

# On-the-Job Training and Academic Performance of Mechanical Engineering Students in one Academic Institution in the Philippines

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**Abstract** - *This study determined the level of student's academic performance General Education subjects like English and Mathematics along with the professional subjects. This also determined their on-the-job training (OJT) performances in relation to their attitudes and perception towards the job, their job performances, obedience to the policies of company and their working standards as assessed by their superiors. This serves as a tool to determine the attitudes and characteristics that graduating students must possess as they get employed after graduating. Their performance inside the school in terms of their Final Grades in both General and Professional Education courses served as reference with regards to their knowledge, understanding and performance during their college studies at the university. The analysis between their academic performances and their OJT performances indicate how well and how valuable the knowledge, theories and skills taught, developed, and inculcated while taking the course which are to be applied in their actual working environment.*

**Keywords:** *On-the-Job Training, Internship, Mechanical Engineering*

## INTRODUCTION

Gaining knowledge is acquired through different aspects like home, school and other avenues. Constructive education is gained in school by studying various subjects with principles necessary for future employment. As students enter the tertiary education, they would encounter not just theory of what they studied but also to apply their knowledge to gain skills in the on- the- job training (OJT) program, where students are trained to absorb different kind of experiences on which it will nourish their minds in their chosen industry as well as their personal view and social commitments.

OJT plays a significant role in the curriculum of every degree program, which serves as a venue for the students to practice what they have learned from concepts and principles in developing work ethics, attitude and produce effective, innovative, and be globally competitive professionals. This hands-on experience aims to apply the knowledge, demonstrate necessary skills, enhance the attitude and hone the character of the students towards a holistic

appreciation of the actual workplace. This is where the students will be given job assignments that will test their ability to accomplish certain task. They are being observed and all their accomplishments are being evaluated based on the criteria set by the academic institution. This is where the student outcomes of the Mechanical Engineering students can manifest through the application of basic and advanced knowledge in mathematics and sciences as well as the soft skills.

OJT is one of the mechanics of Higher Education industries in developing the needed competencies of its graduates. Within a specific number of hours, universities and colleges require their students to perform such training as part of the curriculum. Its goals and objectives served as a guide in developing the needed competencies for a particular job, and translating the training into a gainful working experience [1], [2], [3]. Lyceum of the Philippines University (LPU) educates and trains students to be competitive by providing them with applied learning opportunities that require talented workers and rank

among the best in the world in terms of productivity, career, attitude and technical skills [4]. The institution provides quality educational services in terms of internship programs that cater to the demand of the industries with the support of the quality assurance mechanisms [5]-[9].

On-the-job training's objectives are to create opportunities for the students to learn about their chosen profession in a specific period of time. Along with this program are trainings that are provided by some companies from different industries in which the trainee gains knowledge as well as contributing to the organization. Through their supervision and support, trainees will nurture the knowledge that can build up their potentials on being professionals. Work values are also generated to the students through the experience given by this program that will really help them as they enter the business world. This program will provide students a concrete face to face with the real world of work [10].

The employers or the immediate superior of the trainees provide instruction and direction for better supervision of determining appropriate learning objectives and assessing the outputs. The active participation of the student-trainees in identified company activities is highly encouraged to familiarize themselves in various organizational practices that would help them understand the culture and prevailing core values in the work place. Working in a multidisciplinary team is also being given emphasis to see its importance of performing the duties together with the other workers from different departments with different educational backgrounds and disciplines particularly in the field of engineering. On this way, they will be provided an idea on how a certain work environment can be a place for learning through enhancing their communication skill, interpersonal skill and technical skill which are important components to gain greater employment opportunities [11]-[23].

Engineering students before they graduate should possess the necessary knowledge, skills and values for them to contribute in the demands of manufacturing industries and other sectors of economy in building a progressive society and community of well-informed professionals. Through the outcomes-based education approach of engineering schools in the country where student outcomes placed as significant evidence and measure of students capability to perform and produce quality outputs based on their hands-on experience towards proficiency in specific competency [24]-[32]. The training of mechanical engineering students in handling turbines, HVAC and industrial projects give

substantial information and insights that are considered useful in their future work assignments.

The students' performance or academic achievement plays an important role in producing the best quality graduates who will become great leader and manpower for the country thus responsible for the country's economic and social development [33]. Academic performance serves as a measure of students' progress in developing the knowledge and skills that are essential for their future career [34]-[41].

The effect of on the job training program on abilities and qualities advancement of the students rely on upon the methodologies of the gifted tutors or mentors to enhance the student learners' skill in the classroom and additionally the ideas that both the school and the trades cooperate in the preparation of mechanical students as future modern laborers. The school gave related aptitudes; the part of ventures is to work on the student's capabilities and exercises, accordingly, collaborating enterprises ought to give the students the vital stores expected to develop their execution level of capability and particular abilities and field of specialization.

The researchers wanted the engineering department to clearly determine what subjects to improve and to level those subjects in the field of training. To give attention to areas where the students need to enhance their focus and performance. Different targets incorporate giving input, enhancing communication, understanding training needs, clearing up parts and duties. Distinguishes areas where coaching is fundamental and urges teachers to play a dynamic instructing part. Plans of action to be prepared for the students who will take mechanical engineering course. This research will provide various suggestions on what fields will it be best to take OJT that the university will recommend to the students at their final year.

#### **OBJECTIVES OF THE STUDY**

This study distinguishes the mechanical engineering students' academic performance and their internship performance appraisals from one academic institution in the Philippines.

Specifically the study aimed to determine the level of OJT performance of ME students for the year 2015-2016; to present the academic performance in the general education courses (English and Mathematics); to present the academic performance in the professional courses in terms of Basic Engineering Sciences and Fundamentals of Mechanical Engineering; to test the significant

relationship between the academic performance and OJT performance; and to propose a plan necessary for the improvement of the internship program

## METHODS

### Research Design

This research used the quantitative-descriptive method where quantitative strategies focus on numerical investigation of information assembled and evaluated the information and data on appraisal report and performance in their academics based on the students' last grades in general courses and professional courses from first year to fifth year.

### Participants

The study included the performance appraisal reports of all BS Mechanical Engineering students who were enrolled in their OJT during the academic year 2015-2016. One hundred percent of OJT appraisal reports were collected and analyzed that was from the records of the College of Engineering.

### Instruments

The instruments used in the research were the OJT assessment form used by Internship as a part of assessing the performance of its trainees evaluated by the superiors of the On-the-Job Trainees after their 600 – hours of training. These instruments were provided by the College of Engineering.

### Procedure

The researchers sent a request letter to the Dean of the College of Engineering to ask for permission to have the copies of the data of the mechanical engineering trainees. The researchers secured the copy of the grading sheet and the compiled OJT assessment forms which were rated by the superiors of the mechanical engineering interns.

### Data Analysis

The following data were used in analyzing the performances of the Mechanical Engineering students who have taken their OJT course. The compiled data from the evaluation tool were interpreted using weighted mean and rank to determine the level of performance of OJT and academic performance of latest interns of mechanical engineering program. Correlation method was also used to get the significant relationship of OJT performance and academic performance of the Mechanical Engineering Students Batch 2015-2016. The given scale was used to interpret the result of the evaluation tool: 4.50 – 5.00 = Excellent (E); 3.50 – 4.49 = Very Good (VG);

2.50 – 3.49 = Good (G); 1.50 – 2.49 = Fair (F); 1.00 – 1.49 = Poor (P). The given scale was used to interpret the result of academic performance: 1.00 = Outstanding; 1.25 = Excellent; 1.50 = Superior; 1.75 = Very Good; 2.00 = Good; 2.25 = Satisfactory; 2.50 = Fairly Satisfactory; 2.75 = Fair; 3.00 = Passing.

## RESULTS AND DISCUSSION

**Table 1. Performance of the Respondents on Personal Characteristics**

Indicators	WM	VI	Rank
1. Dresses neatly and appropriately for office work.	4.80	E	1
2. Has a pleasing personality, is cheerful and good humored.	4.60	E	2.5
3. Possesses above average oral and written communication skills.	4.60	E	2.5
4. Projects self-confidence and enthusiasm.	4.20	VG	4
5. Demonstrates leadership potential	3.80	VG	5
<b>Composite Mean</b>	<b>4.40</b>	<b>VG</b>	

Table 1 shows the ratings of the supervisors to the interns in terms of personal characteristics. The ability of the interns to dress neatly and appropriately for office work got a rating of 4.80 which means excellent. The intern's ability to have a pleasing personality, cheerful and good humored got the same rank with possessing above average oral and written communication skills which has rating of 4.60. The intern's capacity to project self-confidence and enthusiasm got ratings of 4.20 which means very good. The intern's ability to demonstrate leadership potential got a rating of 3.80 which means very good also.

The indicator that dresses neatly and appropriately for office work rank first because the company wants the interns to be properly acquired and practiced the sense of being professional. This is one of the requirements when you are in the job or work. However, the last in the rank is the indicator which is demonstrates leadership potential. The reasons for this are that they have insufficient knowledge or actual experience on the job so they are afraid to commit mistake and to notice their mistake by their supervisor. Another reason is that they are not prepared well to handle situation and people in the field where it is all about working actually.

The attitude in this manner will characterize the personality as indicated by psychology is comprised of the trademark examples of considerations, emotions and practices that make a man exceptional. Notwithstanding this, personality emerges from inside the individual and remains genuinely all through life.

**Table 2. Performance of the Respondents on Attitudes towards the Job**

Indicators	WM	VI	Rank
1. Shows marked interest and pride in his/her task and responsibilities	4.80	E	3.5
2. Has an exceptional sense of duty and can always be depended upon to do good job	5.00	E	1.5
3. Cooperates willingly and fits easily to the group	5.00	E	1.5
4. Recognizes the authority and responsibilities of his/her superiors and provide his/her them with necessary support services and assistance required or sought	4.80	E	3.5
5. Takes initiative to update one's technical or non-technical knowledge	4.40	VG	5
<b>Composite Mean</b>	<b>4.80</b>	<b>E</b>	

In terms of the attitudes towards the job, the intern's ability to have an exceptional sense of duty and can always be depended upon to do a good job got the same rank with cooperating willingly and fits easily to the group which has a rating of 5.00. Second in rank is the intern's marked interest and pride in his/her tasks and responsibilities. This has a rating of 4.80. The intern's ability to recognize the authority and responsibilities of his/her superiors and provides his/her them with the necessary support services and assistance required and sought got the same rating of 4.80. The intern's initiative to update one's technical or non-technical knowledge got the rating of 4.40. The composite mean score is 4.80 which means excellent.

The mechanical engineering interns have exceptional sense of duty and can always be depended upon to do good job because they were trained in the school by their professor to do tasks or works by themselves without being forgotten the quality of their work. They can cooperate and fits easily to the group because their professional instructor give them group activities and more importantly they were exercising community extension like free math tutorial where they can interact with students in elementary and outreach program with the LPU houses where they deal with people who have not so good living without

degrading them. The BSME trainees took initiative to update ones technical or non-technical knowledge and they did it very good. They are good to be companion in work because they were taught by their parents as well as their professors to be not selfish with the knowledge they have learned and share it to others who need it.

**Table 3. Performance of the Respondents on Job Performance**

Indicators	WM	VI	Rank
1. Delivers promptly assigned tasks and responsibilities	4.60	E	2
2. Performs assigned tasks with minimum supervision	4.20	VG	5
3. Willingly accepts work assignments and or responsibilities	4.80	E	1
4. Delivers assigned tasks within level of quality	4.40	VG	3.5
5. Performs assigned task in a organized and orderly manner	4.40	VG	3.5
6. Exhibits ability to function well even under pressure	3.80	VG	6
<b>Composite Mean</b>	<b>4.37</b>	<b>VG</b>	

Table 3 displays the ratings of the supervisors to the interns in terms of job performance. The intern's ability to willingly accept work assignment and or responsibilities got 4.80 which means excellent. The on- the- job trainees' capacity deliver promptly assigned tasks and responsibilities got 4.60. The on- the- job trainees' ability to deliver assigned tasks within level of quality and perform assigned task in an organized and orderly manner got 4.40 which means very good in these two aspects. The intern's performing assigned tasks with minimum supervision got the fifth rank with a rating of 4.20 which means very good too. The intern's capacity to function well even under pressure got 3.80 which means very good.

The BSME trainees were willing to accept work assignments and or responsibilities. This is because they wanted to learn all the processes in the job. The interns were prepared well by their professors in the university to be responsible in works and to not pick responsibilities but to interestingly accept the work given to them by their supervisors or instructors. The BSME interns exhibited ability to function well even under pressure. They were rated as very good because they were all trained in school to do overload tasks that often made them to sleep late in the night. Also the company wanted them to finish more tasks in the due time to have better production.

According to Passer and Smith [42] the idea of motivation alludes to a game-plan that influences the assurance and direction of objectives. So also, Kreitner and Kinicki [43] affirmed that motivation speaks to mental practices that empower intentional activities. In the work setting, as affirmed by Coetsee [44], inspiration involves the preparation of people and gatherings to put much effort to accomplish authoritative objectives. From the above, it can be understood that there exists no single and general definition for motivation.

Numerous researchers, who examined the relationship between performance and motivation in associations agreed that goal-setting and clarification makes trust in the workers. By plainly clarifying the importance of the objectives, workers will have a clear view on what the association needs to accomplish. Coetsee [44] avows that the most performing laborers are objective coordinated. Set objectives permit representatives to fulfill authoritative vision, points and vital destinations.

**Table 4. Performance of the Respondents on Adherence to Job Policy**

Indicators	WM	VI	Rank
1. Present at work most of the time	4.40	VG	3
2. Comes at work on time	4.60	E	1.5
3. Adheres to company rules and regulations	4.60	E	1.5
<b>Composite Mean</b>	<b>4.53</b>	<b>E</b>	

Table 4 presents the performance of the mechanical engineering students in term of adherence to job policy. The ability to come to work on time and adhere to company rules and regulations got both a rating of 4.60 which means excellent. The third rank is the intern's skill to present at work most of the time.

The BSME interns came at work on time and adhered to company rules and regulations. The trainees were properly trained to follow rules and regulations of the university and if they committed mistake they were prone to punishments which made them not to do it again. The trainees also didn't want to be the attraction because of wrong doings. They were also present at work most of the time because they wanted to learn more of the production in the company and finish their OJT on time.

The findings of late research support the contention that workers' moral qualities shape their conduct and, in specific, their govern taking after conduct. One case is given by Tyler and Blader [45] who reported two studies: one of a sample of

corporate bankers and another of a huge and differing test of American representatives. Analysis of both tests demonstrates that employee rule following adherence was firmly affected by workers' moral values. This included particular impacts of authenticity and moral-esteem congruence [45].

**Table 5. Performance of the Respondents on Competencies**

Indicators	WM	VI	Rank
1. Demonstrate adequate knowledge in mechanical engineering design and concepts of:	4.60	E	2.5
1.1 power plant design			
1.2 production/manufacturing/process Engineering	4.60	E	2.5
1.3 machine element design/repair and maintenance	4.40	VG	5.5
2. demonstrate adequate knowledge in mechanical and analytical reasoning	4.60	E	2.5
3. shows basic skills in:			
3.1 mechanical repair and maintenance	4.40	VG	5.5
3.2 mechanical operations	4.80	E	1
<b>Composite Mean</b>	<b>4.57</b>	<b>E</b>	

Table 5 displays the ratings of the supervisors to the interns in terms of competencies. The intern's ability to show basic skills in mechanical operations got 4.80 which means excellent in this aspect. The on-the-job trainee's capacity to demonstrate adequate knowledge in mechanical engineering design and concepts of power plant design and production/manufacturing/process Engineering got 4.60 in these areas. The intern's ability to demonstrate adequate knowledge in mechanical and analytical reasoning got a rating of 4.60 also which means excellent. The trainee's capability to demonstrate adequate knowledge in mechanical engineering design and concepts of machine elements design/ repair and maintenance got the fifth rank with a rating of 4.40 which means very good as well as the show basic skills in mechanical repair and maintenance.

The BSME trainees showed basic skills and mechanical operations. They can work on this operation because they were exposed in different laboratories activities and experiments that strengthen their skills in operating the system. They showed basic skills in repairing and maintaining the system this is because they trained to do own experiment and took responsibilities on what will happen.

One important component of student's success is academic performance in their entire study, it reflects

how well the students perform; the level of their ability to understand, comprehend and analyze; as well as their capability to interrelate their disciplines to other disciplines, Determining its significant relationship to on the job training will make educators, teachers and other stakeholders know that it is necessary to exercise enhanced or better services for both them and students to attain progressive outcomes. According to Valdez [46], in Philippine higher education, higher learning institutions were mandated to upgrade higher education curricular offerings to international standards. In relation with this, Mejia, Manzano and Menez [47] said that curriculum was developed to integrate an in-depth academic, laboratory and field internship programs that will ensure the efficiency and quality to meet world class standards.

**Table 6. Performance of the Respondents on General Education**

Courses	GWA	Interpretation
Languages	1.44	Excellent
Mathematics	2.26	Satisfactory

\*GWA- General Weighted Average

As seen from Table 6, the students performed excellent in their Math Languages courses which obtained a general weighted average of 1.44 and verbally interpreted as excellent. However, the respondents' only performed satisfactorily in Mathematics.

The students have excellent performance in language subjects because the LPU-B implemented the Just English Please policy that trains its student and develops English proficiency among them. While in mathematics subjects performs only satisfactory because mathematics in engineering is difficult to make each student work in analyzing problems that can be used in actual.

Krutetskii [48] found that that the difference among great and poor problem solvers lay in their impression of the vital components of the problem they were endeavoring to explain. Great problem solvers regularly have certain capacities that not so good problem solvers needed. First, the capacity to distinguish applicable from unnecessary data. The capacity to see rapidly and precisely the numerical structure of a problem, the capacity to sum up over an extensive variety of comparable issues, and the capacity to recall problem's formal structure for quite a while.

Based from the results in Table 7, the students performed satisfactory in Basic Engineering Sciences

which has a computed general weighted average of 2.46. While for the Fundamental of Mechanical Engineering Courses only performed fairly satisfactory.

**Table 7. Performance of the Respondents on Professional Courses**

Courses	GWA	Interpretation
Basic Engineering Sciences	2.46	Satisfactory
Fundamental of Mechanical Engineering Courses	2.59	Fairly Satisfactory

Engineering, science and technology are three interlinked surges of scientific studies which vary in methodologies in light of attitudes of students. Science is worried with essential hypotheses and correct figuring, while engineering tries to serve humankind with manifestations, in view of simplified logical establishments [49].

**Table 8. Relationship between Academic Performance and OJT Performance**

OJT Performance in terms of:	General Education		Professional	
	r-value	p-value	r-value	p-value
Personal Characteristics	0.936*	0.019*	0.372	0.537
Attitudes Towards the Job	0.627	0.258	-0.141	0.821
Job Performance	0.796	0.107	0.150	0.810
Adherence to Job Policy	-0.209	0.736	-0.170	0.785
Competencies	0.122	0.846	0.801	0.104

\*Significant at  $p$ -value  $< 0.05$

As seen from the Table 8, only personal characteristics and general weighted average on general education courses shows significant relationship. The computed r-value of 0.936 indicates that there is a strong direct correlation as well as the computed p-value of 0.019 which is less than 0.05 alpha levels. This means that there is a significant relationship and implies that the better the performance in general education, the more that their personal characteristics in their OJT is enhanced.

The study shows significant relationship in general education courses and personal characteristics. In general education courses which include language subject and mathematics subject, being good in language makes you more confident on what they are going to say. It is easy for them to communicate and

to deal with others. They can be an expressive individual that enables them to express their feelings or thoughts about the work or perceptions on the situation. If you are good in mathematics, these courses teach you to be organized and careful on what you are doing. You can know the consequences that can be the result of your decisions. It also boosts your confidence because if you know the principle it is easy for you to work on those problems you'll face.

The outcomes demonstrated that honesty and openness to experience can affect academic performance [50], recommending that students who score high in conscientiousness and openness will be more fruitful at college. The outcomes likewise affirmed that inspiration assumes an intervening part in relations between personality qualities and academic performances.

## CONCLUSIONS AND RECOMMENDATIONS

The level of OJT performance of the mechanical engineering interns for year 2015-2016 was excellent. Latest mechanical engineering trainees performed excellent in their language subjects while their performance in Mathematics subjects was at an average level. BSME interns showed satisfactory level of performance in their basic engineering courses while fairly satisfactory level of performance in fundamental of mechanical engineering courses. General weighted average of the latest trainees on general education courses shows strong significant relationship only in personal characteristics. Plan of actions was proposed to develop strategy.

It is recommended that the orientation may be given through the lead of workshops, training and seminars to set up the trainee and help them get required skills and to see better the demand of the real business industry before leaving the entryways of the college and before the real encounter the business.

**Table 9. Propose Plan of Action to Improve the Internship**

<b>Problems</b>	<b>Reason</b>	<b>Strategy</b>	<b>Persons Included</b>
Demonstrating leadership potential	Students have not enough self-confidence in handling situation	Strengthen and engage more in reporting to build up self-confidence	Students, General and Professional Education Professors
Taking initiative to update one's technical or non-technical knowledge	Most students are inactive in exploring innovative things	Exposed students more to such technical or non-technical works	Students, General and Professional Education Professor, Department of Engineering
Performing assigned tasks with minimum supervision	Students are distracted and still requires assistance	Self-disciplinary actions must strengthen	Students, General and Professional Education Professor
Delivering assigned tasks with level of quality	Too many task to turn in which makes a student from best to just good enough quality work	Advise students to well manage their time to allow works to be done perfectly	General and Professional Education Professor
Performing assigned task in an organized and orderly manner and exhibiting ability to function well under pressure	students are not that exposed to work under pressure	Give students school works under pressure	Students, General and Professional Education Professor
Showing mastery of basic concepts of mechanical engineering	Students intends to forget after accomplishing it has been taught	Must provide outcome based test to monitor if a student acquired desired knowledge need in the course	Students, Department of Engineering
Demonstrating capability to deal with people and do professional responsibilities	Most students didn't develop self-confidence to deal and express what they want to with people	Must be strict about training students to polish their skills verbally and mentally. OJT Students must be sent and do more fields works not just focusing with theories but also to be introduced to actual situations	Students, General and Professional Education Professor

Comprehension and evaluation for regular science subjects must be reinforced by the General Education Instructors keeping in mind the end goal to apply this learning in logical innovative work of organizations through including the building graduates in logical research workshop or building up an examination venture that would animate their enthusiasm to take part in finding new actualities.

The OJT Manual must be revisited regularly to make necessary updates, improvements and changes to fit into the present needs and demands of the private industry partners or government agencies. The OJT Coordinator ought to make on-the-spot visitation and monitor the student-trainees and participating offices with respect to the execution of the work assignments of the learners.

For the future researchers, advance studies with respect to the topic might be made to enhance and upgrade the OJT program of the BS Mechanical Engineering and the OJT program of College of Engineering in general.

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