Naval Architecture and Marine Engineering Graduates of the New Curriculum: A Tracer Study for S.Y. 2017-2021

Maria Jean R. Antolihao[1], Maximo C. Tangente[2], Benson Jade Madriaga[3], Christakhis Niño L. Nodalo[4]

[1,2,3,4]Naval Architecture and Marine Engineering Department, University of Cebu-METC, Cebu City, Cebu, Philippines, 6000

Abstract— Every academic institution strives to produce competent and highly qualified graduates who can compete locally and globally. A graduate tracer study is a powerful tool that can provide valuable information for assessing graduates' whereabouts and performance in the workplace. Also, provides significant input and information when evaluating a specific higher education institution in terms of employability and program outcomes for its graduates. This study sought to track graduates of the Bachelor of Science in Naval Architecture and Marine Engineering from 2017 to 2021 and identify the program's significance and relevance to enhance and provide quality education to its constituents. A structured survey questionnaire to collect data interpreted using frequencies, percentages, and ranking. The degree program's relevance to professional requirements was a major strength of the undergraduate curriculum. The majority of graduates have jobs in related to the program. The study did, however, identify areas for improvement.

Keywords— NAME graduates: tracer study: University.

I. INTRODUCTION

Every academic institution strives to produce competent and highly qualified graduates who can compete locally and globally. Therefore, a graduate tracer study is a powerful tool that can provide valuable information for assessing graduates' whereabouts and performance in the workplace [1].

The tracer study is one of the University's monitoring measures for tracking its graduates' work performance, how effective and efficient they are at completing the duties assigned to them, and the expectations they meet compared to their employer's expectations. Similarly, the changing demands of existing and potential employers in society were effectively accommodated and assessed through HEIs' continuous revision of curricula and evaluation via Graduate Tracer Study. A study that provides significant input and information when evaluating a specific higher education institution in terms of employability and program outcomes for its graduates [2].

Badiru and Wahome (2016) used experiences, methods, outcomes, and lessons from a pioneer GTS taught at Moi University. Their paper proposes a seven-stage GTS roadmap tailored to the needs of East Africa. Graduates' recommendations, information feedback, and evaluative proposals based on their experiences while pursuing their degree and transitioning to the job market can significantly help to improve the caliber of education and services provided at the college or University. The purpose of this paper was to

arouse the desire to initiate and establish GTS as a method of quality assurance obtained at universities and East African HEIs The uniqueness and value of this paper stem from its first-ever proposal for a GTS guide, suitable for and domesticated in East Africa. Furthermore, Ghana's experience in a tracer study supported that this tool discovered that the content of their program showed their graduates' job performance was improving after their study. Job supervisors gave graduates a "very high rating" in job performance indicators like "teamwork ability" and "improved work competence"[3].

According to Rizal Technological University (RTU) findings, graduates claimed that their knowledge, academic-acquired skills, and competencies played a significant role in their job performance. The Chi-square goodness of fit test revealed a significant relationship between the graduates' fields of specialization and their post-graduation occupations. Similarly, the graduates' academic-acquired skills and competencies apply to their chosen occupations. The findings also demonstrated that RTU produces marketable and appropriately trained graduates, with the majority securing course-related jobs shortly after graduation. The study also shows that RTU graduates have the skills and competencies to succeed in today's competitive world. However, partnerships with private business entities are forming to maintain the graduates' high employability [6].

One of the objectives of the University of Cebu is to determine the employability status of the graduates of Naval Architecture and Marine Engineering from 2017-2021, locally and abroad, using the BS NAME 2012-2013 Curriculum. The institution always aims to provide the industry with well-equipped graduates with knowledge and skills relevant to local and international standards, improving the aid of a tracing study. Through this study, the University can identify the program's significance and relevance to enhance and provide quality education to its constituents.

The study will determine the effectiveness and the relevance of the BS NAME curricula, knowledge, skills, and values acquired by the graduates to their employment, and other school-related factors related to their employment.

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 2017-2021. In addition, the findings will serve as the basis of a proposed intervention plan.

Specifically, the study answers the following:

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 graduates' 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 than can 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, 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 2012-2013 curricula and completed their courses in the UC-BS NAME program between SY 2017 and 2021. 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 study employed descriptive survey research. The study's approach is appropriate because the goal is to track graduates' employment characteristics and investigate the relevance of acquired skills, competencies, and the curriculum's program educational objectives.

The researchers who will be conducting this study are faculties of BS NAME from the University of Cebu. The faculties are knowledgeable and diverse in different naval architecture practices and expect to gather, tabulate, analyze results and provide accurate conclusions.

Research Respondents

A total of 70 Naval Architecture and Marine Engineering graduates were the targeted respondents of the study, about 27% of the total graduates from 2017 to 2021. The identification of the graduates was primarily based on the Registrar's office's roster of graduates from the said years, which made available the graduates' names, addresses, emails, and phone numbers. The researchers followed up on all students' contact information to ensure it was up to date. Changes in addresses and contacts are possible. The researchers will use social media platforms such as Facebook/Facebook messenger through the respective group chats to increase the number of surveys.

Research Instrument

The study utilized a researcher-made questionnaire The study utilized a researcher-made questionnaire developed based on the Commission of Higher Education Department Memorandum Order 2011. Some questionnaire components were changed to better align with the study objectives.

The questionnaire is divided into three main sections: Section 1 contains the letter of information and request for graduates' participation, together with the privacy of the information. Section 2 is on personal information such as name, year graduated, and employment status—section 3 is on graduate outcomes such as Program Outcomes and Program Educational Objectives.

Descriptive statistics is employed on the data obtained through the questionnaire. Calculate the percentage and frequency of occurrence of the various categories of variables identified in the survey form and the ranking. The researcher agreed that the data would no longer be subjected to additional statistical significance tests. As a result, the researchers will confirm the relevance of graduates' acquired skills and competencies with their obtained occupations.

Data Collection Technique

A letter was sent to the campus registrar's office requesting the list of graduates' batches from 2017 to 2021. In addition, the survey questionnaire was distributed via personal distribution and Facebook messaging, along with a letter informing graduates of the study's purpose and requesting their participation. The participation of identified student respondents was voluntary. The researchers also used a Google form to make it easier for people to respond to the online questionnaire.

Data Analysis

Data will be recorded following the data collection procedure, tabulated, and saved for analysis. The researchers employed descriptive statistics such as the frequency count,

percentage, and frequency count ranking to investigate the distribution of respondents based on profile, employment characteristics, learned competencies, and program educational objective. Furthermore, the researchers utilized the respondents' acquired skills and competencies with their obtained occupations to determine the curriculum's relevance.

IV. RESULTS AND DISCUSSION

Graduates Profile and Employment Characteristics

TABLE I: Distribution of respondents according to year graduated.

School Year	No. of Graduates	Sample	Percentage
2017	51	11	21.6%
2018	48	22	45.8%
2019	66	13	19.7%
2020	67	17	25.4%
2021	27	7	25.9%
Total	259	70	27%

Table I presents the distribution of graduates according to the year they graduated. The study was represented mainly by the samples 45.8% graduated in the year 2018, while there was only 19.7% of graduates in 2019.

TABLE II: Distribution of graduates according to gender and academic profile.

	Frequency	Percentage
Gender		
Male	48	68.6%
Female	22	31.4%
Academic Awardee		
YES	3	4.3%
NO	67	95.7%
Board Examination		
Passed 1st taker	48	68.6%
Passed Retaker/Repeater	4	5.7%
Failed 1st taker	6	8.6%
Failed retaker/repeater	1	1.4%%
Never taken a board examination	11	15.7%

Table II represents the distribution of graduates according to gender and academic profile. Of the majority of the 70 respondents, 68.6% were female, and the rest were male. It shows that 4.3% were academic awardees. Moreover, 74.3% of the graduates from 2017 to 2021 passed the board examination, and 68.6% passed it in their first take.

Table III presents the employment characteristics of the graduates. According to the respondents' employment status, 81.4% of graduates were employed, and only 18.6% were unemployed. The majority of these employed graduates, about 80%, were employed locally. About 50% and 11.4% of the employed graduates were regular and permanent employees, respectively. 14.3% were temporary or contractual, and about 5.7% were trainee, consultancy, and part-time employees. Also, the most graduates, 24.6%, are in ship repair and rehabilitation for steel vessels, and the least, at 1.75%, engage in ship repair and rehabilitation for aluminum vessels. Lastly, about 14% of the employed graduates work in unrelated fields like BPO, logistics, IT, medical, fast food chain, e-commerce industries, etc.

TABLE III: Distribution of graduates employment characteristics.

	Frequency	Percentage
Employment Status		
Employed Locally	56	80%
Employed Abroad	1	1.4%
Unemployed	13	18.6%
Type of Employment		
Regular	35	50%
Permanent	8	11.4%
Contractual/Temporary/ Probationary	10	14.3%
Trainee	2	2.86%
Consultancy	1	1.42%
Part-time	1	1.42%
Self-employed	0	0%
Unemployed	13	18.6%
Employment Setting		
Ship Building, Engineering and Design (Steel)	9	15.8%
Ship Building, Engineering and Design (Aluminum)	4	7%
Ship Building, Engineering and Design (Fiber Composite)	6	10.5%
Ship Building, Engineering and Design (Integrated Materials)	0	%
Ship Repair and Rehabilitation (Steel)	14	24.6%
Ship Repair and Rehabilitation (Aluminum)	1	1.75%
Ship Repair and Rehabilitation (Fiber Composite)	0	0%
Ship Repair and Rehabilitation (Integrated Materials)	0	0%
Ship Operation and Maintenance	2	3.5%
Ship Services	2	3.5%
Public Schools/Universities	0	0%
Private Schools/Universities	3	5.3%
Government Agency	8	14%
Others	8	14%

Graduates' Acquired Skills and Competencies

The tables below show the graduates' acquired skills and competencies based on the curriculum offered and the program's educational objectives and outcomes. This section focuses on the University of Cebu's goals and objectives and the program's potential outcomes that graduates may apply in the real world as Naval Architects and Marine Engineers.

TABLE IV: Distribution of respondents' acquired UC graduate outcomes.

UC Graduate Outcomes	Frequency	Percentage	Rank
Demonstrate skills and competencies in one's educational level and field of discipline for lifelong learning.	55	78.6%	1
Express proficiency in both oral and written communication.	54	77.1%	2
Demonstrate social accountability and ethical responsibility towards the community and the environment.	50	71.4%	3
Exhibit proactive and collaborative attributes in diverse society.	46	65.7%	5
Utilize appropriate technology.	42	60%	6
Manifest ethical behavior in diverse situations.	48	68.6%	4

Table IV presents the frequency, percentage, and ranking of the graduate outcomes targeted by the University of Cebu upon graduation and the acquisition of these outcomes from their field of work.

Out of the six graduate outcomes, the first outcome ranked number one, being chosen by 57 (78.6%) graduates. This 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. Express proficiency in oral and written communication ranked second, being chosen by 54 (77.1%) graduates. Demonstrating social accountability and ethical responsibility towards the community and the environment is the third in a row, having been chosen by 50 (71.4%) graduates. Shipyards are located in areas where they can cater to large ships and perform the activities required for ship repair, construction, and maintenance. This demonstrates that as a NAME graduate, one should be responsible to the community and environment, mainly where one works. The fourth, fifth and sixth in rank are manifesting ethical behavior in diverse situations; exhibit proactive and collaboration attributes in a diverse society; and utilize appropriate technology, having been chosen by 48 (68.6%), 46 (65.7%), and 42 (60%) graduates, respectively. 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. This is an impactful outcome that a graduate could acquire, and this shows in the data given by the respondents. Nowadays, it is also crucial for graduates to know how to operate various software related to ship design and collaborate with the diverse individual in society, not just for personal growth as a professional Naval Architect but as well as for the benefit of the marine and maritime sector, locally and internationally.

TABLE V: Distribution of respondents' acquired Program Educational Objectives.

Program Educational Objectives	Frequency	Percentage	Rank
Registered Engineers who pass the Naval Architecture and Marine Engineering licensure examination.	55	78.6%	1
Design Engineers who manifest competence in designing, building, repairing and maintaining ships and shipyards.	48	68.6%	2
Professional Practitioners who can effectively work in other related fields such as ship and shipyard managers, classification and marine surveyors, offshore designers and builders, marine adjusters and assessors, salvage operators, researchers, technopreneurs, educators and the like.	47	67.1%	3

Table V shows graduates' educational outcomes upon graduating and PEO's application to the chosen field related to NAME. Registered Engineers who pass the Naval Architecture and Marine Engineering licensure examination ranked first, having been chosen by 55 (78.6%) respondents, followed by design Engineers who manifest competence in designing, building, repairing, and maintaining ships and shipyards chosen by 48 (68.6%) graduates. The third in rank

are professional practitioners who can effectively work in other related fields, such as ship and shipyard managers, classification and marine surveyors, offshore designers and builders, marine adjusters and assessors, salvage operators, researchers, technopreneurs, educators, and like having chosen by 47 (67.1%) graduates.

TABLE VI: Program objectives in application to the graduates' employment.

Program Objectives	Frequency	Percentage	Rank
An ability to apply knowledge of mathematics and science to solve complex engineering problems;	50	71.4%	3
An ability to design and conduct experiments, as well as to analyze and interpret data;	43	61.4%	6
An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards;	40	57.1%	9
An ability to function on multidisciplinary teams;	45	64.3%	5
An ability to identify, formulate, and solve complex engineering problems;	42	60%	7
An understanding of professional and ethical responsibility;	57	81.4%	1
An ability to communicate effectively;	48	68.6%	4
Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;	33	47.1%	10
Recognition of the need for, and an ability to engage in life-long learning;	41	58.6%	8
Knowledge of contemporary issues;	33	47.14%	10
An ability to use techniques, skills, and modern engineering tools necessary for engineering practice; and	54	77.1%	2
Knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multi-disciplinary environments.	50	71.4%	3

Table VI shows that the program objective in rank one is understanding professional and ethical responsibility, having 57 (81.4%) responses, followed by the ability to use techniques, skills, and modern engineering tools necessary for engineering practices chosen by 54 (77.1%) graduates. There are two objectives in the third rank, An ability to apply knowledge of mathematics and science to solve complex engineering problems; and being knowledge and understanding of engineering and management principles as a member and leader in a team to manage projects and in

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multidisciplinary environments having 71.4% (50 graduates). Finally, broad education is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context, and knowledge of contemporary issues ranked the lowest having 33 responses at 47%. The data implies that the acquired skills and competencies of the graduates from the program greatly help them in their acquired work related to the field.

V. CONCLUSION

The profiling and employment status information gathered from respondents was valuable data that could be used to assess the percentage of graduates employed and their field of specialization in work as Naval Architects and Marine Engineers. Furthermore, the research findings were essential for improving the curriculum of the program in order to achieve better outcomes for graduates and to have a clear understanding of the factors that make college graduates more employable, which will be an excellent starting point as they prepare for future career opportunities in the field.

The majority of the University of Cebu graduates with a Bachelor of Science in Naval Architecture and Marine Engineering were employed as regular employees in fields related to their degree program, utilizing their academic knowledge and acquiring technical skills and competencies, leadership, and problem-solving skills, based to the findings of the study. After working in the field, the graduates realized the University's desired outcomes and program objectives. The graduates were able to apply their acquired skills and competencies in their field of work. Albeit the good outcomes, there is still a need to improve the curriculum to fully cope with the graduates' needs in professional growth and knowledge in the marine and maritime economic industry.

VI. RECOMMENDATIONS

Based on the study's findings, the researchers recommend the following:

1. Expanding collaboration with private organizations, both locally and internationally, that can provide employment opportunities to graduates must be a continuous process to maintain the graduates' high employability level.
2. Educational leaders, faculty, and maritime industry representatives must review the curriculum regularly to ensure that graduates have the knowledge and skills required to be fully qualified.
3. The review and enhancement of curricular offerings to ensure the provision of more skill and competency development programs, particularly about understanding the impact of Naval Architecture and Marine Engineering on the global maritime economic sector.
4. There must be a sufficient number of respondents on the study, and tracer studies like this one must be supported by the institution in order for it to be kept up to date on how its graduates are doing and what initiatives can be implemented further in the curriculum and manner of instruction to produce more productive and befitting graduates.

5. Before they graduate, expose the students to the various occupations and fields of specialization they could have as Naval Architects and Marine Engineers. This can be achieved through the shipyard and industry tours.

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