

Employability Skill Development Needs of Engineering Students and Employers' Feedback on Their Internship Performance

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Abstract The study explored on the development needs of engineering students on employability skills and its relationship with their internship performance evaluation from the head of the company or department. The study utilized a quantitative descriptive type of research with 125 total engineering graduates from an academic institution in the Philippines. Results of the study showed that engineering students have excellent internship performance evaluation rating with regard to attitude, personality, knowledge and skills. They have identified the System Thinking Skill with very high development need, assessment on employability skills along with critical thinking and interpersonal skill. Meanwhile, they considered literacy and numeracy as well as work ethics and management skills as they have already developed. Test of relationship showed that skill development needs in terms of literacy and numeracy, management skill and work ethics have significant negative correlation to the four aspects of internship performance evaluation while positive relationship exists between skill development needs in terms of critical thinking and system thinking skills and the internship performance.

Keywords System Thinking, Critical Thinking, Interpersonal Skill, Management Skill, Engineering Education

1. Introduction

Employability skills are being given higher emphasis from the moment the students entered high school and being strengthened when started studying in college. These are necessary soft and hard skills [1-4] which students

should know and possess as part of learning outcomes of engineering programs [5,6]. Problems occur when they are about to finish their degree and still they do not possess yet the necessary employability skills which are considered important if not really a requirement for internship or on-the-job training program. If students join the workforce unpreparedly, a decrease might occur on their self-esteem and confidence to continue their goals and aspirations in the future. It is the major role of the higher education institutions (HEIs) to equip the learners with the essential knowledge, skills, and work values both personal and professional for them to become successful on their career choice [7-10]. Graduates could be able to fulfill the requirements of ASEAN Qualification Reference Framework through student development programs of the university. Esa et al. [11] conducted a study regarding how employability skills are integrated in the teaching and learning process in three (3) Malaysian Polytechnics to ensure that these skills will be acquired by the engineering students upon graduation. Meanwhile, Saputra [12] found out that communications, work-specific, and ICT skills are expected by employers in Indonesia from engineering graduates. These are considered essential skills that can still be enhanced by the students through internship.

With this, internship programs of the HEIs aims to guide the students to find their place in the corporate world by letting them immerse in the work environment. It is an essential part of every curriculum which gives learner with better opportunities to see how they can fit in the industry based on their acquired knowledge and skills from the academe. Students are also allowed to take internship programs even go abroad to do some projects and gain experience from the experts.

Internship is an important learning activity to practice what the students learned from theories. Part of the

objectives of internship is to provide students with experiential learning opportunities and real world experiences about the specific discipline or profession in order to enhance their work values and skills [13-17]. Considering the importance of training programs, and for overall development of students, the universities are very keen in framing the practical curriculum [18]. The professional engineering courses provide the basic knowledge on how the principles can be applied into practice. HEIs are trying to align the curriculum with the demands of the industries where internship transforms the students to become ready in facing the challenges of being professionals [19-20] and where engineering graduates faced totally different environment after leaving the academe [21].

Moreover, manufacturing industries are accepting student-trainees who will be part of their projects and workforce. The expertise of the companies is now being shared with the students of universities and colleges because of their advocacy to improve the skills of the future labor force. They also absorb student-trainees after they graduated from college. They provide actual training to students as if they are also regular employees of the company. The trainees gain their abilities in training through the enhancement of their knowledge, skills and values [22]. Internship can be seen as an apprenticeship or purposeful activity organized to achieve learning outcomes in the presence of a supervisor or mentor [23].

Part of the training is the development of interpersonal and work ethics which are essential components of being able to work in a multidisciplinary team and participating in a group that could positively influence the behavior of other workers. The ability to work in multidisciplinary environment is one of the student outcomes for all engineering degree programs from ABET standards. National and International manufacturing and design industries place greater emphasis on both generic and technical skills. A study of Chaibate et al. [24] gave greater emphasis in the context of globalization in developing employability skills among engineers in Morocco with international dimensions.

By filling in the gaps between the current state of acquired skills of engineering graduates and the required skills of foreign labor market within the boundaries of academic institutions and industry partners, it is possible to lessen the burden on the employment process for both hiring personnel and the job applicants. There are some challenges encountered by industries related to job mismatch [25,26] and lack of appropriate soft skills [27]. Identifying on earlier stage the issue of employability skills and committing the resources of the HEIs in addressing the gaps between the given conditions closes the loop between the learning process and application of acquired learning to the needs of the communities and industries. Employers looked for applicants who possessed appropriate technical skills required by a certain position to be filled in. Having a

certain level of leadership and management skills [28-30] is also being considered in entry-level position which proves the ability of the applicant to take higher responsibilities in the future. It gives the employer a better view on how they could plan the career of the new employee. Hiring managers viewed the importance of employability skills [25].

Most of the studies conducted about employability skills assessed the perception of graduates if they really possessed those employability skills [31-35]. However, the present research discussed how the engineering students rate the level of their needs for development of the employability skills as part of the career development program of the university. Thus, this study explores on the employability skills which include Critical Thinking, Literacy and Numeracy, Leadership, Management, Information technology, Interpersonal, System Thinking, and Work Ethics [36] which are considered necessary in hiring new employees especially on entry-level position for fresh graduates. These are combinations of both hard and soft skills. Communication skill is no longer highlighted among these variables because it is considered as one of the most essential requirements for job placement and it should be manifested by every graduate seeking for employment [37-40]. Analyzing the relationship between the result of internship performance and the development needs on employability skills of the engineering students leads to identifying the significance of career development in preparing the learners to become globally competitive professionals following the international qualification and standards for student outcomes. With the increasing demand for engineers in different parts of the Middle East Asia, USA and Australia, engineering students are being challenged to adapt to the demands of international labor market with proper employability skills.

2. Objectives

This study aimed to determine the specific needs of the Engineering Students in developing their employability skill programs. It also aimed to present the result of internship performance based on the evaluation of their immediate superior in terms of knowledge, technical skills, attitude and personality. The study also tested the significant differences on the employability skills development needs and the result of internship performance evaluation when the engineering students were grouped according to their degree programs.

Hypotheses:

1. There is no significant difference in the employability skill development needs of the engineering students when they were grouped according to degree programs.
2. There is no significant different on the result of

internship performance evaluation when they were grouped according to degree programs.

- There is no significant relationship between the employability skill development needs and the result of internship performance evaluation of the engineering students.

3. Methods

3.1 Research Design

Quantitative descriptive type of research was utilized in the study. It is believed to be appropriate in determining the underlying conditions of the engineering students in terms of their needs to develop the employability skills. A survey questionnaire is suitable for the large number of respondents necessary to be included in the study.

3.2. Participants

The participants of the study are the engineering graduating students from 2016 to 2018 which is composed of three batches with 125 total graduates from four (4) different engineering programs a higher learning institution. These four (4) baccalaureate degree programs in engineering include the following fields: Industrial, Computer, Mechanical and Electronics. The total graduates during Academic Year 2015-2016 is composed of 50 graduates while 32 during 2017 and 43 in 2018.

3.3. Instrument

Table 1. Employability Skills Survey Questionnaire Reliability Test

Employability Skills	Number of Items	Cronbach's Alpha Value
LNS	5	0.903
CTS	6	0.912
LS	5	0.909
MS	4	0.933
IS	6	0.929
ITS	7	0.931
STS	7	0.901
WE	7	0.918
Internship Performance Evaluation		
Knowledge	5	0.909
Technical Skills	5	0.926
Attitude	5	0.915
Personality	5	0.907

The instrument used for the study in determining the level of employability skills of engineering graduates was adapted from the study of Rosenberg, Heimler and Morote [36] which is divided into eight (8) different areas with the corresponding number of items: Literacy and Numeracy

Skills-LNS (5), Critical Thinking Skills-CTS (6), Leadership Skills-LS (5), Management Skills-MS (4), Interpersonal Skills-IS (6), Information technology Skills-ITS (7), System Thinking Skills-ST (7), Work Ethics-WE (7). Meanwhile, the institutional internship performance evaluation is being utilized by the University to evaluate the performance of its students enrolled in internship program. This is divided into four dimensions: knowledge (5), technical skills (5), attitude (5) and personality (5). These instruments were content validated by the experts in engineering education, measurement and evaluation, and industrial psychology. The 5-point Likert scale was used to test the reliability of the instrument with 5 as very high level of need and 1 as very low. The researcher invited 50 business administration graduating students who were not the part of the study to serve as respondents for pilot testing. Table 1 shows the results of the reliability test for the eight areas of employability skills and four dimensions of institutional internship evaluation. The instruments obtained greater than 0.9 alpha coefficient that implies the instruments have very high internal consistency based on the rule of thumb.

3.4. Procedure

The questionnaire for identifying the development needs of the engineering students towards achieving employability skills was administered before the start of their fourth year level as one year preparation before they enroll in internship program in fifth year. These questionnaires were administered for three years (2014, 2015 and 2016) during the month of July. Students were well-informed regarding the purpose of the study. They understand that the findings of the study will serve them better to improve their employability skills. Year after year, the university provides them the opportunity to attend several training and workshop to improve their skills based on their identified needs. Meanwhile, documentary analysis was utilized to obtain the result of the internship performance rating from the Internship office. For three years, the data of the students' rating including their names and the answers on employability skill survey were coded and tallied. Upon completion of all necessary data for data processing, all names of the students has been already deleted from the database. Verbatim comments of the employers taken from their evaluation were also included in the discussion to substantiate the result of the evaluation.

3.5. Data Analysis

Weighted mean is the descriptive statistics used to describe the result of employers' feedback of internship performance evaluation and the students' level of employability skills.

Pearson-r was used in testing the relationship between the development needs and the result of internship

performance. Analysis of Variance was used to test the differences of employability skill development needs of the students across four (4) degree programs. Parametric test was utilized in the study because the nature of the gathered data is normally distributed. The result of the internship evaluation performance and development needs was interpreted using the given scale: 4.50–5.00: Excellent; 3.50–4.49: Very Good; 2.50–3.49: Good; 1.50–2.49: Fair; 1.00–1.49: Poor.

4. Results

Table 2 reveals the test of difference on employability skill development needs of engineering students. Results showed that engineering students have significant differences on their employability development needs in terms of critical thinking, leadership, and management skills. Therefore, the null hypothesis of no significant difference is rejected. In general, engineering students have very high development needs on system thinking skills (4.57) followed by a high level degree of need in critical thinking skills (3.34) and moderate need on interpersonal skills (3.04) as the top 3 priority areas identified by the respondents. Moreover, the three least identified skills which the engineering students believed they have already

possessed are the following: work ethics (2.30), management skills (2.22), and literacy and numeracy skills (2.03). Result also showed that Industrial Engineering students have significantly higher development needs in critical thinking skills (3.48) compared to Mechanical Engineering students while they have significantly lower need in management skills (1.87) compared to Electronics Engineering students with significantly higher need. Meanwhile, Computer Engineering students have significantly higher need to develop the leadership skills (2.83) compared to Electronics Engineering students (2.27) with significantly lower development need of leadership skill. On the other hand, engineering students across the four programs have no significant difference on development needs in terms of Literacy and Numeracy Skills, Interpersonal Skills, Information technology Skills, System Thinking Skills, and Work Ethics.

Table 3 reveals the test of difference in the internship performance of engineering students based on the evaluation of their respective employers or immediate superiors. Result showed that no significant difference exists on the internship performance evaluation of the engineering students when they were grouped according to degree programs. Therefore, the null hypothesis of no significant difference is accepted.

Table 2. Test of Differences on Employability Skill Development Needs of Engineering Students

Employability Skills	BSIE	BSCpE	BSME	BSECE	Total (R)	f-value	p-value
Literacy and Numeracy Skills	2.16	1.92	1.82	1.90	2.03 (8)	0.1873	0.904
Critical Thinking Skills	3.48	3.26	2.01	3.24	3.34 (2)	3.0477*	0.031
Leadership Skills	2.63	3.83	2.45	2.37	2.61 (5)	3.2663*	0.043
Management Skills	1.87	2.28	2.48	2.51	2.22 (7)	4.2815*	0.039
Interpersonal Skills	3.11	2.75	3.14	2.98	3.04 (3)	0.2364	0.869
Information technology Skills	2.95	2.36	2.59	2.15	2.71 (4)	0.8479	0.482
System Thinking Skills	4.61	4.56	4.53	4.49	4.57 (1)	0.5442	0.657
Work Ethics	2.48	2.12	2.08	2.01	2.30 (6)	0.2839	0.836
Overall Composite Mean	2.91	2.89	2.64	2.71	2.85		

*Significant at $p\text{-value} < 0.05$

Table 3. Test of Differences on Internship Performance Evaluation of Engineering Students

Internship Performance	BSIE (R)	BSCpE (R)	BSME (R)	BSECE (R)	Total (R)	f-value	p-value
Knowledge	4.53 (3)	4.62 (3)	4.55 (4)	4.59 (3)	4.55 (3)	0.84285	0.44342
Technical Skills	4.48 (4)	4.55 (4)	4.62 (3)	4.52 (4)	4.52 (4)	0.53751	0.73235
Attitude	4.78 (1)	4.89 (1)	4.87 (1)	4.72 (2)	4.81 (1)	0.16544	0.91547
Personality	4.72 (2)	4.85 (2)	4.81 (2)	4.79 (1)	4.77 (2)	0.35782	0.73246
Overall Composite Mean	4.63	4.73	4.71	4.66	4.66		

*Significant at $p\text{-value} < 0.05$

Table 4. Relationship between Employability Skill Development Needs and Internship Performance

Skills Needed	Knowledge (p-value)	Skills (p-value)	Attitude (p-value)	Personality (p-value)
Literacy & Numeracy	-0.639 (<0.01)**	-0.739(<0.01)**	-0.694(<0.01)**	-0.712(<0.01)*
Critical Thinking	0.792(<0.01)**	0.684(<0.01)**	0.753(<0.01)**	0.649(<.001)**
Leadership	0.210(>0.05)	0.301(>0.05)	0.211(>0.05)	0.249(>0.05)
Management	-0.483(<0.05)*	-0.589(<0.05)*	-0.604(<0.05)*	-0.534(<0.05)*
Interpersonal	0.229(>0.05)	0.109(>0.05)	0.537(<0.05)*	0.457(<0.05)*
Information technology	0.219(>0.05)	0.301(>0.05)	0.349(>0.05)	0.288(>0.05)
System Thinking	0.693(<0.01)**	0.745(<0.01)**	0.729(<0.01)**	0.681(<0.01)**
Work Ethics	-0.593(<0.05)*	-.653(0.05)*	-0.622(<.05)*	-0.711(<0.05)*

*Significant at p-value<0.05; **Significant at p-value<0.01

They obtained excellent performance rating in terms of attitude (4.81) followed by another excellent performance rating in personality (4.77) and knowledge (4.55) with the least mean score in technical skills (4.52). The result of analysis of variance revealed no significant difference in the performance of the four (4) engineering programs. Though in overall composite mean, students from Computer Engineering program (4.73) have the highest performance evaluation rating compared to Mechanical Engineering students (4.71) and Electronics Engineering students (4.66) with the least performance mean score obtained by Industrial Engineering (4.63) but these evaluation ratings do not vary significantly.

In terms of ranking across degree programs, they ranked first in the performance evaluation of attitude except for the group Electronics Engineering students that ranks second on this aspect but they ranked first in terms of personality. Between knowledge and technical skills, they ranked third in knowledge except the group of BS Mechanical Engineering students. BSME students ranked fourth on the evaluation of knowledge but they ranked third in technical skills. Results of ranking revealed there are similarities on the way they were rated by their respective employers.

Table 4 presents the relationship between skill development needs and internship performance. Result showed that there are significant relationship between the internship performance evaluation of the engineering students and their employability skill development needs except for leadership and information technology skills. Therefore, the null hypothesis of no significant relationship is rejected.

Employability skill development needs in terms of literacy and numeracy (<0.01), management (<0.01)and work ethics (<0.05) have significant negative correlation to the four aspects internship performance evaluation. However, significant positive relationship exists between skill development needs in terms of critical thinking (<0.01) and system thinking skills (<0.01) and the internship performance rating across four aspect of evaluation. Furthermore, there is also a significant positive relationship between development need on interpersonal skill and the internship performance rating on attitude of the

engineering students as denoted by the computed p-value of less than 0.05 alpha level. Meanwhile, leadership and information technology have no significant relationship with the result of internship performance in four aspects of evaluation with computed p-values greater than 0.05 significant level.

5. Discussion

Employability skills are considered important student outcomes that every engineering graduate must be able to learn and possess upon leaving the academic institutions for them to overcome the challenges of stiff competition when it comes to job placement. This study brings the result on how the engineering students viewed these skills as still needed for development to become job ready. Differences exist in the employability skills development needs in terms of leadership, critical thinking and management skills but there is no significant difference on other stated employability skills in general. This result also confirmed the finding of the study of Saputra [12] in Indonesia where the needs of the engineering students do not vary significantly when they were grouped according to specific discipline. There are learning domains and student outcomes from ABET which are common to every engineering program. The shared practices and culture of engineering make them consistent in developing the skills of future engineers.

Furthermore, engineering students strongly believed that there is still a need for them to develop the system thinking skill and of figuring out how it could benefit them in the future. Systematic thinking is viewed as the interrelation of the organizational events and having holistic perspective towards various elements of development in the institution [41]. This desired skill provides understanding of the collaboration among different components including human resources, technology and financial aspects to achieve the target goals of the organization. Knowing how social, organizational and technological system work is part of developing the understanding of the students in maintaining harmonious flow of communication through a

predefined set of criteria and protocols within the organization. Optimizing the use of technology supports the ability of the organization to provide more reliable outputs for the stakeholders [42]-[44]. Distinguishing trends, and predicting the effects of the course of actions on the system operations emphasized how they can analyze the available data and use this as part of the important procedures in maintaining the business operation. Knowledge on predictive analytics and big data is also believed to be important in support to industrial digitization [45] and data visualization in the construction engineering [46],[47]. Students could able to make some suggestions if they have background knowledge of the entire organizational system on how to adjust the existing systems in improving the major produced goods and quality services and developing new or alternative systems. Likewise, they also need to develop an employability related skill on how to assess and recognize the efficiency of the operation of the social system, organizational system and technological system [48]. Having better understanding of the interrelationship of system within an organization and in the global economy would help them to become responsive on the company requirements towards organizational efficiency [49].

In addition, the ability to generate new ideas is something that the engineering students still need in developing and specifying the goals of the organization as well the limitations, generating alternatives and other plans, considering risks, and evaluating and choosing the best alternative. Critical thinking skill is part of the 21st century skills that learners need to acquire from the academe and industry exposure to stay relevant with the requirements of future jobs [50]-[53]. Part of the development of critical thinking skills is learning how to identify problems and later develop and execute the necessary action plan; organizing and processing graphs, symbols, objects, pictures, and other information as well as acquiring and applying innovative ideas and technical from various sources like prints. Problem solving skill is built into the engineering curricula as one of the student outcomes and graduate attributes [54]-[58]. It also served as a central activity to the engineering practice [59]. Finding out a specific rule or appropriate principle underlying the connection between or among objects is another critical thinking skill they need to possess and applying it when solving a problem.

Likewise, they also felt the need to develop their interpersonal skills for them to help others in learning and contributing to group efforts. This is considered as professional skill not only as social ability to interact with people within the community or workplace [60]. The school environment as well as the family environment and social circle affect the development of interpersonal skill of the learners. Part of this skill is having an ability to communicate effectively and convey messages clearly as well as receiving information accurately [61]-[63] in a

multidisciplinary environment [64]-[66]. They acknowledge the weakness on their ability to work in satisfying customers' expectations and negotiating agreements concerning the exchange of various resources, and resolving divergent interests. They also need to improve their capacity to perform their job well with people from diverse cultural backgrounds and apply their knowledge and understanding on social interactions like being friendly, adaptable, compassionate, and polite in the work place. They recognize the need to develop their personality in such a way that they could able to contribute in the satisfaction of the customer and work in diverse environments with different cultural backgrounds. Personality is considered an important factor in job placement [67]-[69]. Hiring managers sometimes focus their assessments on skills and personality of the applicants [70].

In terms of internship performance where learning happens in many facets of human experience either formal or informal [71] is an essential component of student development. Knowledge as basic foundation of skills and competence is a necessary measure of academic success towards preparation for employment as enhanced from internship. Communication being one of the important skills needed to develop among learners is critical during training. On top of specialized competency on technology is the communication skill that is most valued by the employers [72].

Based on the evaluation of the immediate superior of the engineering interns in terms of knowledge, they evaluated the engineering students with excellent performance rating in terms of how they comprehend and follow instructions easily and how they understand the operating procedures and techniques. One of the supervisors mentioned in the comment that:

"he [the intern] understands the importance of quality assurance. He is able to understand and remember easily the instructions."

Engineering students are equipped with the knowledge and are trained on how to read and follow work instructions and operating procedures most especially in professional courses where they are required to use the machine shop, ergonomics laboratory and other equipment in the laboratories. Safety is the utmost concern during the performance of the activity and experiments. They were given the lecture and proper orientation before they can use the equipment and machines.

Likewise, the interns were rated very good in terms of their competitiveness in handling job assignments. Engineering students have the capability to execute tasks with less supervision. They are very eager to learn from the workplace, that is why they maximize the time of their internship to acquire new knowledge from the actual work environment on how they can get more information to enhance their skills. Some supervisors mentioned in the

comment that:

“Because he is hardworking and fast learner; he can handle the task with less supervision and has sense of responsibility with good attitude”

“it would be beneficial to the company to train young engineers that are willing to render their service for the continuous improvement of the industry.”

“Because he is flexible, hard working person, and had good communication skills at shop workers”

Their immediate superiors rated them very good in terms of the capability to organize and analyze work and the command of relevant general information and technology. Students are prepared to handle assignments that include management and organization of task in performing systems engineering. They learn how to analyze customer needs and requirements from conceptualization of the products or services up to production and operation. Students are equipped with the knowledge in using systems principles and concepts, scientific and technological management approaches.

On the other hand, engineering interns have demonstrated certain levels of competence in performing their duties and responsibilities in the actual work place. They have shown their capability to immerse themselves with the employees doing actual work with confidence and professionalism. This is where engineering interns evaluated with excellent rating overall in technical skills specifically in looking for ways to enhance the acquired skills by initiating to learn latest technologies and best practices. Students can easily adapt to new environment that implements certain technology being used for the production and operation of the industry. They have built certain ability to adjust and easily learn the procedure and protocols to effectively execute particular process. They have already acquired the value of initiative in taking responsibility as part of their duty to learn whatever is new to them in the workplace. Supervisors and managers do not need to give more instructions to these engineering students because they already know what to observe from the people and operation as well as the equipment and machines.

They ask questions if they do not know and they do not pretend that they know everything. Based on the interview with one intern:

“I believed that every workplace in manufacturing industry is critical. Therefore, I always ensure that what I do is based on the process and protocols. That’s why, I always keep on asking for new things I encountered which are not part of the orientation because not everything will be covered during the orientation.”

Also, they were evaluated with excellent performance in maximizing the utilization of company resources assigned

to them and by providing the required number of output within the specified time. Engineering students are very productive in the use of their official time in preparing reports and documents for their current project. They really value the importance of time and follow the schedule in delivering quality outputs to maintain the smooth operations of the department. They explore other possibilities on how they can use other resources in the company to better contribute in the attainment of goals and objectives as part of their job description. One of the employers mentioned in the comment of one industrial engineering intern:

“because he has the IE skills needed by this company and those skills will be a great help to the group and to the company. His eagerness to learn made him an exceptional one and that is one of the skills a company is looking for to its employees. Good skills plus a good personality is equal to a good asset in a company and I can see that he will be an asset of company in the future”

The immediate superiors have observed the engineering interns with very good performance on being comfortable to present and recommend suggestions as well as criticisms to their immediate superiors. They are also practicing open communication and accommodate ideas with positive point of view. There is still room for improvement in terms of how the students express their views and opinions and share their suggestion to the people within the department. They still have fear of rejection about their ideas, that is why they are not confident to voice out their suggestions.

“Since I’m still new in the office, I don’t know what the people will think about me if I will comment about their processes and operations for continuous improvement. That’s why I just remained silent.”

Engineering interns were also evaluated with very good performance rating in the accuracy and efficiency of their work. Though, their performance cannot be considered perfect but still, they did their best effort to fulfil all the required tasks they need to accomplish with precision and quality. Since they are still learning some of the processes in the department, they cannot really absorbed all the operations in just three (3) to four (4) months. They were trained to perform those tasks but they still need more time to learn and apply some techniques on how to make them better. Some supervisors and managers compare their work with other regular employees and workers in the department as benchmark of interns’ performance, because these managers consider these interns as part of their projects. Therefore, they are expected to perform at the same level with the regular employees.

“We were treated as if we are part of their family. Although, I stayed only five (5) months in the department, I felt that I already have a place in the office and I’m one of them. They are very approachable and they are not

selfish of their knowledge and experiences. I got some techniques on how to become better professional engineer and how to deliver outputs with certain level of accuracy and efficiency.”

The engineering interns have excellent performance rating in terms of attitude when they were seen by their superiors as delighted and at ease while working with peers and colleagues in the department. They describe their comfortable working relationship as free of challenging issues and conflicts among their colleagues and superiors in the department or work unit. They really prioritize the value of obedience and respect for authority to ensure understanding and unity would be the foundation of strong rapport.

They were also rated excellent in applying the qualities of openness, perseverance, honesty and professional integrity in different aspects of their work assignment. Engineering interns build the trust and confidence of their superiors by following the company policies, rules and regulations and ensuring safety and security of all critical processes and information within their circles. They always report and provide update regarding the status of their work assignment by being honest of their mistakes committed and learning from them to improve their performance. They always thought of the welfare of the people within the department who entrusted them to perform such responsibilities that are good sources of learning experiences.

The interns were evaluated excellent for having positive attitude towards criticism and towards superiors. They are proactive in maintaining positive attitude in the middle of negative situations or circumstances, because they believe that criticisms serve as a feedback mechanism for them to improve their work. It guides them to learn new things and to have strong personality in dealing with negative issues. They also exert more effort to do their best in order to avoid criticisms.

They do not take these criticisms personally because these are always part of the job for professional growth. They learn how to be patient and realize that they cannot please everyone. Understanding the situation is a better way to approach the issue and maintaining calmness is a sign of respect to authority.

The engineering interns were also rated excellent as reliable in handling the tasks assigned to them imbued with a sense of responsibility. Because they are aware of their duties and obligations as interns; They are oriented to their roles and assignments in the department, and everything is clear to them on how to become productive. The essence of orientation makes everything in order, evident and open for questions and clarification to understand the abstract meaning of some company policies involving cultures and norms. They are also aware of the consequences on what will happen to them in case of committing negligence and demonstrating negative attitude in the workplace. They are also protecting the name and reputation of the University

because they are representing the institution as interns. They know that anything bad that happens to them due to fostering negative attitude will reflect on the image of the university. Therefore, they are very careful and watchful of their words and gestures in handling tasks and making decisions.

They also received an excellent performance rating in terms being punctual and efficient in completing and submitting the assigned task ahead of time, but this indicator obtained the least mean score among those with excellent rating. Sometimes due to workload and because they are still learning some of the work processes in the department, they tend to slow down their activity to ensure and check they are producing accurate and reliable outputs. Assurance on quality of their reports and other deliverables sometimes resulted in delays in finishing the tasks as scheduled.

Overall, the engineering interns have very high positive attitude as observed by their immediate superiors. They demonstrated the ability to share positive character and work values towards co-workers and superiors. They have possessed qualities of good employees who are not only technically knowledgeable about operations but also reliable, humble and passionate individuals.

Engineering interns were evaluated excellent overall in terms of personality specifically in reporting for work with proper attire and follows good personal hygiene and being flexible in work, while dealing with people. Engineering interns have personalities that could easily adapt to different kinds of people because they respect individual differences and acknowledge the strengths and weaknesses of those around them. They are flexible in a sense that they can easily make friends in the workplace and adapt to the organizational culture most especially if they are all engineers in the department.

“We have many commonalities as engineers and we speak the same language. The line of thinking is almost the same in terms of thought processes. We treat ourselves as siblings where we get easily acquainted through sharing of experiences. But some differences on beliefs and personal views about the profession still exist in terms of styles or strategies on how to solve certain problem in the department where I still learn from them.”

It is very easy for the engineering students to follow proper attire because most manufacturing and industrial companies are requiring employees even interns to wear uniforms. Unlike other business establishments where corporate attires are required, the word ‘proper uniform’ can be very subjective to some companies unless they provide protocols. They are also wearing Personal Protective Equipment (PPE) whenever they need to visit in the field or site. They really observe proper procedures and protocols for their own safety. They behave like professionals and act the same with the regular employees.

They also keep good personal hygiene and well-groomed to make them more presentable and feel comfortable working with the colleagues.

“We are not always staying in an air-conditioned room or office, that’s why we have to make sure that we follow personal hygiene to maintain the good condition of our body most especially during hot weather.”

Engineering interns are very willing to accept assignments beyond what is expected of them to accomplish, because they believe that it is an opportunity for them to learn new skills that will add to their job experiences. They are very optimistic and interested in every additional task assigned to them. They are very much aware that the time they will spend in internship is limited, therefore, they want to make it sure that they cover everything they need to know and experience. It is very important that they are interested at the same time and motivated to take extra mile in accomplishing tasks with greater sense of commitment. It is the nature of engineering students to keep themselves quiet when it comes to their personal and other work-related problems as long as they can solve the problem within their level; they will do their best to make it accomplished. But they also recognized their own capabilities and the extent of the work-related problems they can only be allowed to solve even without supervision.

In the result of correlation, the significant negative correlation signifies that those engineering students with lower development needs for literacy and numeracy, management and work ethics are also those students with higher internship performance. Engineering students believed that they have possessed and already developed these skills that contribute to obtaining higher performance evaluation rating from their employers during internship program. The positive relationship between interpersonal skill and performance rating on attitude implies that students recognize their limitations in engaging themselves with people within the workplace. Because of the nature of engineering program which prepare students to become critical thinkers and problem solvers through conducting projects with minimal interactions with people. They need concentration and intense application of analytical thinking in performing laboratory experiments and solving problems in mathematics and allied engineering sciences. The significant positive relationship implies that those students with higher skill development needs on critical and system thinking skills are also those students with higher internship performance evaluation rating. Engineering students acknowledge their weaknesses on these skills in order for them to fulfill the required qualifications of industries.

6. Conclusions

Engineering students have achieved an excellent

performance evaluation rating from employers or immediate superiors in terms of attitude with the highest rating followed by personality, knowledge and skills with the least. The context of student evaluation provides important results for the academic institution to ensure that its graduates could be able to join the workforce in ASEAN region and even beyond the region of Asia.

The findings of the annual assessments were considered for educational planning of the student development programs to address the common identified needs of the engineering students. They have thought of developing more of their System Thinking Skill, Critical Thinking and Interpersonal skills in order for them to best fulfill the employability skills and be more prepared for their future employment in the Philippines even in the United States and most parts of the Middle East where Filipino engineers are employed.

Industrial Engineering students have significantly higher development needs in critical thinking skills while they have significantly lower need in management skills. Meanwhile, Computer Engineering students have significantly higher need to develop the leadership skills while Electronics Engineering students have significantly lower development need for leadership skills. Educational leaders are prompted to broadly develop the management and leadership skills of the students in order for them to acknowledge the importance of having lifelong learning strategies and objectives.

Significant strong negative relationship exists between the skill development needs in terms of literacy and numeracy, management skill as well as work ethics and the four aspects of internship performance evaluation while positive relationship exists between the skill development needs in terms of critical thinking and system thinking skills and the internship performance rating across four aspects of evaluation.

Engineering students must strengthen even more their technical capabilities and knowledge to fulfil their assigned duties and responsibilities during internship, so that they could able to sustain the learning experiences until they go to the actual work environment. Higher education institutions must be aware of the development needs of the students not only for the employability skills but also for the other aspects of improving their character, moral values and personality to rich their full potentials as future leaders of their respective disciplines and communities.

Findings served as input to improve the delivery of instruction and strengthen the approaches of Outcome-Based Education to become holistic in developing the knowledge, skills and character of the future engineering professionals. The changing work values of the Millennial as well as their way of treating the importance of employability skills must be addressed through relevant activities based on the findings of this study. Further, the students’ success on their chosen careers is always the product on how they were nurtured in the

academe. The holistic development of the students also depends on how educational services are delivered effectively and impacted their lives with positive learning experiences.

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