

Tracer Study of Naval Architecture and Marine Engineering Graduates of the Old Curriculum (S.Y. 2012-2016) of the University of Cebu

Jelie E. Agostilo¹, Jacklyn A. Descartin², Michelle G. Estomo³, Dave J. Tabornal⁴

^{1,2,3,4}Naval Architecture and Marine Engineering Department, University of Cebu-METC, Cebu City, Philippines, 6000

Abstract– This paper focuses on the achievement of the University of Cebu outcomes, program educational objectives (PEO) and program objectives graduate tracer study of Naval Architecture and Marine Engineering students. The graduate tracer study covered the profile, employment status, present occupation of the graduates. Using the frequency and percentage distribution of the data taken from the graduates on their employment and occupation status, outcomes and objectives achieved the graduates were identified and compared. Results revealed that the old curriculum of BS NAME was not able to provide the graduates with the necessary skills and competencies needed for professional practice. There is a need to improve the old curriculum for the graduates to have better performance in practicing their field and acquire the needed skills. On the other hand, the graduates were highly employable in a wide range of industries, not only in ship related work but also in other sectors such as in government agencies, academies, and other industry works. The study also verified that the university's teaching practices and methodologies need to be improved in developing the graduates' work-related values and character. The graduates have also not fully achieved the university outcome, PEOs and PO's of the BS NAME program which signified the graduates' performance in their field of work.

Keywords– Naval architecture and marine engineering tracer

I. INTRODUCTION

A graduate tracer survey collects data on the graduate's college experience, skills learned, instruction quality, and how it relates to employability. A graduate tracer study can illuminate the relationship between college experience and labor market outcomes, which can aid in formulating actions for the higher education sector. Higher academic institutions are constantly generating graduates who have the capability of applying technology and knowledge-based Information to the nature and demands of their work environment. The need for naval architects and marine engineers prompted the College of Engineering program of the University of Cebu to provide education that offers knowledge of ship design and construction as well as experiences in applying the theories learned to the actual fieldwork. Naval Architecture and Marine Engineering (BS NAME) is a 5-year program that focuses on the knowledge of the design of floating vessels and the integration of their components. The program teaches the students comprehensive knowledge. It provides the application and knowledge of the complete process of conception, design modeling, implementation, and operation of boats, ships, marine installations, and other complex systems, together with deep theoretical knowledge in related subjects such as mechanics and management. Higher academic institutions must provide an

updated curriculum, modern laboratory facilities and equipment, efficient student services, and responsive organization and administration to the need for professional education in naval architecture and marine engineering. Educators must also possess effective teaching techniques and strategies to maximize student learning. The graduates from the University should also have many opportunities to develop employability skills like communication, leadership, and problem solving while still in the academy. The employability concept requires focusing on four main dimensions: the dimension relating to the skills and competencies that make an individual potentially employable, that focus 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, financial, health-related and unemployment effects. However, you do not have to decide whether or not you will participate in this Study since you are allowed to ask permission from school authorities, parents, or guardians or consult anyone with whom you are comfortable about the research. If there are contents in the survey questionnaire that you do not understand and find it ambiguous, then feel free to contact and inform the researcher. Rest assured that all the answers and responses that you will provide will be kept strictly confidential.

II. OBJECTIVES

Statement of the Problem

The Study will determine the professional status of the Naval Architecture and Marine Engineering Graduates, University of Cebu S.Y. 2012-2016. Specifically, the study sought to find answers and provide the following objectives:

1. The personal details of the graduates in terms of the following personal characteristics:
 - 1.1. Gender
 - 1.2. Year graduated
2. The current employment status and present job position of the graduates;
3. The relevance of the program's educational objectives to graduates;
4. The relevance of the school-acquired skills and competencies to the graduate's occupation according to:
 - 4.1 Professional Courses
 - 4.2 Engineering Mathematics and Sciences; and
 - 4.3 General Education Courses

5. The recommended skills and competencies from the graduates to make the curriculum more relevant to the current jobs.
6. The significant difference in the graduates; perceived relevance of program educational objectives when grouped according to year graduated.
7. The intervention plan can then be proposed.

Significance of the Study

1. To assist the academic department in assessing and evaluating the University's curricular programs.
2. For the Commission on Higher Education (CHED), this will assist their Curricular Committee in the development of curricula and designing/redesigning the programs that will be offered and served to students.

Hypotheses

1. The majority of UC-BSNAME graduates are employed in their fields of specialization.
2. The Programs' educational objectives are relevant to the graduates' chosen fields.
3. The graduates' school-acquired skills and competencies are applicable to their chosen occupations in the field.

Scope and Delimitation

This tracer involves graduates who enrolled in the 2006-2007 curricula and completed their courses in the UC-BS NAME program between S.Y. 2012 and 2016. Personal characteristics, academic factors, and employment factors are all taken into account for each graduate. The investigation focused on the claims of tracing the graduates' employment and whether their acquired skills and competencies during college, as well as the program's educational objectives, were significant and relevant to their occupations after graduation.

III. METHODOLOGY

Research Design

The researchers utilized a descriptive research design wherein, according to Shuttleworth (2008), it is a scientific method that involves the observation and description of the behavior of a subject without influencing it in any way. The Study's approach is thought to be appropriate because the goal is to track graduates' employment characteristics and investigate the relevance of acquired skills, competencies, and curriculum's program educational objectives.

Research Respondents

The target respondents for the tracer study included the graduates of BS NAME of the year 2012 – 2016 of the University of Cebu. The respondents comprised all the graduates of the said years. The researchers' identification of the graduates were based on a list of graduates provided by the University's Registrar's Office. The researchers who conducted this Study are faculties of BS NAME from the University of Cebu. The faculties were knowledgeable and diverse in different naval architecture practices and expected to gather, tabulate, analyze results and provide accurate conclusions.

A descriptive statistical test was performed on the quantitative data obtained through the questionnaire.

Calculated the percentage of frequency of occurrence of the various categories of variables identified in the survey form. Because the Study is only a part of a much wider tracer study at the University, the researchers agreed that the data would no longer be subjected to additional statistical significance tests. As a result, the researchers helped confirm the relevance of graduates' acquired skills and competencies with their obtained occupations.

Research Instrument

A researcher-made questionnaire was used in the survey based on the Program Outcomes (P.O.) and Program Education Outcomes (PEO) of the Naval Architecture and Marine Engineering department. Some questionnaire components were changed to better align with the study objectives.

The questionnaire was composed of two main parts:

1. Personal Information such as name, year of graduation, and employment status.
2. Graduate Outcomes such as Program Outcomes and Program Educational Objectives.

Data Collection and Process

The researchers utilized a quantitative approach in collecting data. A survey questionnaire was distributed via Email or Facebook group chats with the respondents. It was under the NAME department's official email account or through group chats with the respondents. After all the respondents answered the survey questionnaire, it was collated by the researcher for filing and treatment of data.

IV. RESULTS AND DISCUSSION

Table 1 shows the frequency and distribution of the respondents, Bachelor of Science in Naval Architecture and Marine Engineering graduates from the school year 2012-2016 adopting the old curriculum of the program. The sample population comprises thirty and five-tenth percent (35.35%) or the equivalent of 35 respondents out of 99 of the total population of the graduates within this school year.

TABLE 1. Distribution of Research Respondents

School Year	No. of Graduates	Sample	Percentage
2011-2012	13	11	84.6%
2012-2013	15	9	60%
2013-2014	19	2	10.5%
2014-2015	23	7	30.4%
2015-2016	29	5	17.2%
Total	99	35	35.35%

Table 2 shows that sixty-eight and six-tenth percent (68.6%) of the total respondents are male, and the remaining thirty-one and four-tenths percent (31.4%) are female. Regarding the academic profile of the respondents, the table shows that only a total of eight and six-tenths percent (8.6%) of the respondents received an academic award upon graduating. Regarding the board examination results of the graduates within the specific school year, eighty-eight and six-tenth percent (88.6%) have successfully passed the board exam. In this data, seventy-four and three tenth percent (74.3%) successfully passed the board exam in the first take.

TABLE 2. Frequency and Percentage Distribution of the BSNAME Graduates Profile

	Frequency	Percentage
Gender		
Male	24	68.6%
Female	11	31.4%
Academic Awardee		
Summa Cum Laude		
Magna Cum Laude	2	5.7%
Cum Laude	1	2.9%
No academic award	32	91.4%
Board Examination		
Passed 1st timer	26	74.3%
Passed Retaker/Repeater	5	14.3%
Failed 1st timer	0	0
Failed retaker/repeater	2	5.7%
Never taken a board examination	2	5.7%

Table 3 presents the employment status of the graduates. Of the 35 respondents, 26 or eighty percent (80%) were employed locally. Six of the respondents, or seventeen and one-tenth percent (17.1%), were employed internationally, and one out of 35 is currently unemployed.

TABLE 3. Frequency and Percentage Distribution Employment Status of BSNAME Graduates

Employment Status	Frequency	Percentage
Employed Locally	28	80%
Employed Internationally	6	17.1%
Unemployed	1	2.9%

Table 4 presents the employment data of the graduates. Of the 35 respondents, 22, or sixty-two and nine-tenth percent (62.9%), have Regular employment status. 6 of them, or seventeen and one-tenth percent (17.1%), have Permanent employment status. A contractual or probationary status covers five and seven-tenth percent, equating to 2 respondents. Furthermore, one out of 35 respondents is currently unemployed.

Table 4 also shows the present occupation of the respondents in line with their current employment status. The Others category has the highest percentage of twenty percent (20%) accumulated from 7 of the respondents. This category includes the occupation not explicitly mentioned in the given questionnaire. A few were mentioned as Shipowner, Plant, and Construction-related works and could be a combination of some of the occupations mentioned in the questionnaire. Ship Repair and Rehabilitation (Steel) and Ship Operation and Maintenance got the second highest percentage, with the same percentage of fourteen and a third of tenths percent (14.3%), having five respondents each for the occupations mentioned. It is worth mentioning that Ship Building, Engineering, and Design (Steel) and working in the Government Agency, having eleven and four-tenth percent (14.3%), is significant in the data presented in this table.

Ship Repair and Rehabilitation (Aluminum), Ship Repair and Rehabilitation (Fiber Composite), and Ship Repair and Rehabilitation (Integrated Materials) do not have significant data depicted in this table.

TABLE 4: Frequency and Percentage Distribution Employment Data of BSNAME Graduates

	Frequency	Percentage
Present Employment Data		
Regular	22	62.9%
Permanent	6	17.1%
Part-time	0	
Contractual/Temporary/Probationary	2	5.7%
Trainee	0	
Self-Employed	3	8.6%
Consultancy	0	
Not Employed	2	5.7%
Present Occupation		
Ship Building, Engineering and Design (Steel)	4	11.4%
Ship Building, Engineering and Design (Aluminum)	2	5.7%
Ship Building, Engineering and Design (Fiber Composite)	2	5.7%
Ship Building, Engineering and Design (Integrated Materials)	2	5.7%
Ship Repair and Rehabilitation (Steel)	5	14.3%
Ship Repair and Rehabilitation (Aluminum)	0	0
Ship Repair and Rehabilitation (Fiber Composite)	0	0
Ship Repair and Rehabilitation (Integrated Materials)	0	0
Ship Operation and Maintenance	5	14.3%
Ship Services	1	2.9%
Public Schools/Universities	1	2.9%
Private Schools/Universities	2	5.7%
Government Agency	4	11.4%
Others	7	20%

The tables below are the third part of data gathering from the respondents, which focuses on the goals and objectives of the University of Cebu and the possible program outcomes that the graduates may apply in the real world.

Table 5 presents the frequency, percentage, and rank of the outcomes the University of Cebu targeted to their graduates upon graduating and acquiring these outcomes from their field of work.

TABLE 5. Frequency and Percentage Distribution of UC Outcomes Acquired by the BSNAME Graduate from their Employment

	Frequency	Percentage
UC Graduate Outcomes		
Demonstrate skills and competencies in one's educational level and field of discipline for lifelong learning;	27	77.1%
Express proficiency in both oral and written communication;	20	57.1%
Demonstrate social accountability and ethical responsibility towards the community and the environment;	23	65.7%
Exhibit proactive and collaborative attributes in diverse society;	18	51.4%
Exhibit proactive and collaborative attributes in diverse society;	18	51.4%
Manifest ethical behavior in diverse situations	22	62.9%

Twenty-seven respondents have chosen the first outcome in Table 5 as the top outcome they acquired from their work experience. This outcome is ranked first among the other

outcomes listed, with seventy-seven and one-tenth percent (77.1%). The percentage shows that demonstrating skills and competencies in one's educational level and field of discipline for lifelong learning is a commonly acquired outcome by graduates. To be able to deliver what the company needs, one should be able to have adequate skills and should be competent to strive in this field of work. Demonstrating social accountability and ethical responsibility towards the community and the environment is the second-ranked outcome chosen by 23 respondents having fifty-seven and one-tenth percent (57.1%). Shipyards are strategically located where they can cater to large ships and do the activities needed for ship repair, construction, and maintenance. This percentage shows that as a NAME graduate, one should be responsible towards the community and environment, precisely where their work is.

Moreover, the third-ranked outcome manifests ethical behavior in diverse situations, chosen by 22 respondents with sixty-two and nine-tenth percent (62.9%). Working in the field and dealing with different types of people in different positions would mold one's actions and ethical behavior in every diverse situation that could arise. It is an impactful outcome that a graduate could acquire, and this shows in the data given by the respondents.

Table 6 below presents the educational outcomes targeted by the program to their graduates upon graduating and acquiring these outcomes from their field of work.

TABLE 6. Frequency and Percentage Distribution of the Program Educational Objectives in application to the Employment Data of BSNAME Graduates

Program Educational Objectives (PEO)	Frequency	Percentage
Ship Design Engineers;	14	40.0%
Professional Practitioners such as ship and shipyard managers, classification and marine surveyors, offshore designers and builders, marine adjusters and assessors, and salvage operators; and	18	51.4%
Researchers, technopreneurs as well as educators.	12	34.3%

As shown in Table 6, Professional Practitioners such as ship and shipyard managers, classification and marine surveyors, offshore designers and builders, marine adjusters and assessors, and salvage operators come first amongst other listed program education outcomes acquired by the graduates. It shows that working professional practitioners has the highest percentage, with 18 respondents and fifty-one and four-tenth percent (51.4%). Fourteen respondents are Ship Design Engineers, gaining forty percent (40%) of the total sample population. Twelve respondents are Researchers, technopreneurs, and educators, with thirty-four and three-tenth percent.

Table 7 below presents the program objectives targeted by the program to their graduates upon graduating and acquiring these objectives from their field of work.

From the data acquired from the respondents, the table shows that three objectives were chosen by 21 respondents having sixty percent (60%) of the sample population. (1) Ability to solve engineering problems with a sound foundation in mathematics, science, naval architecture, and marine engineering design - This shows that the ability to solve engineering problems in application to their line of work is

highly significant, and the foundation of this is established while studying in the program. (2) Competence in the use of both English and Filipino languages -The use of different languages is impactful as it gained a high percentage of the respondents. It shows that language might be an advantage or a disadvantage to those working locally or internationally. (3) Awareness of professional, social, and ethical responsibility - Professionalism in work, socializing with different types of people, and practicing ethics at work are critical factors to striving in the field of work.

TABLE 7. Program Objectives in application to the Employment Data of BSNAME Graduates

Program Objectives (PO)	Frequency	Percentage
Ability to solve engineering problems with sound foundation in mathematics, science, naval architecture and marine engineering design;	21	60.0%
An ability to design and conduct experiments, analyze and interpret data;	16	45.7%
An ability to design and conduct experiments, analyze and interpret data;	16	45.7%
An ability to identify, formulate, and solve naval architecture and marine engineering problems;	17	48.6%
An understanding of the naval architecture and marine engineering solutions and their impact in a global, economic, environmental and societal context;	19	54.3%
An understanding of the naval architecture and marine engineering solutions and their impact in a global, economic, environmental and societal context;	18	51.4%
Mastery of engineering and management principles to manage projects in multi-disciplinary environments;	11	31.4%
An ability to function in multi-disciplinary and multi-cultural teams;	17	48.6%
Competence in the use of both English and Filipino languages;	21	60.0%
Commitment for lifelong learning and continuous professional education;	17	48.6%
Awareness of professional, social, and ethical responsibility;	21	60.0%
Cognizance of contemporary issues; and	15	42.9%
Commitment in preserving and promoting Filipino historical and cultural heritage.	12	34.3%

Aside from the top-ranked objectives acquired by the graduates, mastery of engineering and management principles to manage projects in multi-disciplinary environments gained the lowest percentage having 11 responses. The data shows a need for more foundation for some of the graduates when it comes to management. The graduates might need additional guidelines, or the problem might be related to needing more confidence in managing projects and dealing with different people, such as clients, stakeholders, and workers.

V. CONCLUSION

The following is the study's conclusion; first, the profiling and employment status information gathered from the respondents are essential data to assess graduates' employment percentage and their field of specialization as Naval Architects and Marine Engineers. Secondly, research results were critical in improving the program's curriculum to achieve better graduate

outcomes. Third, those studying Bachelor of Science in Naval Architecture and Marine Engineering will know the factors that make college graduates more equipped. It will be a great place to start as they prepare for future professional opportunities.

According to the findings, most University of Cebu graduates with a Bachelor of Science in Naval Architecture and Marine Engineering were employed permanently in fields related to their degree programs, using their academic knowledge and acquiring technical, leadership, and problem-solving skills. The graduates needed to acquire the outcomes targeted by the university fully and the objectives present within the program upon working in the field. The old curriculum adopted by the BS NAME graduates of 2012-2016 needs to be improved to fully cater to the needs of the graduates in terms of their knowledge, skills, ethics, ability to manage and handle people, responsible, and vigilant in their environment, and developing lifelong learning.

VI. RECOMMENDATIONS

Based on the study's findings, the researchers recommend gaining more respondents to broaden the sample in the chosen population: the BS NAME graduates of 2012-2016. Academic leaders, faculty, and industry representatives must periodically examine the curriculum to ensure that graduates have the knowledge and skills needed to be highly equipped in the industry, improving the BS NAME program's marketability and its graduates' career prospects.

Before graduating and passing the board examination, graduates should obtain highly appropriate on-the-job training that gives them various career opportunities and valuable experience to assess the engineering skills they need to develop. The exposure to different occupations and fields of specialization that the graduates could work as Naval Architects and Marine Engineers may be achieved by having shipyard and industry tours. Such industries and companies to be visited should provide different ship-related work with different types of hull material, surveying, and inspection or consultancy services. Furthermore, more studies on tracer effects from other aspects of the program for future reference help enhance the BS NAME curriculum.

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