

Assessing Academic and Profession Alignment: A Tracer Study of Civil Engineering Graduates of Bulacan State University

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Abstract

Civil engineers' job performance and achievements at work depend on their educational attainment, training requirements, and where they studied and learned to be globally competitive. Every employer expects effective and positive job performance from their employees. The survey seeks responses from 2014–2018 Bachelor of Science in Civil Engineering graduates and their employers on employment performance and results to verify employee performance. BulSU CE graduates and employers are surveyed using Google Forms. Frequencies, percentages, composite means, and two sample t-tests from Minitab are used to investigate if graduates and employers perceive alumni job performance and outcomes differently. Most 2018 graduates are male, 22–25 years old, bachelor's degree holders, and Civil Engineering Board Exam passers. In terms of employment placement, 63.8% of graduates are regular or permanent employees, 65.59% have 1–3 years of experience, and 70.6% work in Construction Engineering and Management. Results reveal that graduates and employers view employment performance and results similarly. Thus, the foundation provided by universities, notably the Civil Engineering Department, helped graduates perform well in their jobs. Seeing engineering knowledge, problem-solving, communication, ethics, competency, and determination to succeed enables graduates and employees to accomplish their jobs well and makes them valuable locally and globally.

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1. Introduction

Educational institutions that are involved in fostering individuals' development through comprehensive training are obligated to oversee the advancement of their former students [1]. A tracer study is a specific empirical inquiry that offers valuable insights for evaluating the results of educational and training programs provided by an institution [2]. The study enables data collection about potential deficiencies within the program. The aforementioned data can then be utilized as a foundation for improving the program.

A survey conducted among alumni provides significant insights into former students' present condition and future paths, enhancing the perspectives of administrators, faculty, and current students. The institution should evaluate many factors, including income, employment industry, current position, cultivated values, and refined work capabilities. An employee's performance is intricately linked to the efficacy of the curriculum, which plays a crucial role in defining students' educational experiences during their academic stay.

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According to the research conducted by Hassan et al. (2006), there exists a pressing necessity for engineering programs to enhance their overall performance, with particular emphasis on the non-technical facets of engineering education. In essence, it is advisable to implement educational programs that aim to bolster employability skills by prioritizing the development of non-technical proficiencies among undergraduate students. The Employability Talents Framework enumerates specific talents that engineering graduates acquire [3]. These skills align with the criteria emphasized for professional skills outlined in the Accreditation of Engineering Programmes (EAC) Manual.

Engineering graduates are anticipated to possess employability skills that will facilitate their ability to enhance their knowledge and technical expertise proficiently in the future, as per the expectations of employers. Employers place considerable value not only on the academic qualifications of prospective engineers but also on their possession of crucial competencies, skills, abilities, and personal traits. There is a need for enhancement in the engineering education curriculum by including on-the-job training and practical coursework [4].

This study aims to answer the following research questions to achieve the objective of this study:

RQ1: What are the personal and academic characteristics of BulSU Civil Engineer graduates, including factors such as name, age, gender, year graduated, highest educational attainment, licensure examination passage, and participation in seminars/training?

RQ2: What is the job placement profile of the respondents in relation to their Employment Status, Years of Working Experience, Nature of Work, Category of Employment/Position, and Category of Present Employer?

RQ3: How do BulSU Civil Engineering graduates rate their job performance across various dimensions, including technical competence, ethical standards, communication skills, self-directed learning, and the preparedness of their BulSU education for employment and industry roles?

RQ4: How do the graduates assess the achievement of student/program outcomes, encompassing aspects like independent problem-solving, engineering knowledge, professional ethics, teamwork, communication skills, motivation for learning, and integrating new tools in their work?

The general objective of the study is to follow up on the performance of the Bulacan State University (BulSU) Civil Engineering graduates as the basis for the curriculum enhancement. Firstly, it seeks to assess the work performance of employed graduates within five academic years, from 2013-2014 to 2017-2018. Additionally, it aims to compile a comprehensive profile of these graduates, including their nature of work, job positions, and productivity within their respective institutions or companies. The research further intends to establish a detailed job placement profile based on factors such as years of working experience, nature of work, and employment position. Furthermore, the study strives to identify the specialized fields in which alumni have engaged in their current roles, encompassing disciplines like Structural Engineering, Construction Engineering and Management, Water Resource Engineering, Geotechnical Engineering, Environmental Engineering, and Transportation Engineering. Moreover, the investigation aims to provide an insightful description of the job performance exhibited by the graduates. Lastly, the study seeks to provide a comprehensive account of these graduates' student/program outcomes.

2. Research Method

The present study used a non-experimental, quantitative, and descriptive approach to assess the collected data. The study will observe and evaluate the professional performance of civil engineering graduates from BulSU between the years 2014 and 2018, as perceived by the graduates themselves. This will serve as the primary focus of the research. In this study, the primary instrument employed by the researchers was a questionnaire. The questionnaire consisted of inquiries about the respondents' job placement, work-related values, and skills acquired during their time at Bulacan State University. Using Likert scale survey questions is crucial for assessing an individual's perspective or disposition towards a specific topic [5]. Table 1 shows the scaling method used in the administration of the survey questionnaire via online platforms.

Upon obtaining information regarding the total number of civil engineering graduates, the researchers administered the survey questionnaire via online platforms such as email and Facebook. This was facilitated through the utilization of Google Forms. The graduates were duly informed about the study's objectives and the importance of their participation in contributing to the research. Quantitative data analysis commonly uses frequencies, percentages, and mean comparisons [6].

Table 1. The Likert Scale used to interpret the survey questionnaire results

Scale	Scale Range	Verbal Interpretation
4	3.50 – 4.00	Strongly Agree
3	3.49 – 2.50	Agree
2	2.49 – 1.50	Disagree
1	1.49 – 1.00	Strongly Disagree

3. Results and Analysis

3.1. Personal Profile of the Graduates

The present study summarizes the findings and analyses derived from a survey with a sample size of 279 participants, primarily focusing on individuals who have obtained a degree in civil engineering. Regarding the distribution of age (Table 2), a significant proportion of participants, comprising 61.60%, belonged to the age bracket of 22 to 25 years, while 37.60% fell into the age range of 26 to 30 years. The gender distribution, as shown in Table 3, indicates that 61.60% of the respondents identified as males, while 38.40% identified as females. Table 4 reveals that the graduating class of 2018 had the most representation, accounting for 26.50% of the total. This was followed by the classes of 2014 (20.80%), 2015 (19.70%), 2017 (17.60%), and 2016 (15.40%).

Table 2. Age of Respondents

Age Range	Frequency	Percentage (%)
31-35	2	0.70%
26-30	105	37.60%
22-25	172	61.60%

Table 3. Gender of the Respondents

Gender	Frequency	Percentage (%)
Male	172	61.60%
Female	107	38.40%

Table 4. Year of Graduation of the Respondents

Year Graduated	Frequency	Percentage (%)
2018	74	26.50%
2017	49	17.60%
2016	43	15.40%
2015	55	19.70%
2014	58	20.80%

Regarding educational achievement (Table 5), a significant majority of participants, amounting to 97.80%, had successfully obtained a bachelor's degree, while a lower proportion, namely 2.20%, had attained a master's degree. With regards to the board examinations (Table 6), it was found that 76.70% of the graduates indicated successful completion of these exams. In comparison, 23.30% did not pass or did not attempt the licensure examinations. Finally, Table 7 illustrates the distribution of graduates' participation in seminars and trainings. It reveals that 13.60% of the graduates attended the PICE National seminar, 6.10% attended the PICE National Midyear seminar, 3.90% attended the ASEP International seminar, and 17.30% participated in other civil engineering-related activities. Notably, a significant majority of respondents, precisely 59.10%, reported a lack of attendance at seminars or training. The findings above offer meaningful insights into the attributes and encounters of survey participants who have completed their education in civil engineering.

Table 5. Distribution of Graduates who pursue graduate studies

	Frequency	Percentage (%)
Pursued Graduate Studies	6	2.20%
Did not pursue graduate studies	273	97.80%

Table 6. Frequency distribution of the Civil Engineering graduates in terms of passing the licensure examination

	Frequency	Percentage (%)
Passed	214	76.70%
Not Passed	65	23.30%

Table 7. Frequency distribution of the Civil Engineering graduates in terms of seminars/trainings attended

Seminars/Trainings	Frequency	Percentage (%)
ASEPInternational	11	3.90%
PICENationalMidyear	17	6.10%
PICENational Conference	38	13.60%
Other Seminars/Trainings	48	17.30%
None	165	59.10%

3.2. Job Placement Profile of the Civil Engineering Graduates

The findings and evaluation contained in the given information can be succinctly described as follows. Regarding the job status of the participants (Table 8), a significant proportion, specifically 63.80%, hold regular or permanent employment. This is followed by 21.10% who have contractual status, 9.00% in probationary status, and lesser percentages for self-employed and unemployed individuals. In relation to the data presented in Table 9, it can be observed that most graduates, specifically 65.59%, have acquired job experience ranging from one to three years. Additionally, 34.05% of graduates have reported work experience spanning from four to six years, while a mere 0.36% of graduates have accumulated work experience of seven years or more.

Table 8. Civil engineering graduates distribution in terms of category of employment

Employment Status	Frequency	Percentage (%)
RegularorPermanent	177	63.80%
Probationary	25	9.00%
Contractual	59	21.10%
Self-employed	7	2.50%
Unemployed	11	3.60%

Table 9. Civil engineering graduates in terms of working experience

Years of Experience	Frequency	Percentage (%)
1 – 3	183	65.59%
4 – 6	95	34.05%
7 and above	1	0.36%

According to the data presented in Figure 1, it can be observed that among the graduates who are now working, a majority of 54.41% have remained with their current employer for a period ranging from one to three years. Additionally, 31.80% of employed graduates have been with their current company for less than a year, while 13.79% have maintained employment for four to six years. Regarding the employment positions outlined in Figure 2, the most significant proportion is occupied by Site/Field/Office Engineers, accounting for 18.01% of the total. Engineers (I, II, III, Cadet, Junior, Senior, etc.) are closely behind at 16.48%, and Project Engineers/Project-In-Charge at 15.33%. Table 10 illustrates that engineers at various levels (Cadet, Junior, Senior, etc.) and managers are the predominant employers in the field.

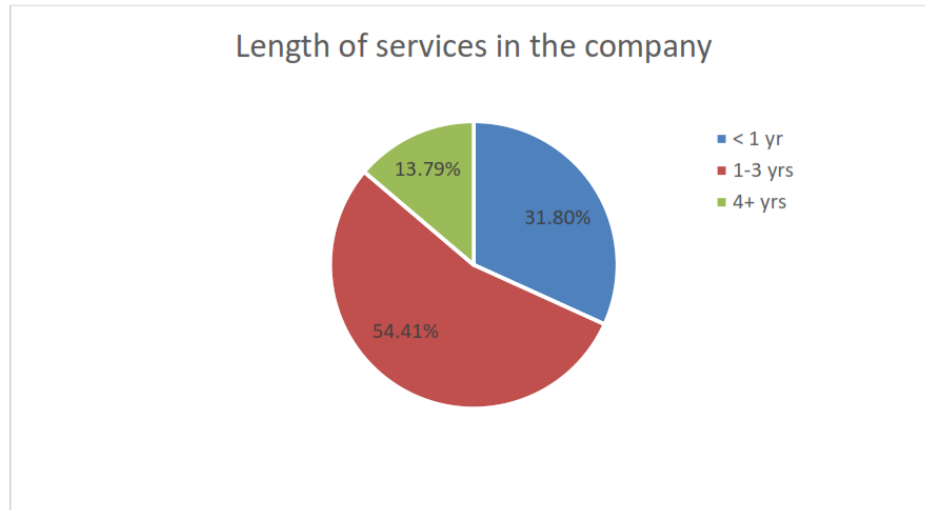


Figure 1. Civil engineering graduates' length of services in the company

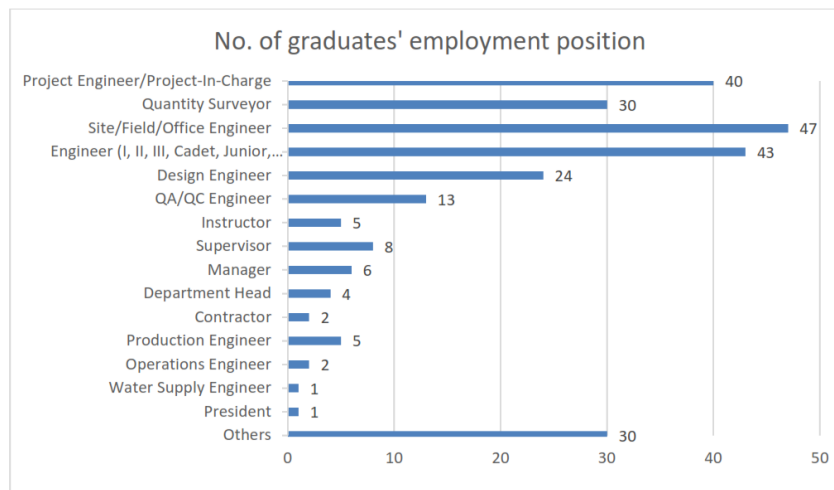


Figure 2. Civil engineering graduates' distribution in terms of position in their employment

Table 10. Frequency distribution of the civil engineering graduates employers in terms of their

Position of Employer	Frequency	Percentage (%)
DepartmentHead	2	4.08%
Director	2	4.08%
Engineer (I, II, III, Cadet,Senior, etc.)	14	28.57%
Manager	5	10.20%
President	1	2.04%
Project Engineer	4	8.16%
Quantity Surveyor	3	6.12%
SiteEngineer	3	6.12%
StructuralEngineer	1	2.04%
Supervisor	4	8.16%
Others	10	20.41%

According to the data presented in Figure 3, most graduates, specifically 70.60%, pursue careers in Construction Engineering and Management. This is followed by 18.60% of graduates choosing jobs in Structural Engineering. The remaining percentages represent graduates who choose to work in various other subfields within civil engineering. The provided data presents an overview of the employment status, professional experience, occupational roles, and specialized fields of the civil engineering graduates who participated in the survey.

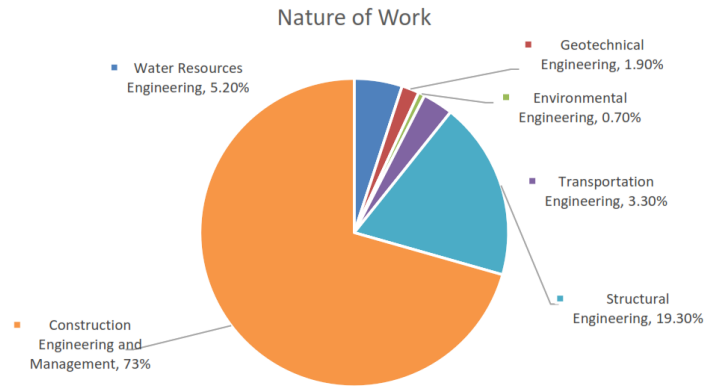


Figure 3. Civil Engineering graduates in terms of Nature of Work

3.3. Job Performance of Graduates

The findings of the study suggest that the acquisition of knowledge and skills has a notable influence on the academic and professional achievements of individuals who have completed a civil engineering program. According to Table 11, the graduates who participated in the survey expressed a strong consensus regarding their possession of crucial skills and abilities. These include a solid foundation of technical knowledge, a commitment to upholding ethical and professional standards, proficient communication skills, the capacity to work independently with minimal guidance, and preparedness for employment and industry-specific responsibilities. This phenomenon can be ascribed to the fact that the participants, who were individuals with a background in civil engineering, already held considerable expertise and understanding in their respective domains.

Table 11. Job Performance of the Civil Engineering Graduates in Terms of the Skills and Abilities, they Possess as Perceived by the Graduates

Particular	Weighted Mean	Interpreted Value
Possess good technical knowledge and competency to perform their work.	3.27	Agree
Carry out your work with high ethical and professional standards, with due consideration to global, business, technological, societal and environmental issues.	3.33	Agree
Demonstrate effective communication and interpersonal skills to engage in diverse team.	3.29	Agree
Self-learners and able to undertake their work with minimal instruction and supervision.	3.39	Agree
BulSU education prepared the graduates for employment.	3.06	Agree
BulSU graduates well for their roles in the industry. BulSU education prepared the	3.08	Agree
Composite Mean	3.24	Agree

Figure 4 provides additional evidence that the graduates possess high self-perceived proficiency in analytical and critical thinking skills, adaptability, and competence. However, Figure 5 highlights certain areas that might be improved, with communication skills being seen as the primary aspect needing refinement, followed by technical competency and ethical conduct. As mentioned above, the findings provide insights into the competencies and areas of improvement exhibited by civil engineering graduates from Bulacan State University (BulSU) in relation to their abilities and qualities.

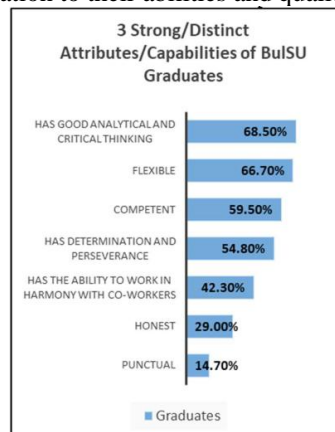


Figure 4. Frequency Distribution of the 3 Strong/Distinct Attributes/Capabilities of BulSU Graduates

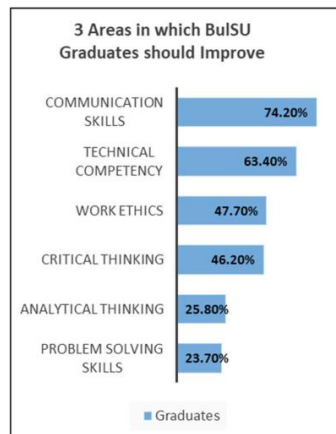


Figure 5. Frequency Distribution of the 3 Areas in which BulSU Graduates should Improve on as Perceived by the Graduates

3.4. Achievement of Program Outcomes of the Civil Engineering Graduates

According to the findings presented in Table 12, it is evident that graduates in civil engineering express a high level of recognition regarding their possession of various skills and abilities. These include the ability to investigate intricate engineering problems thoroughly and a comprehensive understanding of engineering principles, the ability to operate efficiently as independent individuals, and a strong inclination towards continuous learning and acquiring new skills. The findings above demonstrate the aptitude and expertise of the participants, who possess degrees in civil engineering. It is worth mentioning that the individuals had notable strengths in problem-solving abilities and possessed technical backgrounds [4]. The findings additionally suggest that individuals who have completed their education have attained praiseworthy outcomes as students, showcasing a solid understanding of professional ethics and obligations in their respective positions inside organizations. The employability skills comprise various essential attributes that are crucial for success in the field of civil engineering. These skills include effective communication, practical application competence, teamwork, problem-solving abilities, ethical awareness, lifelong learning, understanding of engineering principles, awareness of contemporary issues, experimental design, theoretical competence, and entrepreneurial skills. These skills align with the comprehensive skill set expected of civil engineering graduates [7].

Table 12. Student Outcomes Achievement of the Civil Engineering Graduates as Perceived by the Graduates

Particular	Weighted Mean	Interpreted Value
Having the ability in investigation of complex engineering problems to arrive at valid conclusions (able to conduct independent research, analysis and interpretation of data).	3.10	Agree
Having the breadth and depth in Engineering Knowledge.	3.10	Agree
Being aware of professional ethics and responsibilities of the assigned role in the company.	3.23	Agree
Functioning effectively as an individual, and as a member in diverse teams and in multidisciplinary settings.	3.29	Agree
Communicating effectively with your colleagues in clear, concise and correct manner (overall oral and written communicating skill).	3.24	Agree
Having motivation to learn new things or acquire new skills.	3.41	Agree
Adopting new software or analytical and design tools in work.	3.29	Agree
Composite Mean	3.24	Agree

4. Conclusion

The study of data collected from the alumni survey, explicitly focusing on the responses of civil engineering graduates, has resulted in the identification of numerous significant discoveries. The survey participants consist primarily of individuals who are young, predominantly male and have achieved a bachelor's degree. Many individuals have effectively completed the licensure examination for civil engineers. A significant proportion of the graduates are presently employed, particularly in the Construction Engineering

and Management domain. These individuals frequently hold professional, technical, managerial, or higher jobs within one to three years after gaining work experience. These graduates demonstrate various valuable qualities, such as a comprehensive understanding of engineering principles, proficient problem-solving capabilities, proficient communication skills, a strong sense of ethics, competence, and steadfast resolve. These attributes enable them to make significant contributions both at the local and global levels.

Nevertheless, it is essential to acknowledge that the study has highlighted certain aspects that may be enhanced. The educational offerings supplied by colleges and universities are widely regarded as valuable. However, there exists an opportunity to strengthen the competitiveness of graduates within the business. The study has specifically emphasized the necessity for supplementary instruction in occupation-specific tasks and the utilization of diverse design software. The inclusion of practical coursework and exposure to industrial tools and equipment should be given due consideration while designing the curriculum [8].

Based on the above facts, it is strongly advised that the college and university adopt proactive measures to improve the curriculum. This necessitates a comprehensive evaluation and adjustment of the curriculum to enhance the cultivation of skills, talents, and competencies in accordance with the program's objectives. It is imperative to prioritize the development of communication skills and ethical conduct to align with the desired graduation traits of the institution. Furthermore, it is essential to actively seek and utilize regular input from graduates to make instructional changes that effectively cater to the market's demands. By implementing these recommendations, the college can ensure its civil engineering graduates are adequately equipped to thrive professionally and maintain a competitive edge in the ever-evolving engineering sector.

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