unemployed and under-employed graduates, occupational classification, how much they earn from their jobs, how long they were trying to get a job after graduation, and reasons for any time gap between obtaining their degree and their first employment. It also identified the rate of contribution of the program of study to the personal and professional growth of the graduates; and how would they rate the degree program they finished at the College of Science.

2 Materials and Methods

The tracer study used the descriptive research design. The respondents of the study were the 110 BS Math graduates from 2001 to 2015. A questionnaire was the main instrument, consisting of three parts: respondent's profile, employment information of the respondents, and the competencies learned that were useful to their personal and professional growth.

The tracer study questionnaire from the University of Santo Tomas Graduate School anchored by the CHED Graduate Tracer was used with a few revisions in order to fit to the BS Math graduates of the College of Science, University of Eastern Philippines.

Personal data such as names, addresses and phone numbers were gathered through the undergraduate theses' index and through social media. The researchers administered some of the questionnaire personally and others were sent through emails and Facebook messenger. The researchers also asked help from friends,

relatives, and currently enrolled BS Math students at the time of our data gathering for the personal delivery of the questionnaire.

The data were tabulated. Frequency counts, percentages, and weighted mean were used to determine the degree of competencies learned that were useful to them; and ranking was utilized to show the importance of the items used.

3 Results and Discussion

Majority of the respondents (91 or 83.00%) were employed. This can be indicative that the BS Math graduates can easily get a job. Thirty-six (36) or 40.00% are teachers. This is an evidence to show the importance of incorporating the 18 units of professional education subjects in the 2010 revised BS Math curriculum. There were 19 or 17.00% graduates whose data were not gathered. Majority (43.00%) of the respondents work on a contractual basis while 35.00% are on permanent status, and 5.00% are self-employed. Many think that the only career path available to graduates with bachelor's degree in Mathematics is that of a secondary high school teacher. While it's true that this degree can qualify for such career, there are many options available.

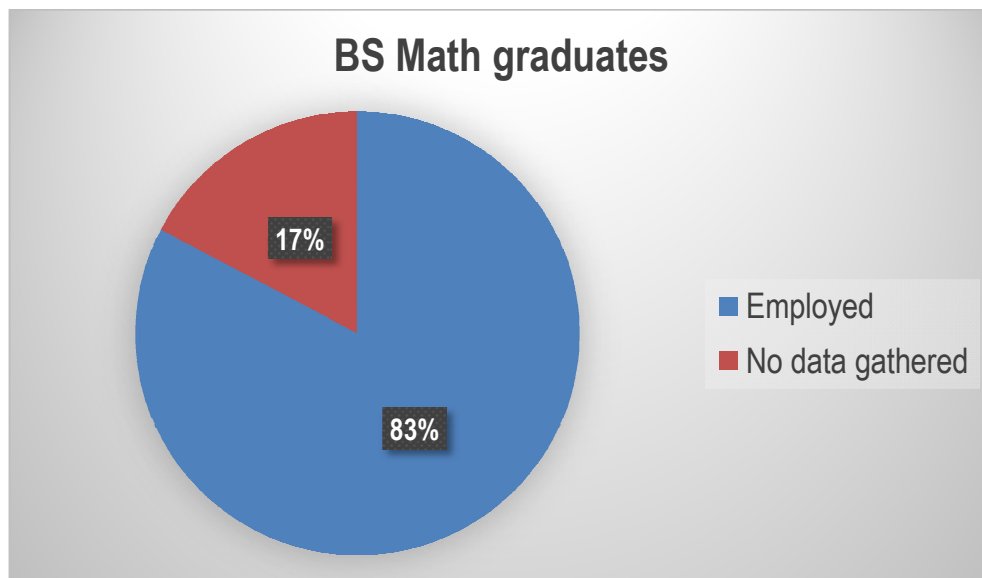


Fig. 1. Employability of BS Mathematics graduates

Majority (36 or 40.00%) of our respondents are all professionals, followed by being clerks. The least present occupation of the respondents is a trade or related worker wherein he is involved in selling glass supply. The demand of teachers today because of the K to 12 implementation means more opportunities for BS Math graduates to land a job as teachers.

A total of 84 or 92% of the graduates are working within the Philippines. The result implies that there is a demand for Mathematics graduates in the Philippines.

There were 43.00% BS Math graduates earning 10,000 to 20,000 pesos and 42.00% earning 21,000 to 30,000 pesos a month. Many jobs like teacher 1 or credit collection specialist in companies are earning within the range of 10,000 to 20,000 pesos.

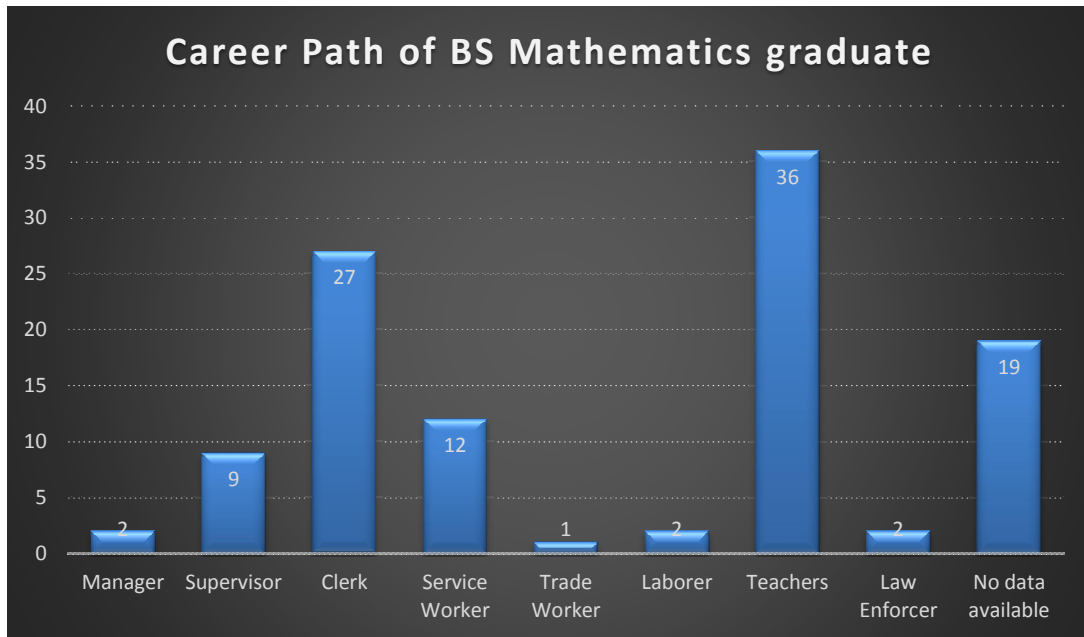


Fig. 2. Career Path of BS Mathematics graduate

There were 70.00% of the graduates whose work are related to their course while 13.00% are under employed. This is an implication that BS Math graduates have a wide range of job opportunities. The under employed considered in this study are the following jobs of the respondents: security guard, laborer and some clerical works in an office or company.

Most of them landed a job after 1 year to 2 years because they need to take the Licensure Examination for Teachers. They stayed on their first job as teachers because it is their field of specialization and they are financially stable.

Table 1. Rate the contribution of the program of your study at the college of science to personal and professional growth

Indicators	Weighted Mean	Rank
Academic Preparation	3.30	8
Research Capability	3.41	3
Learning Efficiency	3.77	2
Communication Skills	3.19	10
People Skills	3.25	9
Problem Solving Skills	3.88	1
Information Technology Skills	3.35	6
Meeting Present and Future Professional Needs	3.30	7
Exposure to Local Community within Field of Specialization	3.19	11
Exposure to International Community within Field of Specialization	2.84	13
Critical Thinking Skills	3.37	5
Salary Improvement and Promotion	3.37	5
Opportunities Abroad	2.93	12
Personality Development	3.40	4

The responses showed that problem- solving skills followed by learning efficiency were the great contributions of their program of study to their personal and professional growth (Table 1). This implies that the BS Math graduates have strong foundation in problem-solving skills. The least response is the exposure to international community within the field of specialization with a weighted mean of 2.84. This implies that BS Mathematics graduates have no exposure to international community because this was not emphasized in the curriculum.

The responses also showed that the teacher-student relationship and the professors’ pedagogical expertise contribute how they rate the degree program they finished at the College of Science (Table 2). This implies that since few students enrolled in the BS Math program, the teacher and students knew each other well and therefore have a good relationship. The least response with a weighted mean of 3.0 is the library resources. The library holdings in the university were always a problem among students and faculty.

Table 2. Rate of the degree program at the college of science

Indicators	Weighted Mean	Rank
Range of Courses	3.35	10
Relevance to your Profession	3.65	4
Extracurricular activities	3.40	9
Premium Given to Research	3.12	11
Interdisciplinary Learning	3.63	5
Teaching and Learning Environment	3.51	7
Quality of Instruction	3.35	10
Teacher-Student Relationship	3.77	1
Library Resources	3.0	12
Laboratory Resources	3.53	6
Class Size	3.44	8
Professors’ Pedagogical Expertise	3.74	2
Professors’ Knowledge of Subject Matter	3.72	3

4 Conclusion and Recommendation

Majority of the BS Math graduates have gainfully employed from one to two years of waiting time after graduation because they took the Licensure Examination of Teachers. Most of them are on contractual basis and are working within the Philippines. Majority are professionals as teachers and are still holding their first job after graduation. Ranked second among the jobs is clerical work. Most of them are earning from 10,000 pesos to 20,000 pesos and 21,000 pesos to 30,000 pesos per month. Problem-solving skills have been useful to their personal and professional growth. The teacher-student relationship was relevant to their program of study as BS Mathematics graduates.

The following recommendations are based on the input of the graduates and the faculty:

1. Strengthen linkages with other universities to provide exposure to local and international opportunities.
2. Incorporate English Proficiency Program to enhance their written and oral communication before graduation.
3. The College of Science particularly the Department of Mathematics should update yearly the status of their graduates and possibly ask suggestions for the enhancement of the curriculum. A tracer Graduate Unit is recommended.
4. The BS Mathematics students should be exposed to trainings/seminars and other competitions to further strengthen their confidence when landing a job.
5. The university should provide adequate library resources.

Competing Interests

Authors have declared that no competing interests exist.

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