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Volunteerism is Associated with Improved Soft Skills of Marine Engineering Students in the Philippines

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ABSTRACT

We assessed the impact on soft skills in among 60 marine engineering students after completing a 36-month long community service program. A Soft Skills-Graduate Attribute Scale was developed to measure the following outcomes, namely, professional competence, critical thinking skills, communication skills, lifelong learning, social and ethical responsibility, productivity, and interpersonal skills. Our results show that the students who participated regularly in volunteer activities possess significantly higher measures of graduate attributes relating to professional competence, communication skills, and social and ethical responsibility compared to non-regular and first-time volunteers. These specific soft skills were aligned with the expected outcomes based on the program design of the volunteer activities. Our study adds to the growing literature on the value of service-learning programs in higher education as community-oriented programs can potentially result in improving soft skills and cross-cultural competencies of students, especially in the technical fields.

Keywords: volunteerism, soft-skills, community outreach, positive psychology

BACKGROUND

Volunteerism is an initiative or action intended to help another person, group or organization by an individual who willingly and non-obligatorily employs personal time, resources, and skills without expecting any benefit in return (Penner 2004; United Nations Volunteer, 2015). Monetary reward is not a principal motivating factor for this pro-social behavior (Volunteering Australia, 2015). Volunteerism also plays significant role in society by enhancing employability of marginalized people, strengthening social connectivity, delivering excellent goods and public services, and supporting youth education (Wu, 2011).

For students, volunteerism has been recognized to impact on their sense of responsibility and citizenship. Students who volunteer regularly are more likely to engage in varied political behaviors, such as voting and working for political campaigns in later life (Youniss et al. 1999; Wilson & Musick 1999). They participate more often in community service activities (Astin & Astin 2000) and tend to choose service-oriented professions, such as teaching, after graduation (Avalos et al. 1999). Some investigators also noted that volunteerism improves academic performance (Astin & Sax 1998), develops leadership potential (Astin & Astin 2000), boosts self-confidence (Astin et al. 2000), and expands career paths and personal wellbeing (Wu, 2011; Nazroo and Matthews, 2012).

A strategy to promote school volunteerism in higher education is via service-learning programs, or the merging of community service with pedagogy and research (Levesque-Bristol et al. 2010; Clinton & Thomas 2011; Eyler 2002; Govekar & Govekar 2008; Bringle & Hatcher 2000; Bourner & Millican 2011; Gullatt & Jan 2003; Kielsmeier et al. 2004). In the United States, higher education institutions (HEIs) actively motivate students to join volunteer service by incorporating volunteerism into the curriculum and general education courses (Cohen & Kinsey 1994; Markus et al. 1993). Volunteer activity through service-learning programs are also popular in Europe and in Asia (Bosanquet et al. 2007, 2012; Clinton and Thomas 2011; McCarthy et al., 2005).

While several publications cite the benefits of volunteerism to students, in the era of outcomes-based education, its impact on student competencies has not been thoroughly explored, especially in the Philippines. Here, we analyze the effects of volunteerism on some soft skills on a group of marine engineering students enrolled in a private HEI that pioneered outcomes-based education in the Philippines (Llanes, 2008).

While engineering schools emphasize technical knowledge grounded on science, technology, engineering and mathematics (STEM), we are aware that 21st century engineers are also expected to cultivate a wide range of soft skills and competencies useful in society and the workplace (Abdulwahed et al. 2013). The soft skills assessed in this investigation are the institutional learning outcomes (ILOs) of the private HEI, namely, professional competence, critical thinking skills, communication skills, lifelong learning, social and ethical responsibility, productivity, and interpersonal skills.

THEORETICAL FRAMEWORK

An approach to enhance student learning experience while complementing soft skills development is through direct hands-on experiential activities aimed at solving real-world problems (Hagan, 2012; Kolb & Kolb, 2009). With its convergence with the various learnings derived from life experience and formal education, a student may experience what is deemed as a holistic education (Fry, Ketteridge, & Marshall, 2009; Kolb & Kolb, 2009). Smith (2001) suggests that experiential learning can also provide added opportunities to observe societal problems, form abstract concepts, and validate theoretical knowledge. As a modality for promoting meaningful and conscious personal learning, the following are the basic assumptions of an experiential education: a) the acquisition of knowledge is a process in itself; b) it is a holistic process of adaptation resulting from synergetic interactions between the person and the environment; and c) it creates new knowledge (Kolb & Kolb, 2009). According to Kolb (1984), experiential learning occurs in 4 stages: Stage 1, formation of experience; Stage 2, reflective observation of the situation; Stage 3, abstract conceptualization of the phenomenon; and Stage 4, active experimentation. It is noteworthy that theory and practice are both conceptualized and re-positioned to deepen a student's understanding of the world (Kolb & Fry, 1975). These features make experiential learning transformative because it shapes the understanding and interpretation of theories, beliefs, values, and practices of a person (Ambrose et al., 2010; Cooper, Orrell, & Bowden, 2010).

Given the framework on experiential learning, we are interested to study the phenomenon through the lens of volunteerism as its shapes the soft skills of students in highly technical careers involving exposure to multi-cultural environments of the workplace, such as seafaring.

RESEARCH METHOD

Participants

The study employs a descriptive survey research design involving 60 college students, aged 16-24 years old, enrolled under the Bachelor of Science in Marine Engineering program during the 2nd Semester, School Year 2015-2016 in a private HEI in Quezon City, Philippines. The respondents were purposively selected based on their regularity of participation in 14 community service engagements from 2013-2015 (see **Table I**).

Survey Instrument

Demographic questionnaire. While maintaining respondent's anonymity, the researchers gathered data on gender, age, grade point average (GPA), parents' education, and combined family monthly income.

Instrument. The Soft Skills-Graduate Attribute Scale (SS-GAS) (Cronbach $\alpha = 0.77$) was used to assess student opinion on the attainment of the ILOs described in **Table II**. We previously piloted the instrument with 56 college students from architecture, education, and civil engineering programs in the same school. The questionnaire uses a 7-point Likert scale from 1 ('*strongly disagree*') to 7 ('*strongly agree*') on each graduate attribute. SS-GAS consists of 27 items from the 7 ILLOs: professional competence (4 items) (Cronbach $\alpha = 0.92$), critical thinking skills (5 items) (Cronbach $\alpha = 0.82$), communication skills (3 items) (Cronbach $\alpha = 0.78$), lifelong learning (4 items) (Cronbach $\alpha = 0.70$), social and ethical responsibility (4 items) (Cronbach $\alpha = 0.85$), productivity (3 items) (Cronbach $\alpha = 0.76$), and interpersonal skills (4 items) (Cronbach $\alpha = 0.86$). Each participant took an average of 10 minutes to accomplish the questionnaire.

To interpret the results, an anchor-based approach, i.e., a criterion is applied to define a substantial change, was utilized. Here, the computed mean score falling within the prescribed range of 1.00-1.86 was categorized as 'very low'; 1.87-2.72 as, 'low'; 2.73-3.58, 'below average'; 3.59-4.44, 'average'; 4.45-5.30, 'above average'; 5.31-6.16, 'high'; and 6.17 – 7.00 as 'very high'. A major limitation of the anchor-based approach is that it does not take measurement precision into account (Lydick and Epstein, 1993).

Data Gathering Procedure

Pen-and-paper survey forms were given to the respondents to obtain data on demographics and soft skills. The respondents were provided with

Table I

The community engagement activities undertaken by the respondents. Institutions with labelled asterisk are national government agencies. The different disciplinary programs partnered with the marine engineering program for specific community activities are indicated.

Activity	Site	Collaborating Departments/Institutions	Expected Soft Skills or Outcomes
International coastal clean-up	Freedom Island, Paranaque City	Local Government Units (LGUs); Department of Environment and Natural Resources (DENR)*	Social and ethical responsibility; Interpersonal skill; Communication skill
Basic welding training	On-campus	LGUs	Professional competence; Social and ethical responsibility; Interpersonal skill; Communication skill
Development of multi-sensor floating garbage disposal system	On-campus		Professional competence; Interpersonal skill; Communication skill; Productivity; Social and ethical responsibility
Development of portable solar lamps	On-campus	Electrical engineering program	Professional competence; Interpersonal skill; Communication skill; Productivity; Social and ethical responsibility
Estero (drainage) clean-up drive	Quezon City	LGUs	Social and ethical responsibility; Interpersonal skill; Communication skill
Tree planting, literacy, and numeracy projects	Bulacan	Information technology, education and electrical engineering programs; DENR*	Professional competence; Communication skills; Social and ethical responsibility; Interpersonal

Mangrove planting	Freedom Island, Paranaque City		Social and ethical responsibility; Interpersonal skill; Communication skill
Coastal clean-up	Freedom Island, Paranaque City		Social and ethical responsibility; Interpersonal skill; Communication skill
International coastal clean-up	Freedom Island, Paranaque City	DENR*	Social and ethical responsibility; Interpersonal skill; Communication skill
House painting	Tanza, Cavite	Architecture, civil engineering, electrical engineering, business education programs; Habitat for Humanity (NGO)	Social and ethical responsibility; Interpersonal skill; Communication skill
Brigada Eskwela literacy program	Quezon City	Department of Education (DepEd)*	Social and ethical responsibility; Interpersonal skill; Communication skill
Coastal clean-up	Freedom Island, Paranaque City		Social and ethical responsibility; Interpersonal skill; Communication skill
Tree planting	Bulacan	DENR*	Social and ethical responsibility; Interpersonal skill; Communication skill
Relief operation after Typhoon Haiyan	DSWD Center, Pasay City	Department of Social Welfare and Development (DSWD)*	Social and ethical responsibility; Interpersonal skill; Communication skill

the following information about the survey: a) the goal of the study, b) absence of monetary incentive to participate, c) the potential societal benefits of the research, and d) option to withdraw from the study at any

point in time. To ensure the confidentiality, individual folders were provided to the respondents to insert the completed survey sheets prior to submission. The respondents were also told that their names and other identifiers were not required to be written on the answer sheet. The respondents were also reminded that there were no correct or wrong answers, not to leave any items unanswered and they can take their time in answering the survey questions. The study protocol was reviewed by the Research and Development Management Office (RDMO) of the school.

Data Analysis

Shapiro-Wilk test was used to test normality of the data. Since our data was found to be non-normally distributed, which implies that the mean values are sensitive to outliers, we assigned the median as the measure of central tendency (Field, 2013). Kruskal-Wallis *H* test, a non-parametric test, was used to determine the effects of volunteerism on the soft skills with $p < 0.05$ as being significant (Field, 2013). Cohen's *d* for non-parametric data was computed to report the effect size (Lenhard & Lenhard, 2016).

RESULTS AND DISCUSSION

A focus of youth volunteerism is around educational institutions, especially in the higher education sector. Despite the popularity of student volunteerism, its impact on student competencies is relatively under-researched in the Philippines (Llenares & Deocaris 2018; Llenares & Deocaris 2015; Santillan 2011; Cardenas et al. 2009; Lalap et al. 2013). This observation is surprising given that community service is a mandatory requirement in Philippine higher education delivered through the National Service Training Program (or NSTP). NSTP is a 6-unit credit course offered for 2 semesters. During the 1st semester, NSTP comprises of lectures on humanistic self-development, Filipino characteristics and its value system, disaster management, and various current national issues. Formal community immersion programs are performed during the 2nd semester. It should be noted that NSTP is a mandated by a national law, Republic Act #9163 (or the NSTP Act of 2001).

While the body of literature on curricular benefits of volunteerism has been expanding (Astin & Sax, 1998; Astin et al. 2000; Avalos et al. 1999), there is a growing need to examine the impact of volunteerism among technical students, especially in the context of molding these graduates to acquire a fuller skill set aligned with industry needs. The term "soft skills" are variably denoted as ILOs, "key competencies," "generic

skills," "generic competencies," or "employability skills." These allied skill sets are considered vital to enhance technical competency in a way which can be applied to a broader aspect of life and work (Rychen & Salganik 2003; Abdulwahed et al. 2013; Acomi & Acomi, 2016).

How then does volunteerism impact of the soft skills of our 21st-century engineers? In this study, we focused on marine engineering students because the Philippines is the leading source of seafaring labor in the world. Filipinos comprise over 20% of the total shipboard workforce in international trading fleets (Leggate 2004; Corbett & Winebrake, 2008). Marine engineers are involved with the design, development, building, installation, inspection, and maintenance of equipment and parts that make boats and other maritime vessels (Taylor, 1996). With the international dispersion of marine engineers, the students are expected to operate within heightened cross-cultural global cooperation requiring intercultural competencies and soft skills.

Table II.

Operational definitions of the type of volunteer engagement and soft skills. Examples of statements from the instrument are shown.

Terms	Definitions
Regular volunteers	Those who consistently provide time, effort and skills to support civic activities, such as initiating community outreach planning, organizing fellow volunteers and implementing volunteer activities
Non-regular volunteers	Those who volunteer whenever they are free from their academic obligations, for example, during the semestral break
First-timer volunteers	Those who have volunteered before the survey yet only within the context of the mandatory school-based service program
Graduate Attributes	Refers to the soft skills expected to develop among students across academic programs when they graduate
Professional Competence	Refers to the understanding and mastery of fundamental knowledge and skills required for effective professional practice in the field of specialization "*I am updated on the major developments in the professional or discipline-related program."*

Critical Thinking and Problem-Solving Skills	Refers to critical and creative thinking in providing solutions to discipline-related problems "*I analyze problems and issues and obtains relevant data before making decisions*."
Communication Skills	Refers to effective communication skills, both orally and writing, using the English language *"I can communicate my ideas clearly, convincingly, and in an organized manner."*
Lifelong learning	Refers to the lifelong learning skills in pursuit of personal development and excellence in professional practice *"I can diagnose what I know from what I don't know."*
Social and Ethical Responsibility	Refers to the personal values and beliefs as ethical professional consistent with Filipino family values, industry-desired values, and global citizen values *"I put into mind preserving natural resources in my work."*
Productivity	Refers to the nation-building and national development through the application of new technology *"I use software and other modern tools to develop cheaper technology in addressing community problems"*
Interpersonal skills	Refers to working effectively in multi-disciplinary and multicultural teams *"I can effectively manage and resolve conflict within a group."*

The student respondents were selected based on their community outreach portfolios. Although most of the outreach projects were not credited under the regular courses, the school ensured that the design of the NSTP volunteer activities were aligned with skills and technical expected from marine engineering students.

Table I shows the community competencies expected from marine engineering students' activities co-developed by the faculty of the marine engineering program in partnership with the Social Orientation and Community Program (SOCIP) staff. SOCIP is the office that takes charge of coordination, implementation, and monitoring of NSTP community projects. An example of a skills-matched volunteer activity for marine engineers is the design and assembly of portable solar lamps for the impoverished communities in Montalban, Rizal, a province 20-km from the school.

Since a multidisciplinary perspective was adopted in the design of the community engagement program, we hypothesize that a single volunteer activity can simultaneously involve the application of several soft skills.

For example, the development and community deployment of a cost-effective multisensory floating garbage collector is expected to involve soft skills other than professional (or engineering) competence, such as communication skills, interpersonal skills, productivity, and social and ethical responsibility. Interestingly, not all the community projects were related to marine engineering. Some students collaborated with their peers from other disciplines to support the literacy and numeracy projects for indigent communities, refurbish public school classroom fixtures during the '*Brigada Eskwela*' (or School Brigade) program, and paint houses in partnership with Habitat for Humanity-Philippines (HHP). All in all, the respondents were exposed to a total of 14 diverse volunteer activities. However, based on the volunteer activities in **Table I**, the expected outcomes leaned more on student communication skills, interpersonal skills, and social and ethical responsibility. There was lesser involvement of professional competence and productivity in the community-based activities.

Table III

Soft Skills Profile of the respondents (n=60) based on the SS-GAS Inventory

Soft Skills	Median Score	Rank	Description
Professional Competence	5.50	6	High
Critical Thinking	5.80	1	High
Communication Skill	5.67	5	High
Lifelong learning	5.75	2.5	High
Social and Ethical Responsibility	5.75	2.5	High
Productivity	5.30	7	Above Average
Interpersonal	5.75	2.5	High

Using the soft skills instrument to extract student perspectives on the attainment of the soft skills, we observed that soft skill scores of the students were already generally high (**Table III**). The levels of their soft skills may be a good indicator for the alignment of their competencies as far as the Standards of Training, Certification, and Watchkeeping (STCW) is concerned.

To separate the effects of classroom-based learning from the volunteer work, we stratified the respondents according to their volunteering activity: regular, non-regular volunteers and first-time volunteers (see **Table II** for the operational definitions). Significant differences between the

groups emerged when it comes to professional competence, communication skills, and social and ethical responsibility (see **Figure 1**). These skill sets, in our opinion, may have been likely enhanced through the relevant volunteer activities that require the development of solutions to existing community problems. It is interesting to note that these soft skills are associated with our expected outcomes as shown in **Table I**.

An interesting observation is that the enhancement of soft skills was only seen with students who performed community outreach on a regular basis. These volunteers, compared with occasional and first-time volunteers, experienced the improvement in their soft skills probably because of their general interest for life learning. This observation is consistent with the results of our earlier study showing Filipino students are attracted to volunteer activities for personal and career growth (Llenares & Deocaris 2015). Other groups have also noted this observation (Primavera, 1999; Eppler *et al*. 2011).

Among these 3 soft skills that that were significantly enhanced by volunteerism, it was score for social and ethical responsibility that increased the most between first-time volunteers and regular volunteers. This is particularly promising since there is move among educational policy experts to highlight engineering ethics in the curriculum as engineers are expected to come up with better value judgment and assess the impact of their actions. This is properly timed as a response to the growing number of engineering-associated disasters, such as the Hyatt Regency Hotel Walkway Collapse (1981), the Chernobyl nuclear leak (1986) and Space Shuttle Columbia disaster (2003). The Accreditation Board for Engineering and Technology (ABET) draws to attention the study of ethics in order for students to better acquire "an understanding of the professional and ethical responsibility" (Bucciarelli, 2008). Besides having a firm grasp of science, mathematics and engineering fundamentals, ABET-accredited institutions will have to aim to produce graduates with soft skills in communication, multidisciplinary teamwork, and lifelong learning skills and awareness of social and ethical considerations (Rugarcia *et al*. 2000).

We no longer pursued further study on other academic disciplines, such as teacher education and information technology education, despite these courses being more popular in the Philippines. Instead, we focused on marine engineering program because of the urgent national issue when the study was being conceived. In 2013, the European Union questioned the quality of Philippine maritime education prompting the Commission on Higher Education (CHED), together with Maritime Industry Authority, to heighten inspection and monitoring of all private and public HEIs offering

maritime courses (Magkilat, 2018). Any substandard findings resulted in the closure of programs, as in the case of a local college (GMA news online, 2011).

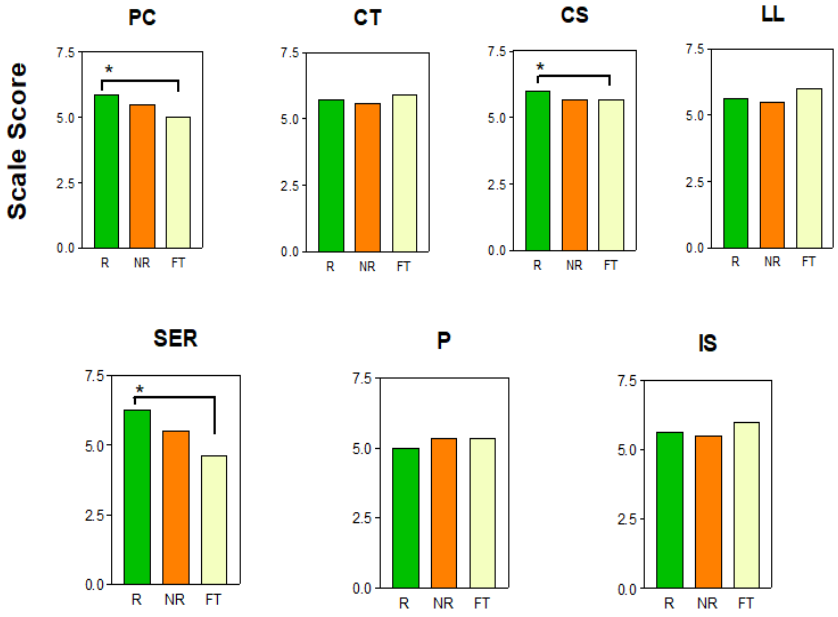

Figure 1. Graduate Attributes of Marine Engineering Students. Median scores based on the Soft Skills-Graduate Attribute Scale (SS-GAS) of 60 undergraduate marine engineering students based on the frequency of volunteering activities: regular volunteer (R), non-regular volunteer (NR) and first-time volunteer (FT). Asterisk indicates a significant difference at $p<0.05$ based on Kruskal-Wallis test (H) and Cohen's Test for non-parametric data (d) in the Soft Skill-Graduate Attribute scale for Professional competence (PC) ($H = 49.16$, $p > 0.01$, $d = 4.43$), communication skill (CS) ($H = 8.57$, $p < 0.01$, $d = 0.78$) and social and ethical responsibility (SER) ($H = 53.16$, $p< 0.01$, $d = 2.97$). Other soft skills, i.e., critical thinking (CT), lifelong learning (LL), productivity (P) and interpersonal skill (IS) did not show a significant difference based on the volunteering frequencies.

IMPLICATIONS

With pressures from both national and international bodies, the Philippines responded by enacting innovative strategies to augment and improve the

quality of its maritime education programs. Among the steps implemented were the enforcement of stricter academic retention policies, application, and upgrading of technology, and strengthening of shipboard training. In the light of this pressing situation, the salutary effects of community engagement and volunteerism on soft skills of marine engineering students affirm the need to enhance policies and practices that will promote skills-matched volunteerism in maritime education. It would be worth investigating how volunteerism would positively impact other courses as well.

LIMITATIONS OF THE STUDY

As this study follows a descriptive design, future studies may involve a longitudinal approach, e.g. a graduate tracer study, to better measure the impact of soft skills enhancement and volunteerism on employability.

On the methodology, we did not evaluate the soft skills before and after the community-based projects as it is difficult to isolate the effects of discrete activities on specific behavior or competency given several other confounding variables, e.g., family background, student values, etc.

CONFLICT OF INTEREST
There is no conflict of interest. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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