



# Complementation of Automotive Technology Programs and Industry Standards of State Universities and Colleges in the Philippines

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### **ABSTRACT**

The study conducted to determine the complementation of automotive technology courses and industry standards among State Universities and Colleges in Region 2, Cagayan Valley Region. The descriptive-normative method of research through convenience sampling was used and the questionnaire as the main data gathering tool for automotive students, automotive faculty and automotive industry partners as respondents. Results of the study showed that the automotive faculty qualification, availability of equipment, and students' competencies along automotive servicing NC-III and NC-IV core competencies has no complementation with the training regulations. Using the SWOT analysis, the strengths of the automotive technology courses were: compliance to CHED minimum requirement along curriculum and instruction, laboratories and physical facilities, extensive exposure of automotive students to automotive industries, competent automotive students along soft skills, automotive servicing NC-I and NC-II, basic and common competencies of NC-III and NC-IV and the complementation of required competencies of automotive faculty and automotive industries.

**Keywords:** Complementation, Automotive Technology Courses, Industry Standards, Automotive Industries

### **INTRODUCTION**

The term Industry 4.0 is trending in many countries where technological advances facilitate significant changes in industry. The term was originally coined by Kagermann et al. in 2011 as cited by Clavert when referring to the Fourth Industrial Revolution, where technology will not only increase resource and time efficiency, but will also change the way people work.

Industry 4.0 denotes the transformation of "traditional" industries by the Internet of Things, Data and Services. The term has been used to summarize a paradigm shift in the industry. The real-time networking of products, processes and infrastructure is leading in the fourth industrial revolution where supply, manufacturing, maintenance, delivery and customer service are all connected via the internet. Rigid value chains are being transformed into highly flexible value networks. Kagerman et.al (2016)

With this, the status of SUC's offering technology courses as producers of future work force of the country has been challenged and called into question. How can these educational institutions innovate, combine and complement with the industry emerging fields? How a school that has traditional teachers who use traditional modes of teaching, traditional instructional materials, equipment and laboratory facilities integrate with Industry 4.0? Human work in the fourth industrial revolution is not meant to be rejected, but its role must transform in order to succeed and find new solutions to increasingly complex challenges on skills issues such as skills mismatch, shortages of skilled talent, and skills gap.

Similar concern is on the industry immersion of automotive students to automotive industries or Host Training Establishment (HTE). In the first five to ten days of actual industry immersion of automotive students, the HTE requires the students to conduct familiarization of equipment, tools, materials, and other industry practices in their respective automotive service centers. As notice by the researcher as former supervising instructor of the BSIT and BTTE students major in automotive for their industry immersion, the HTE frequently commented that the students were weak along the use of sophisticated equipment. After finishing the required number of hours of industry immersion, mandatory evaluation of automotive student performance also conducted and giving of feedback by the HTE also form part of the evaluation process with the purpose of improving the automotive technology program. On the industry feedback, some recommended that the automotive students should improve on servicing

electronic components of automobile, the used of electro-pneumatic lifter, wheel balancing and alignment, engine overhauling and other skills competencies in automotive servicing both soft and hard skills dimensions. Hence, the conduct of this study.

### **Framework of the Study**

Giving more importance to the advancement of the country's future workforce to contribute in the national and regional development, the researcher selected some theories and Philippine laws that enhance the pursuit of developing the backbone of the nation through technology education courses.

This study was inspired by Prosser's sixteen theorems particularly industry standards and work habits wherein, effective vocational training can only be given where the training jobs are carried on in the same way, with the same operations, the same tools, and the same machines as in the occupation itself. In the same vein, vocational education will also be effective in proportion as it trains the individual directly and specifically in the thinking habits and the manipulative habits required in the occupation itself. (Prosser, 1925)

This study also includes the technical teacher education program; hence this is also anchored to Craftsperson as included in the theorems which states that vocational education will be effective in proportion as the instructor has had successful experiences in the application of skills and knowledge to the operations and processes he undertakes to teach.

Another theory anchored to this study is the Human capital theory, more education is positively linked with higher productivity (measured in wages). Wage differentials happen between individuals with high levels of education, job training, and experience relative to those with less.

The researcher also selected some laws related to the study. Prime to these laws is the Education Act of 1982 or the Batas Pambansa Bilang 232 clearly states in one of its objectives to "Train the nation's manpower in the middle-level skills for national development." (The Educ. Act of 1982, Sec. 4 no. 2.) The Act also mentioned in the delivery of formal education in the tertiary education level as one of its objective "to train the nations' manpower in the skills required for national development."

The paradigm of variables is shown in Figure 1. The study is based from the CIPO model, indicating the context, input, process and output. The context is the legal bases of education system. In this study, the context is based from the CHED Memorandum Orders: CMO 79, s. 2017, CMO 56, s. 2007 and CMO 30, s. 2005. These were the basis of crafting the curriculum for Industrial Technology in the absence of CMO. The education standards in higher education are embodied in CHED Policies, Standards and Guidelines (PSGs). The PSGs set minimum standards operationalized as the minimum set of desired program outcomes in terms of knowledge, skills and values that learners are expected to demonstrate at the end of the learning experience or at the time of graduation. AQRF Referencing Report of the Philippines (2019)

The input includes the profile of SUC's and automotive industries, required competencies of the industry partners and the competencies of the BSIT and BTTE students along soft and hard skills dimensions. The BTTE program was included in the study the fact that according to section 2 of CMO 56, s. 2007 states that the main concern of the program is the preparation of would-be teachers in technical-vocational education and training (TVET) and higher education institutions who are equipped not only with strong theoretical understanding of teaching and technology, but also with practical exposure in industry. Graduates of the course should be equipped with the necessary competencies essential for effective teaching.

The process involves the analysis on the profile of the SUC's and industry, the industry required competencies and competencies of students. Interview was also employed to validate the data. The last box which is the output is the complementation of automotive technology courses and industry standards.

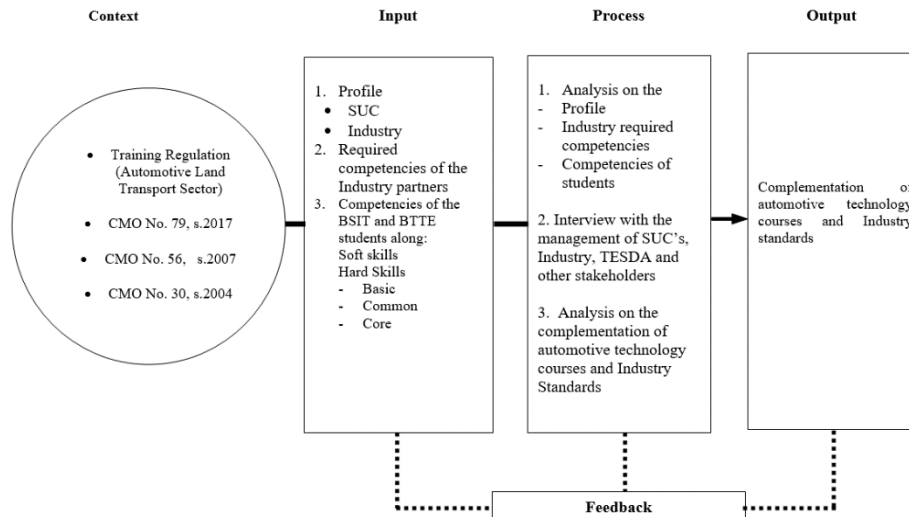


Figure 1: The Research Paradigm

## METHODOLOGY

### Research Design

This study used the descriptive-normative method of research. A descriptive-normative survey combines two research methods: gathering information to describe the object of study as it is, has been or is viewed (descriptive method) and critiquing to identify ways to improve it (normative method). This type of research method is used to describe the established standards through the study of what is prevalent and made to ascertain the normal or typical practice or condition which is compared to local results with a state or national norm. It is an investigation which ascertains the facts concerning the present status. (National Center for Education Evaluation and Regional Assistance (NCEE) home: part of the U.S. Department of Education (ED), 2001)

For triangulation purposes, an interview with automotive industry, TESDA and other stakeholders was conducted to elicit responses that could validate the questionnaire data. The descriptive-normative method was utilized as it matched the intention of the study in describing and analyzing the complementation of automotive technology courses and industry standards among State Universities and Colleges in Region 2.

### Sources of Data

The respondents of the study included the BSIT and BTTE automotive students who are enrolled in industry immersion/supervised industry training, the automotive technology faculty members of the three (3) SUC's and the automotive industry-partners of the said SUC's in the province of Cagayan, Isabela and Nueva Viscaya. The sample per group was determined using the required samples at 95% confidence level with a margin of error of 5%. The number of samples from SUC's were proportionately allocated by campus.

The BSIT and BTTE automotive students were randomly selected as sample which were distributed as follows: CSU-Carig, 39; CSU-Appari 17, NVSU, 38; ISU-Ilagan, 20 from BSIT and 14 in the BTTE; ISU-Cauayan, 98; and ISU-Angadanan 40 from BSIT and 2 from the BTTE. A total of 252 BSIT and 16 BTTE automotive students. For the automotive faculty members, applying total enumeration 26 were taken as respondents. In CSU-Carig, 5, CSU-Appari 2, NVSU, 5; ISU-Ilagan, 4; ISU-Cauayan 7 and ISU-Angadanan, 3 and for Automotive Industry-partner respondents, there were 60 purposively selected respondents among big and small industries which composed of managers, service advisors and technicians or mechanics.

### Data Gathering Tools

The data gathering instrument used in this study was the survey questionnaire. It is composed of different units of competencies, which were lifted from the training regulations of automotive/land transport sector particularly in automotive servicing NC-I, NC-II, NC-III and NC-IV. The competencies included in the study were both common to BSIT and BTTE curriculum.

The training regulations (TR) were developed in consultation with industry leaders and promulgated by the TESDA board. The training regulations consist of the competency standards, training standards and assessment and certification arrangements. This serves as the bases for the development of curriculum and instructional materials and

competency assessment packages for competency-based technical education and skills development. It spells out the over-all parameters by which programs are qualified and registered. The development of TR takes into consideration four (4) essential components of training delivery: the curriculum, the qualification of trainers, the tools and available equipment and training facilities. Philippine Technical Vocational Education and Training (TVET) System.

Since the competencies were lifted from the training regulations, the validity and reliability test were no longer employed/applied. However, the questionnaire was checked to improve form, style and mechanics through his adviser and it was presented to the members of the Oral Examination Committee (OREC) during the dissertation proposal defense for improvement. Corrections were incorporated and the final copy was prepared.

To determine the competencies of the BSIT and BTTE automotive students as well as the required competencies of automotive industries and automotive faculty members, three (3) sets of questionnaires were prepared: (1) for automotive technology students, (2) for the industry partners and (3) for the automotive technology faculty members. The soft skills competencies were determined using four learning outcomes while the hard skills competencies cover the basic, common, core and elective competencies of the training regulations.

### **Data Gathering Procedures**

Before the actual distribution of the questionnaire, the researcher coordinated with the adviser, the OREC members, and the Dean of the College of Graduate Studies for their approval to proceed with the data gathering. After it was approved, the researcher sought endorsement from the CHED Regional Office II, which were then attached to the request letter for the presidents of the three (3) state universities to allow him administer the survey questionnaire and to gather data in their respective institutions. He also requested the supervising instructor/professors for industry immersion and/or programs chairs of the SUC's to assist him in identifying the automotive industry-partner respondents. Similar permission for industry partners were also sought. The researcher made himself available to the respondents to assist them complete the questionnaire and to answer any verification that they may ask. After the questionnaire was answered, it was re-checked to ensure that the collected data are complete.

### **Analysis of Data**

As soon as the assessment was completed, the data gathered were collated, tabulated, analyzed and interpreted. The profiles of SUC's and automotive industry partners in Region 2 were treated with frequency and percentage. The profile includes: (For SUC) curriculum and instruction, laboratories and physical facilities, availability of equipment, faculty and students (For Industry) type of business, services offered to customers and competency assessment compliant to TESDA regulation. The SUC's profile along curriculum and instruction, laboratories and physical facilities were determined based on CMO 56, s.2007, CMO 79, s. 2017, the summary evaluation of CHEDRO2 and the Certificate of Program Compliance issued by the commission, while the availability of equipment and faculty were determined based to what is required in the training regulation. Frequency and percentage were also used to determine the required competencies of industry-partner respondents as well as the competencies of students along soft and hard skills dimensions.

The fourth problem on determining the strengths, weaknesses, opportunities and threats of automotive technology courses among SUC's in Region 2, the offshoot of problems 1, 2 and 3 of the study were considered. While in determining the complementation of automotive technology courses and industry standards, in-depth analysis was conducted. In the analysis, the profile of SUC's and automotive industry-partner were also considered including the competencies of automotive students as well as the required competencies of automotive faculty members. The aforementioned parameters were compared to the industry standards regulated by the TESDA regulation.

## **RESULTS AND DISCUSSIONS**

### **Profile of Industry**

#### **Type of Business**

As gleaned in table 1, the foremost type of business of the big industry group are in servicing (100%) followed by marketing business (60%) and distribution (17%). While the small automotive industry group, all of them have focus on servicing business. This finding corroborates the trends and statistics in the automotive aftermarket industry, wherein, 75% of aftermarket auto repair is performed by independent auto repair shops, while 25% of the business lives with dealerships, also, there is a trend toward large franchise auto repair businesses, which have smaller shops rolling up into them. That is a good opportunity for profitable businesses on the service/seller-side business. V12 Data (2019)

### Services Offered to Customers

On the services offered to customers by the big automotive industries, the table shows that all the possible services were offered to customers.

**Table 1: Profile of Industry in Terms of Type of Business, Services Offered to Customers, and Competency Assessment Compliant to TESDA Regulation**

Profile of Industry		Big Industry	Small Industry
		% (n=30)	% (n=30)
<b>Type of Business</b>			
	Servicing	100	100
	Distribution	17	0
	Marketing	60	0
<b>Services Offered to Customers</b>			
	Periodic Maintenance	97	90
	Parts/accessories sales	93	77
	Car Accessories Installation/repair	90	63
	Car sales/Dealer	93	0
	Car Registration and Insurance Processing	83	0
	Car Finance Processing	53	0
	Car Wash and Auto Detailing	63	0
	Underchassis Repair	90	90
	Towing and Transport Services	53	17
	Body repair and Painting	77	0
	Car Electrical Repair	93	47
	Car Aircon service	93	0
	Engine Overhaul and repair	97	43
	Trouble diagnosing	97	77
	Greasing	93	90
	Tire replacement and wheel balancing	60	70
	Wheel alignment	60	70
<b>Competency Assessment Compliant to TESDA Regulation</b>			
	NC-I Automotive Servicing	50	17
	NC-II Automotive Servicing	73	60
	NC-III Automotive Servicing	30	7
	NC-IV Automotive Servicing	20	0

It is worthy to note that periodic maintenance, engine overhaul and repair, trouble diagnosing are the most offered services with 97 percent. This is followed by parts/accessories sales, car sales/dealer, car electrical repair, car aircon service and greasing with 93 percent. It is also noted that the least services offered to customers are car finance processing and towing/transport services with only 53 %.

Meanwhile, the table also shows that 90 % of the small automotive industries mostly focus on periodic maintenance, underchassis repair and greasing with 90 percent, this is followed by parts/accessories sales and trouble diagnosing with 77 percent. It can be noted further that the small industries did not offer car sales/dealer, car registration and insurance processing, car financing processing, car wash and auto detailing, body repair and painting.



The above finding implies that regardless of the differences as to the services offered by the two groups of automotive industry respondents, trainees still have to possess all the necessary knowledge, skills and attitudes of automotive technician, because it is expected that they were deployed to both small and big automotive industries. According to the Bureau of Local Employment, an automotive technician is involved in assembly, operation, performance testing, trouble shooting, repair and maintenance operation, and use of all kinds of automotive equipment and machine tools including quality control. He/She can either be an auto diesel mechanic, automotive electrician, power train and under chassis mechanic or an auto body repairman with complex work in the shop.

### Competency Assessment Compliant to TESDA Regulation

Majority of the respondents both from the big and small industries were holders of NC-II with 73 and 60 percent respectively, followed by ATS NC-I with 50 percent for the big industry group and 17 percent for the small automotive industries. For NC-III (30%) and NC-IV (20%) for the big automotive industry group and none were holders of NC-III and NC-IV for small automotive industries. This means that the automotive industries value most the ATS NC-II and NC-I but not on NC-III and NC-IV.

This finding highlighted the importance of national certificate I and II for automotive technicians and automotive shop owners. Pursuant to Presidential Decree No.1572, TESDA Certificate of Competency (Level not specified) is the basic requirement of the Department of Trade and Industry for the issuance of Certificate of Accreditation for servicing and repair shops. The certificate of accreditation is very important for automotive industries for it serves as recognition, business identity and a way to access various programs of the DTI.

It is also evident that automotive industries were not compliant concerning national assessment. In an interview with the shop supervisor of a big automotive industry, new technician applicants regardless of national certificate they were holding, they value most their technical skills competencies, as they were required to undergo trade test prior to their employment following the company's own prescribed standards. While for the small automotive service shops, applicant mechanic should serve first as mechanic-helper prior to employment. Thus, national certificate is not also a requirement.

### Required Competencies of the Industry Partners of BSIT and BTTE Major in Automotive Soft Skills Competencies

Table 2 shows the soft skills competencies required by the industry partners of the BSIT and BTTE major in automotive which covers personal characteristics, attitudes towards the job, job performance and adherence to company policies.

**Table 2: Required Soft Skills Competencies**

Soft Skills Competencies		Automotive Industries	
		Required	Not Required
		% (n=60)	% (n=60)
Personal Characteristics			
a.	Use appropriate dress at work	100	0
b.	Observe proper haircut and personal hygiene	100	0
c.	Possess average oral and written communication	87	13
d.	Projects self-confidence and enthusiasm	100	0
e.	Demonstrate leadership	93	7
f.	Friendliness	100	0
	Average	97	3
Attitudes Towards the Job			
a.	Shows mark interest and in his task/responsibilities	100	0
b.	Has a sense of duty and can be depended upon to do a good job	100	0
c.	Cooperates willingly and fits easily to the group	100	0
d.	Takes initiative	100	0
e.	Decision Making	88	12

f.	Motivation	98	2
g.	Emotional Competence	92	8
h.	Interpersonal Skills	98	2
	Average	97	3
<b>Job Performance</b>			
a.	Delivers promptly assigned task/responsibility	97	3
b.	Perform assigned task with minimum supervision	97	3
c.	Willingly accepts work assignments	98	2
d.	Delivers assigned task within acceptable level of quality	98	2
e.	Performs assigned task in an organized manner	100	0
f.	Ability to function well under pressure	92	8
	Average	97	3
<b>Adherence to Company Policies</b>			
a.	Present at work most of the time	100	0
b.	Comes to work on time	100	0
c.	Follow company policies	100	0
	Average	100	0

Of the four required soft skills competencies, it reveals that all or 100 percent of the respondents required the adherence to company policies, while personal characteristics, attitudes towards the job, job performance obtained a percentage of 97.

This means that the automotive industries value and requires the importance of soft skills in their work area. This implies that the soft skills play a vital role in the industry immersion/supervised industry training of automotive students.

Majid (2012) stated that appropriate soft skills play an important role in a successful career as well as during social interactions in the society. These skills are also highly sought after by employers recruiting fresh graduates.

Along personal characteristics, use of appropriate dress at work, observance of proper haircut and personal hygiene, projects self-confidence and enthusiasm and friendliness got the highest percentage of 100 followed by demonstrate leadership with 93 percent.

The two groups of respondents affirmed that personal characteristics is very important when working in automotive industry because they are dealing with different people with different attitudes specially the industries primary type of business is servicing.

In a research conducted by Hakim as cited by Miller (2011) beauty is an “economic premium.” He further explained that “physical and social attractiveness deliver substantial benefits in all social interaction-making a person more persuasive, able to secure the co-operation of colleagues, attracts customers and sell products.” The high regard of big industries for proper haircut and personal hygiene connotes one important issue, service managers/advisors in the big industries put premiums on personal appearance of employees that it plays a vital role in the performance of technicians’ duty in the workplace.

Meanwhile, majority with 87 percent of the respondents required would be employees to possess average oral and written communication. This finding confirm the 2018 talent shortage survey, that globally more than half (56%) of employers say communication skills, written and verbal, are their most valued human strengths followed by collaboration and problem-solving.

In the study of Seetha (2014), it configures that the critical skills for workplace success should include good communication, to be able to maintain a positive attitude, the ability to get along with the next person, work in teams, and analyze and think critically in order to solve problems and to be able to lead.

Along attitudes towards job, a few with 12 percent do not require students to possess qualities in decision-making, this maybe because there were higher officials who do the decision. Most of the respondents were in the service area wherein there are still other higher ranking officials in the workplace who do the decision.

This finding contradicted with the industry reports related to Industry 4.0 skills. The World Economic Forum, for example, suggests that the skills needed for future workforce are “people with strong oral communication and persuasion skills, as well as judgment as related to decision making)..

In the same vein, Alibin (2019) said that judgment and decision making as well as coordinating with each other whether through oral or written were the needed skills by 2020 which is anchored to industry revolution 4.0.



For Job Performance, the table exposed that 100 percent of the respondents, requires the students to perform assigned task in an organized manner. According to De Jesus (2018) this observation can be associated with planning skills. A trait a student should possess to help one's succeed in the course. This is the ability to organize and prioritize activities or task effectively and must be able to think of ways on how to do a job efficiently.

Generally, the data shows that job performance were strongly required by the automotive industry-partner respondents as evident by a high rating of 97 percent. This suggest that job performance competency is an essential expertise an automotive student-interns to acquire during industry immersion at the automotive industry.

Hard Skills Competencies Along Automotive Servicing NC-I. Table 3 shows that the respondents required the automotive interns to possess the knowledge, skills and attitudes along this qualification as indicated by high percentage rating for basic, common and core competencies with 93%, 78% and 94% respectively.

This means that the students must be competent to perform pre-delivery inspection and periodic maintenance of automotive parts and components. A person who has achieved this qualification is competent to be: Pre-delivery inspector / Check lister, periodic maintenance personnel/staff, periodic maintenance associate, junior technician, maintenance technician, auto – service personnel.

Most of the common task of a beginner mechanic is on maintenance of automotive parts and components. This substantiates the job description for automotive service technician / mechanic wherein they diagnose, repair and perform maintenance on automobiles. When performing diagnostics, automotive service technicians use electronic testing equipment to identify problems. (Bureau of Local Employment)

**Table 3: Required Hard Skills Competencies Along Automotive Servicing NC-I**

Hard Skills Competencies		Automotive Industries	
		Required	Not Required
		% (n=60)	% (n=60)
<b>Basic Competency</b>			
1	Received and respond to workplace communication	93	7
2	Work with others	93	7
3	Demonstrate work values	92	8
4	Practice basic housekeeping procedures	93	7
	Average	93	7
<b>Common Competencies</b>			
1	Validate vehicle specification	82	18
2	Move and position vehicle	55	45
3	Utilize automotive tools	92	8
4	Perform mensuration and calculation	80	20
5	Utilize workshop facilities and equipment	90	10
6	Prepare servicing parts and consumables	82	18
7	Prepare vehicle for servicing and releasing	63	37
	Average	78	22
<b>Core Competencies</b>			
1	Perform pre-delivery inspection	65	35
2	Perform periodic maintenance of automotive engine	87	13
3	Perform periodic maintenance of drive train	82	18
4	Perform periodic maintenance of brake system	92	8
5	Perform periodic maintenance of suspension system	92	8
6	Perform periodic maintenance of steering system	85	15
	Average	84	16

Along basic competency, it reveals that 93 percent of the respondents required the automotive students to be competent in receiving and responding to workplace communication, work with others, demonstrate work values and practice basic housekeeping procedures.

This implies that the students when they enter into OJT program, they should possess non-technical skills (knowledge, skills and attitudes) that everybody will need in order to perform satisfactorily at work and are considered portable and transferable irrespective of jobs and industrial settings. These competencies are integrated with 21st century skills, referring to a broad set of knowledge, skills, work habits, and character traits believed to be critically important to success in today's world, particularly in contemporary careers and workplaces.

For the common competencies, the table reveals that 92 percent of the respondents requires the automotive students to be competent in utilizing automotive tools, 82 percent in validation of vehicle specification and prepare servicing parts and consumables, 80 percent in performing mensuration and calculation, and 63 and 55 percent in preparing vehicle for servicing/releasing and move and position vehicle respectively.

These imply that the students should be knowledgeable and skilled in the preparation, used and maintenance of automotive tools, checking body type of vehicle, vehicle specification and complete validation of vehicle specification, identifying parts and consumables, retrieve and withdraw parts and consumables and complete the work process. This further implies that the students are also required to be knowledgeable and skillful particularly on the use automotive measuring tools, select measuring instruments, carry out measurements and calculation as well as maintaining measuring instruments.

It is surprising to note that the automotive industry partners least required the moving and positioning of vehicle with only 55 percent. Although it is not included in the table, when the small group of industry partners give their views on this particular unit of competency, it shows that majority or 97 percent of the small industry respondents required their automotive students to possess this skill while the big industry group least required it with only 63 percent. A chief mechanic of a small automotive industry stated in an interview that as much as possible, the automotive students deployed in their company must know how to move and position vehicle because they allow their trainees to test the vehicle before and after servicing to check whether the vehicle trouble has been solved.

For the core competencies, 92 percent of the respondents required the automotive students to be competent in performing periodic maintenance of brake system, and suspension system, 87 percent on maintenance of automotive engine, 85 percent steering system, 82 percent in drive train and 65 percent in performing pre-delivery inspection.

This means that automotive industries focus mostly on underchassis jobs such as the ability to carry out periodic maintenance of vehicle's brake system, vehicle suspension system, automotive engines, steering system and drive train in order to keep automobile in top condition and prevent serious trouble.

Hard Skills Competencies Along Automotive Servicing NC-II. It can be noted in table 4 that the respondents required the automotive interns to be competent on these qualifications as indicated by a high percentage rating given along basic, common and core competency with 95% , 81% and 87 % respectively.

These mean that the automotive students were required to possess the knowledge, skills and attitudes particularly on cleaning and repairing mechanical or electrical parts, components, assemblies and sub-assemblies of light and heavy-duty automotive vehicle with diesel or gas engine in accordance with manufacturer's specification.

**Table 4: Required Hard Skills Competencies Along Automotive Servicing NC-II**

Hard Skills Competencies		Automotive Industries	
		Required	Not Required
		% (n=60)	% (n=60)
<b>Basic Competencies</b>			
1	Participate in Workplace Communication	93	7
2	Work in Team Environment	95	5
3	Practice Career Professionalism	95	5
4	Practice Occupational Health and Safety Procedures	95	5
	Average	95	5
<b>Common Competencies</b>			
1	Apply appropriate sealant/adhesive	87	13
2	Move and position vehicle	60	40
3	Perform mensuration and calculation	77	23
4	Read, interpret and apply specifications and manuals	73	27
5	Use and apply lubricants/coolants	93	7
6	Perform shop maintenance	88	12

7	Perform job estimates	65	35
8	Interpret/ draw technical drawing	67	33
9	Practice health, safety and environment procedures	95	5
10	Inspect technical quality of work	85	15
11	Maintain quality systems	87	13
12	Provide work skill instructions	87	13
13	Identify and select original automotive parts and products	87	13
	Average	81	19
Core Competencies			
1	Service Automotive Battery	88	12
2	Service Ignition System	87	13
3	Test and Repair Wiring/Lighting System	87	13
4	Service Starting System	83	17
5	Service Charging System	87	13
6	Service Engine Mechanical System	87	13
7	Service Clutch System	88	12
8	Service Differential and Front Axle	88	12
9	Service Steering System	90	10
10	Service Brake System	92	8
11	Service Suspension System	90	10
12	Perform Underchassis Preventive Maintenance	92	8
13	Overhaul Manual Transmission	77	23
	Average	87	13

They were also required to be skillful in servicing engine mechanical components such as cooling and lubricating system, performing power train and underchassis servicing and repair.

The very high rating given by the respondents in ATS NC-II shows that the competencies in this qualification are the common problems encountered by the technicians.

The finding corroborates with the most common problems reported for all car makes and models since 1996. The most common car problem involves the vehicle's engine and engine cooling with 135,177 problems reported. The second most common car problem is the electrical system problem, with 129,782 problems reported, Third is the power train with 113,658 problems, fourth, the airbag problem with 111,786 problems and fifth, service brakes with 93,649 number of problem reported. All the top five common car problems are included in ATS NC-II.

Hard Skills Competencies Along Automotive Servicing NC-III. It can be noted in the table 5 that high percentage rating were given to basic, common and core competencies with 85, 81 and 76 percent respectively.

This means that the automotive industries required the automotive students to be competent in checking, testing, replacing and repairing mechanical, electrical and electronic control system components of a motor vehicle such as the automatic transmission systems, engine management system, steering and suspension systems. They should be competent also in inspecting, preparing, installing and servicing mechanical, electrical and electronic control parts, and components of an automobile. It also includes the removal and replacement of auto engine and engine-related system for repowering the vehicle as well as in testing and replacing electronic components or devices in security and engine management systems.

Meanwhile, the respondents do not require the students to possess the knowledge, skills and attitudes along elective competencies with only 5 percent. It is evident that none of their services covers the LPG fueled automobile.

The finding implies that the elective competencies for ATS NC-III are no longer practiced in the automotive industry in the region. This findings is similar to the assessment of the Department of Energy (DOE) that there is marked decline on uptake of such alternative public transport system.

**Table 5: Required Hard Skills Competencies Along Automotive Servicing NC-III**

Hard Skills Competencies		Automotive Industries	
		Required	Not Required
		% (n=60)	% (n=60)
<b>Basic Competencies</b>			
1	Lead workplace communication	82	18
2	Lead small teams	82	18
3	Develop and practice negotiation skills	87	13
4	Solve problems related to work activities	85	15
5	Use mathematical concepts and techniques	87	13
6	Use relevant technologies	87	13
	Average	85	15
<b>Common Competencies</b>			
1	Apply appropriate sealant/adhesive	87	13
2	Move and position vehicle	60	40
3	Perform mensuration and calculation	77	23
4	Read, interpret and apply specifications and manuals	73	27
5	Use and apply lubricants/coolants	93	7
6	Perform shop maintenance	88	12
7	Perform job estimates	65	35
8	Interpret/ draw technical drawing	67	33
9	Practice health, safety and environment procedures	95	5
10	Inspect technical quality of work	85	15
11	Maintain quality systems	87	13
12	Provide work skill instructions	87	13
13	Identify and select original automotive parts and products	87	13
	Average	81	19
<b>Core Competencies</b>			
1	Test and Repair Electrical Security System/Components	70	30
2	Service Electronic Engine Management	70	30
3	Overhaul Engines and Associated Components	63	37
4	Service Automatic Transmission	73	27
5	Perform Maintenance Service Check-Up and Repair to Auto AC System	72	28
6	Remove and Replace Automotive Engine and Engine-Related Systems	78	22
Continuation of Table 10...			
7	Service and repair electronically controlled steering systems	82	18
8	Service and repair electronically controlled suspension systems	78	22
9	Repair Instruments and warning systems	88	12
10	Carry out diagnostic procedures	87	13
	Average	76	24
<b>Elective Competencies</b>			
1	Install LPG Conversion Kit	5	95
2	Test and Adjust LPG Calibration	5	95
3	Service LPG System	5	95

Average	5	95
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Hard Skills Competencies Along Automotive Servicing NC-IV. Table 6 reveals that the respondents required the students to be competent on this qualification as indicated by a high percentage rating along basic, common and core competency with 90 percent, 81 percent and 77 percent respectively.

These means that the automotive students were required to be knowledgeable in leading a section or group of workers as well as in servicing and repairing various types of motor vehicles. Automotive industries also required the automotive students to be competent in servicing and repairing electronically controlled components or devices and emission control system of a motor vehicle and can also service both diesel and gasoline engines.

Along basic competencies, it is worthy to note that promotion of environmental protection is the most required by automotive industries with 92 percent rating. This means that adhering to environmental protection principles, strategies and guidelines were required by the automotive industries to be included in the curriculum so that students possess this competency when they start their training in industry.

**Table 6: Required Hard Skills Competencies Along Automotive Servicing NC-IV**

Hard Skills Competencies		Automotive Industries	
		Required	Not Required
		% (n=60)	% (n=60)
<b>Basic Competencies</b>			
1	Utilize specialized communication skills	90	10
2	Develop teams and individuals	90	10
3	Apply problem solving techniques in the workplace	88	12
4	Collect, analyze and organize information	90	10
5	Plan and organize work	90	10
6	Promote environmental protection	92	8
	Average	90	10
<b>Common Competencies</b>			
1	Apply appropriate sealant/adhesive	87	13
2	Move and position vehicle	60	40
3	Perform mensuration and calculation	77	23
4	Read, interpret and apply specifications and manuals	73	27
5	Use and apply lubricants/coolants	93	7
6	Perform shop maintenance	88	12
7	Perform job estimates	65	35
8	Interpret/ draw technical drawing	67	33
9	Practice health, safety and environment procedures	95	5
10	Inspect technical quality of work	85	15
11	Maintain quality systems	87	13
12	Provide work skill instructions	87	13
13	Identify and select original automotive parts and products	87	13
	Average	81	19
<b>Core Competencies</b>			
1	Service Diesel Engine Management System	88	12
2	Service Electronic Body Management System	72	28
3	Service Diesel Fuel Injection System Components	70	30

4	Service Emission Control System	53	47
5	Service and repair electronically controlled anti-lock braking system	80	20
6	Service and repair electronically operated traction control System	73	27
7	Service and repair electronically operated stability control System	73	27
8	Plan assessment activities and processes	80	20
9	Manage facility and inventory requirements	75	25
10	Estimate complex jobs	68	32
11	Ensure a safe workplace	90	10
12	Implement continuous improvement	90	10
13	Manage people performance	88	12
14	Plan and manage compliance with environmental regulations in a workplace or business	85	15
	Average	77	23

On the other hand, application of problem solving techniques in the workplace is the least required by the respondents although its percentage is still high with 88 percent. This means that the students were also required to possess the knowledge, skills and attitudes such as problem solving and other problems beyond those associated directly with the technical works.

For the core competencies, the table shows that servicing emission control system is the least required competency for automotive students with only 53 percent.

This means that many (47%) of the respondents do not require the automotive students to be knowledgeable in OH & S legislation, the implementing Rules and Regulation for Phil. Clean Air Act 1999, the identification of motor vehicle emissions and their effects on the environment and others.

This finding is contrary to the provisions of RA 8749 also known as Philippine Clean Air Act of 1999 particularly on section 2 in its concluding part which states that the state recognizes that a clean and healthy environment is for the good of all and should, therefore, be the concern of all. This also contest the TR for ATS NC-IV because in the assessment, it requires the students to conduct emission control test of vehicle and serviced emission control systems and associated components.

Giving emphasis on automobile electronic systems built into modern automobiles, the automotive students were also required by the automotive industries to be competent along this unit competency as evident by a high percentage rating given along servicing diesel engine management system (88%) servicing and repairing electronically controlled anti-lock brakes (80%) in accordance with manufacturer/component supplier specifications fitted to light vehicles and/or heavy vehicles.

With all the complex repair and maintenance machinery used and the new technology built into modern automotive components, knowledge of auto electronics is increasingly desirable in a mechanic. In fact, the new developments in engines, transmissions and suspension systems, and the increased use of electronic components are changing the mechanic's job into that of a technician, with more emphasis on vehicle diagnosis. This lend support to Truity (2019) who states that service technicians work on traditional mechanical components, such as engines, transmissions, and drive belts. However, they also be familiar with a growing number of electronic systems. Braking, transmission, and steering systems. Other integrated electronic systems, such as accident-avoidance sensors, are becoming common as well. In addition, a growing number of technicians are required to work on vehicles that run on alternative fuels, such as ethanol and electricity.

#### **Assessed Competencies of the BSIT and BTTE Automotive Students Along Soft and Hard Skills**

Soft Skills Competencies. Table 7 presents the competencies of the BS Industrial Technology and BTTE automotive students who are enrolled in industry immersion and deployed in the different automotive service centers in the Philippines. The tables also include the required competencies of automotive faculty members among SUC's in Region 2.

Generally, the automotive students viewed themselves as competent along soft skills competencies as indicated by a high average rating ranging from 94 to 98 percent. Students believed that they possess soft skills competencies. This is in line with the required competency of automotive faculty as indicated by high percentage rating ranging from 99-100 percent. This means that the students are competent enough along personal characteristics, attitudes towards the job, job performance and adherence to company policies.

Some of the automotive students are BTTE and expected that they would-be teachers and/or industry workers who are aware how important these soft skills in their industry immersion and career development. They will be meeting



different people such as students, parents, co-workers, barangay officials and school or industry executives, hence they should project decent physical traits to serve as role model in work, in the workplace and in the community. Soft skills is necessary to deal with these various groups.

**Table 7: Soft Skills Competencies of BSIT and BTTE Students and Required Competencies of Automotive Faculty.**

Soft Skills Competencies		Faculty	OJT
		Required	Competent
		% (n=26)	% (n=168)
<b>Personal Characteristics</b>			
a.	Use appropriate dress at work	100	95
b.	Observe proper haircut and personal hygiene	100	90
c.	Possess average oral and written communication	93	93
d.	Projects self-confidence and enthusiasm	100	96
e.	Demonstrate leadership	100	96
f.	Friendliness	100	98
	Average	99	94
<b>Attitudes Towards the Job</b>			
a.	Shows mark interest and in his task/responsibilities	100	100
b.	Has a sense of duty and can be depended upon to do a good job	100	99
c.	Cooperates willingly and fits easily to the group	100	99
d.	Takes initiative	100	99
e.	Decision Making	100	97
f.	Motivation	100	98
g.	Emotional Competence	100	98
h.	Interpersonal Skills	100	98
	Average	100	99
<b>Job Performance</b>			
a.	Delivers promptly assigned task/responsibility	100	96
b.	Perform assigned task with minimum supervision	100	97
c.	Willingly accepts work assignments	100	99
d.	Delivers assigned task within acceptable level of quality	100	97
e.	Performs assigned task in an organized manner	100	98
f.	Ability to function well under pressure	100	97
	Average	100	97
<b>Adherence to Company Policies</b>			
a.	Present at work most of the time	100	97
b.	Comes to work on time	100	96
c.	Follow company policies	100	98
	Average	100	97

The findings are in line with the soft skills needed by the automotive industries as well as the required competency of automotive faculty.

In the study of Mahid, (2012) on the importance of soft skills for education and career success, majority of the students strongly agreed that soft skills were very important for career advancement, highly sought after by employers and for getting a better job.

The automotive students also highlighted friendliness (98 %), they viewed friendliness has a positive effect in the workplace. The importance of a friendly working environment results in higher job satisfaction among employees and increases productivity and a higher rate of engagement. Research shows that being friends with co-workers results drastically in improved job satisfaction.

Meanwhile, observe proper haircut and personal hygiene (90%) least rated by the respondents although the rating is still high. Personal hygiene at work not only boosts the employee's confidence but also has its positives for the organization's reputation.

**Hard Skills Competencies Along Automotive Servicing NC-I.** As shown in table 8, the automotive students generally assessed themselves as competent in terms of the competencies along this qualification as indicated by a high average rating for basic competency (98%) common competency (92%) and core competency (92%).

This means that the automotive students are confident enough to perform the competencies along this qualification which includes pre-delivery inspection, periodic maintenance of automotive parts and components, and under chassis preventive maintenance such as drive train, brake, suspension and steering system.

**Table 8: Hard Skills Competencies of BSIT and BTTE Students and Required Competencies of Automotive Faculty Along Automotive Servicing NC-I**

Hard Skills Competencies		Faculty	OJT
		Required	Competent
		% (n=26)	% (n=168)
<b>Basic Competencies</b>			
1	Received and respond to workplace communication	100	99
2	Work with others	100	99
3	Demonstrate work values	100	96
4	Practice basic housekeeping procedures	100	96
	Average	100	98
<b>Common Competencies</b>			
1	Validate vehicle specification	100	90
2	Move and position vehicle	100	92
3	Utilize automotive tools	100	95
4	Perform mensuration and calculation	100	90
5	Utilize workshop facilities and equipment	100	96
6	Prepare servicing parts and consumables	100	91
7	Prepare vehicle for servicing and releasing	100	93
	Average	100	92
<b>Core Competency</b>			
1	Perform pre-delivery inspection	100	88
2	Perform periodic maintenance of automotive engine	100	94
3	Perform periodic maintenance of drive train	100	90
4	Perform periodic maintenance of brake system	100	96
5	Perform periodic maintenance of suspension system	100	94
6	Perform periodic maintenance of steering system	100	93
	Average	100	92

For the automotive faculty, generally they required the automotive students to possess the hard skills competencies along NC-I as indicated by a rating of 100 percent along basic, common and core competencies.

Evidently, the automotive students were competent along this qualification and the automotive faculty also required it which means that there is complementation of what has been taught by the faculty and the acquired competencies of the students.

**Hard Skills Competencies Along Automotive Servicing NC-II.** Table 9 presents the competencies of BSIT and BTTE automotive students and the required competencies of automotive faculty along automotive servicing NC-II.

**Table 9: Hard Skills Competencies of BSIT and BTTE Students and Required Competencies of Automotive Faculty Along Automotive Servicing NC-II**

Hard Skills Competencies		Faculty	OJT
		Required	Competent
		% (n=26)	% (n=168)
<b>Basic Competencies</b>			
1	Participate in Workplace Communication	100	98
2	Work in Team Environment	100	99
3	Practice Career Professionalism	100	95
4	Practice Occupational Health and Safety Procedures	100	99
	Average	100	97
<b>Common Competency</b>			
1	Apply appropriate sealant/adhesive	100	96
2	Move and position vehicle	100	93
3	Perform mensuration and calculation	100	93
4	Read, interpret and apply specifications and manuals	100	91
5	Use and apply lubricants/coolants	100	97
6	Perform shop maintenance	100	99
7	Perform job estimates	100	95
8	Interpret/ draw technical drawing	100	92
9	Practice health, safety and environment procedures	100	97
10	Inspect technical quality of work	100	98
11	Maintain quality systems	100	97
12	Provide work skill instructions	100	97
13	Identify and select original automotive parts and products	100	94
	Average	100	95
<b>Core Competencies</b>			
1	Service Automotive Battery	100	99
2	Service Ignition System	100	95
Continuation of table 14...			
3	Test and Repair Wiring/Lighting System	100	94
4	Service Starting System	100	95
5	Service Charging System	100	95
6	Service Engine Mechanical System	100	95
7	Service Clutch System	100	97
8	Service Differential and Front Axle	100	96
9	Service Steering System	100	95
10	Service Brake System	100	99
11	Service Suspension System	100	99
12	Perform Underchassis Preventive Maintenance	100	96
13	Overhaul Manual Transmission	100	94
	Average	100	96

The table shows that the automotive students were competent along this qualification as indicated by a high percentage rating of basic, common and core competencies with 97 %, 95% and 96 percent respectively. This is in line with the big number of passers in ATS NC-II national competency assessment as reflected in the students' profile.

The high rating given by the automotive students and their national certificates in this qualification evidently mean that they were competent in servicing automotive electrical system such as ignition, starting, charging, lighting and other electrical systems and components of automobile. They were also competent in servicing underchassis components such as steering, brake, suspension and other underchassis related works.

For the automotive faculty, generally they required the automotive students to possess the hard skills competencies along NC-II as indicated by a rating of 100 percent along basic, common and core competencies.

Evidently, the automotive students were competent along this qualification and the automotive faculty also required it which means that there is complementation of what has been taught by the faculty and the acquired competencies of the students.

Hard Skills Competencies Along Automotive Servicing NC-III. Table 10 presents the competencies of BSIT and BTTE automotive students and the required competencies of automotive faculty along automotive servicing NC-III.

As gleaned from the table, the automotive students were competent enough along the basic and common units of competencies as indicated by a general rating of 94 percent. However, for the core competencies, generally, the automotive students assessed themselves as not competent in most of the competencies as indicated by a rating of 45 percent not competent.

This means that majority (55%) of the automotive students' lack of skills on servicing and repairing electrical and electronic components of an automobile such as electrical security system, electronic engine management system, overhauling engines and associated components, automatic transmission, auto AC system, electronically controlled steering and suspension systems, and instruments and warning systems.

Just like the automotive industries as reflected in the industry-required competencies, the automotive faculty required also the automotive students to possess the knowledge, skills and attitudes along this qualification as indicated by a high percentage rating of 100 percent along basic, common and core competencies. This means that the automotive faculty are aware as regards the competencies required by the industry and the standards.

**Table 10: Hard Skills Competencies of BSIT and BTTE Students and Required Competencies of Automotive Faculty Along Automotive Servicing NC-III**

Hard Skills Competencies		Faculty	OJT
		Required	Competent
		% (n=26)	% (n=168)
<b>Basic Competencies</b>			
1	Lead workplace communication	100	96
2	Lead small teams	100	96
3	Develop and practice negotiation skills	100	96
4	Solve problems related to work activities	100	95
5	Use mathematical concepts and techniques	100	91
6	Use relevant technologies	100	91
	Average	100	94
<b>Common Competencies</b>			
1	Apply Appropriate Sealant/Adhesive	100	94
2	Move and Position Vehicle	100	90
3	Perform Mensuration and Calculation	100	91
4	Read, Interpret and Apply Specifications and Manuals	100	91
5	Use and Apply Lubricant/Coolant	100	96
6	Perform Shop Maintenance	100	97
7	Perform Job Estimate	100	93
8	Interpret/Draw Technical Drawing	100	92
9	Practice health, safety and environment procedures	100	96
10	Inspect technical quality of work	100	95
11	Maintain quality systems	100	96
12	Provide work skill instructions	100	95
13	Identify and select original automotive parts and products	100	93
	Average	100	94
<b>Core Competencies</b>			
1	Test and Repair Electrical Security System/Components	100	46
2	Service Electronic Engine Management	100	43
3	Overhaul Engines and Associated Components	100	49
4	Service Automatic Transmission	100	43

5	Perform Maintenance Service Check-Up and Repair to Auto AC System	100	42
6	Remove and Replace Automotive Engine and Engine-Related Systems	100	49
7	Service and repair electronically controlled steering systems	100	42
8	Service and repair electronically controlled suspension systems	100	40
Continuation of table 15...			
8	Service and repair electronically controlled suspension systems	100	40
9	Repair Instruments and warning systems	100	46
10	Carry out diagnostic procedures	100	49
	Average	100	45
Elective Competencies			
1	Install LPG Conversion Kit	64	25
2	Test and Adjust LPG Calibration	64	25
3	Service LPG System	64	25
	Average	64	25

While the automotive faculty required the automotive students to possess the core units competencies, the automotive students viewed themselves as not competent which means that there is a gap between the required competency of faculty and the competencies of students which means that faculty have to consider improving the skill competencies of the students in order to meet the needs of the industry partners.

For the elective competencies, majority or 75 percent of the automotive students assessed themselves as not competent on the installation of LPG conversion kit, testing and adjusting LPG calibration and service LPG system. This is in line with the trainings attended by the faculty, wherein none of them have attended trainings on LPG fueled vehicle. Topics on LPG are not also covered in the SUC's curriculum.

Moreover, knowledge, skills and attitudes in LPG fueled vehicle is not required also by the partner industries in the region as reflected in the industry-required competencies. However, it is still necessary for the students to be skilled in this field because the Department of Energy (DOE) promotes the use of LPG (or Autogas) under its alternative transport fuels program to diversify the country's fuel sources while providing solutions to air pollution caused by vehicular emissions. Between about 2005 and 2010, the Philippine Autogas program, which mainly encouraged the conversion to LPG of taxis, was progressing in earnest. Taxi units, especially those with expiring franchises, were given an extension of three years if the units converted to LPG. This and the more important lower prevailing cost per liter of LPG versus gasoline convinced many taxi operators to convert to LPG. Quiros, E. (2017)

As of the end of 2011, the DOE reported that 19,052 taxis or 49 percent of the total 39,000 taxis nationwide have already converted to LPG. In the National Capital Region, about 39 percent of the 28,047 taxis running were using LPG. DOE data also showed that there were 229 LPG refueling stations in the country as of March 2012, including 31 accredited auto-LPG conversion shops. The DOE and the Department of Trade and Industry also have developed 5 sets of standards covering LPG retrofit systems and components, installation, dispensing stations, and a code of practice for implementation in the Auto-LPG industry.

Hard Skills Competencies Along Automotive Servicing NC-IV. Table 11 shows that the automotive students assessed themselves as competent in the basic and common competencies with an average rating of 93 and 87 percent respectively. In contrast, for the core competencies, only few (42%) percent of the automotive students says that they are not competent in this area. This means that majority (58%) of the students' lack of skill to lead a section or group of workers to service and repair various types of motor vehicles also in servicing and repairing electronically controlled components or devices and emission control system of a motor vehicle.

**Table 11: Hard Skills Competencies of BSIT and BTTE Students and Required Competencies of Automotive Faculty Along Automotive Servicing NC-IV**

Hard Skills Competencies		Faculty	OJT
		Required	Competent
		% (n=168)	% (n=168)
<b>Basic Competencies</b>			
1	Utilize specialized communication skills	100	87
2	Develop teams and individuals	100	86
3	Apply problem solving techniques in the workplace	100	87
4	Collect, analyze and organize information	100	86
5	Plan and organize work	100	88
6	Promote environmental protection	100	86
	Average	100	87
<b>Common Competencies</b>			
1	Apply Appropriate Sealant/Adhesive	100	92
2	Move and Position Vehicle	100	91
3	Perform Mensuration and Calculation	100	89
4	Read, Interpret and Apply Specifications and Manuals	100	92
5	Use and Apply Lubricants/Coolants	100	93
6	Perform Shop Maintenance	100	95
7	Perform Job Estimate	100	92
8	Interpret/Draw Technical Drawing	100	90
9	Practice health, safety and environment procedures	100	95
10	Inspect technical quality of work	100	96
11	Maintain quality systems	100	94
12	Provide work skill instructions	100	96
13	Identify and select original automotive parts and products	100	93
	Average	100	93
<b>Core Competencies</b>			
1	Service Diesel Engine Management System	100	42
2	Service Electronic Body Management System	100	37
3	Service Diesel Fuel Injection System Components	100	40
4	Service Electronic Drive Management System	100	36
5	Service Emission Control System	93	36
6	Service and repair electronically controlled anti-lock braking system	100	35
7	Service and repair electronically operated traction control System	100	34
8	Service and repair electronically operated stability control System	100	35
9	Plan assessment activities and processes	100	47
10	Manage facility and inventory requirements	100	46
11	Estimate complex jobs	100	46
12	Ensure a safe workplace	100	49
13	Implement continuous improvement	100	50
14	Manage people performance	100	50
15	Plan and manage compliance with environmental regulations in a workplace or business	100	49
	Average	99.5	42

The faculty requires the students to possess the knowledge, skills and attitudes along NC-IV as indicated by a high percentage rating along basic (100%), common (100%) and core (99.5%) competencies.



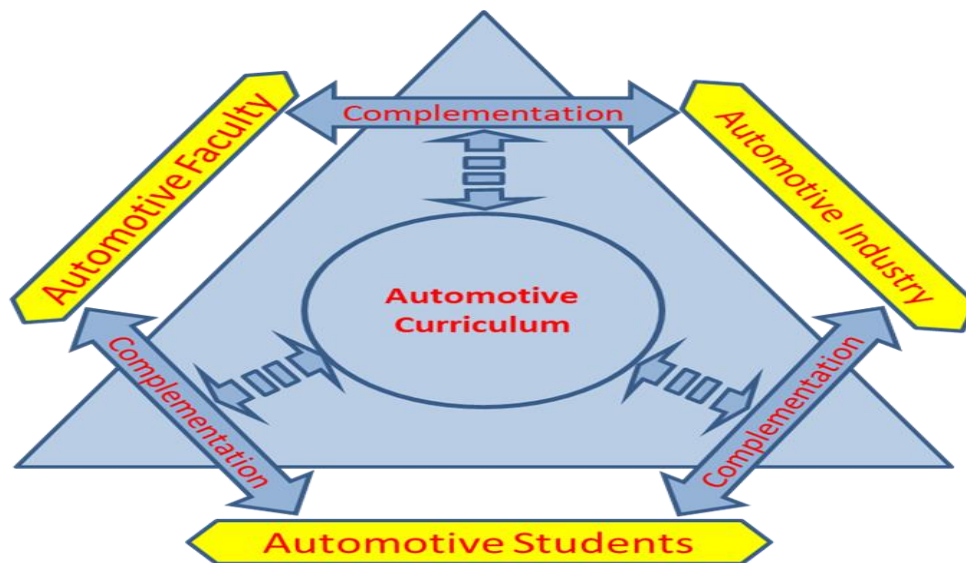
The assessment of automotive students implies that when they deployed to big automotive industries for their industry immersion, they still need to be oriented particularly on the use of sophisticated equipment and electronic components of automobile as it is the coverage of NC-IV. This further implies that the competencies of students do not complement with the required competencies of the automotive industries and automotive faculty.

The above findings support the common skills challenges and recommendations for ASEAN-5 specifically the inability of the educational institutions to meet industry demands. (Morgan, n.d.)

The findings are very alarming for the students in region 2 because according to the Jobsfit Labor Market Information (LMI) Report 2013-2020, jobs in the automotive industry rank among the most in-demand for the said time frame, with automotive painter, automotive technician and calibration technician to name a few.

### Complementation of Automotive Technology Courses and Industry Standards

Figure 2 shows the interrelationship on the complementation of automotive technology courses and industry standards. The automotive curriculum is at the center as basis in implementing the course. However, the success of its implementation is based primarily in the complementation of the required competencies of automotive industries, the required competencies and qualifications of automotive faculty members, and the competencies of the automotive students. Such that the contents of the automotive curriculum be likewise complemented to the industry needs, the qualifications of faculty and the acquired knowledge, skills and attitudes of automotive students. To determine the complementation of automotive technology courses and industry standards, these were considered, analyzed and compared to the industry standards regulated by TESDA regulation.



**Figure 2: Interrelationship on the Complementation of Automotive Technology Courses and Industry Standards**

### Availability of Equipment

The findings show that the recommended equipment for automotive servicing – NC I was the only qualification that complemented with the training regulation, while NC-II to NC-IV has no complementation. This means that the required availability of equipment among automotive shopwork of SUC's were not fully met. According to Prosser's 16 theorems, particularly on industry standards, effective vocational training can only be given where the training jobs are carried on in the same way, with the same operations, the same tools, and the same machines as in the occupation itself. This means that the students are not ready to engage in the industry works specially they were expected to use sophisticated equipment when they are deployed to automotive industries. However, to address this concern, The SUC's management may consider forging a Memorandum of Agreement/Memorandum of Understanding with the automotive industry partners for the familiarization of automotive faculty and automotive students on sophisticated automotive equipment used by these industries. In the above findings, the curriculum particularly on the availability of equipment as part of it shall be improve as required in Sec. 14.3 of CMO 56, s 2007 and Sec.16.3 of CMO 79, s.2017 that the technology facilities and requirements shall be based on the training regulation of TESDA.

### **Faculty**

It can be noted that there were automotive faculty members who are not certified and holders of National TVET Trainer's Certificate in automotive servicing at different levels, and many were not expose to automotive industry while the standard required that the trainer must be a holder of National TVET Trainers Certificate (NTTC) Level 1 in the different levels of automotive servicing and must have at least 1 year industry experience in automotive servicing within the last 3 years. In the same manner, the faculty/trainers' are also required to be a holder of a COC in LPG Retrofitting and/or LPG Re-powering, however, none of the automotive faculty were holders of this qualifications. These means that the required qualification of faculty along this parameter is not fully met and has no complementation with the industry standards. According Prosser 16 theorems, particularly on craftsman, vocational education will be effective in proportion as the instructor has had successful experiences in the application of skills and knowledge to the operations and processes he undertakes to teach. In the above findings, the qualifications of faculty to teach in the automotive technology courses should be upgraded by following what is required in the training regulation and as prescribed in CMO 56, s.2017 sec.11.1.1 and CMO 79 s.2017 sec.14 C.2. With this, the faculty members should subject themselves to training and national assessment of TESDA and undergo industry immersion in automotive industries.

### **Soft and Hard Skills Competencies**

Along automotive servicing NC-I, II, III and IV, it shows that the required competencies as assessed by the faculty were complemented with the industry standards as reflected in the required competencies of the automotive industry partners. It is also noted that the automotive students were competent along NC-I and NC-II. However, for NC-III and NC-IV core competencies, the students assessed themselves as not competent. In the above findings, while it is true that the required competencies of automotive faculty and the industry standards were complemented, the student in this parameter were not competent, which means that there is a gap between what is taught by the faculty and with the competencies of the automotive students. The qualification of faculty in this scenario as reflected in the SUC's profile along faculty were questioned wherein, many of them are not certified along NC-III and NC-IV. These means that the curriculum particularly on the qualifications of automotive faculty should be improve to help the students to be competent along core competencies particularly in leading a section or group of workers to service and repair various types of motor vehicles and in servicing and repairing electronically controlled components or devices, security and engine management systems and emission control system of a motor vehicle.

### **CONCLUSIONS AND RECOMMENDATIONS**

The findings of a study suggest that the automotive industry partners require automotive students to possess soft skills such as personal characteristics, positive attitudes towards their job, job performance, and adherence to company policies. Moreover, they should have the basic, common, core, and elective competencies of Automotive Servicing NC-I to NC-IV. However, the study found that the automotive students are lacking in core competencies in Automotive Servicing NC-III and NC-IV. The study identified specific areas that need improvement, including the core competencies of automotive students in NC-III and NC-IV and the availability of equipment and faculty qualification. The soft and hard skills competencies required by the automotive industry partners and automotive faculty members complemented the industry standards.

The study recommends including the specific areas where automotive students lack competency, particularly the core competencies of ATS NC-III and NC-IV, as part of the major subjects in automotive technology courses. This is necessary to address the non-complementation of the core competencies of automotive students with the required competencies of automotive industry partners. The university curriculum review and development council should be presented with the study's results to serve as a benchmark in enhancing the curriculum for automotive technology courses.

The automotive technology curriculum should sustain the areas where soft and hard skills competencies complement industry standards. The areas that lack complementation, such as faculty qualification and equipment availability, should be improved by sending automotive faculty members to technical training and assessment related to automotive technology. The SUC's management could consider forging a memorandum of agreement/memorandum of understanding for familiarizing automotive industry partners with sophisticated equipment. Acquisition of automotive equipment based on industry standards should be prioritized to address the equipment shortage found in the study. The specific areas in the soft and hard skills competencies that complement with the industry standards should be sustained in the automotive technology curriculum, while those areas that has no complementation such as faculty qualification and availability of equipment as part of SUC's human and physical resources should be

improve by considering the attendance of automotive faculty members in technical training and assessment related to automotive technology. The SUC's management may also consider forging a memorandum of agreement/memorandum of understanding for the familiarization of sophisticated equipment used by the automotive industry partners. If budget warrants, acquisition of automotive equipment based on what is required in the industry standards may be prioritized in order to address the lack of equipment found in the study. The SUC's in region 2 should maintain their compliance to CHED standards and should consider improving the automotive faculty qualification by sending them to trainings and industry immersion. Forging a Memorandum of Agreement/Memorandum of Understanding with the partner industries for faculty immersion are effective ways to enhance/update their skills and to address the lack of industry experience problem found in the study. The SUC's in region 2 should consider the required competencies of the training regulation in designing/revising the automotive curriculum. They should develop more relevant and updated curriculum for automotive that is aligned with what the industry needs. Cooperation with TESDA and automotive industries should be systematized and harmonized that would entail seamlessness in the complementation of automotive technology courses and industry standards.

## REFERENCES

1. Alibin, P. (2019) PACUIT: Leading the 21st Century Generation Towards a Globalized Industrial Technology, [MS Powerpoint Handouts] PACUIT National and International Convention.
2. Bureau of Local Employment. (n.d.) Automotive Technician. Retrieved on August 19, 2019 at <http://ble.dole.gov.ph/index.php/cg/66-automotive-technician>.
3. CHED Memorandum Order No. 23. Series 2009. Guidelines for Student Internship Program in the Philippines (SIPP) for all Programs with Practicum Subject. Retrieved on September 11, 2019 at <https://ched.gov.ph/cmo-23-s-2009/>
4. CHED Memorandum Order no. 56 series of 2007. Policies and Standards for the Ladderized Bachelor of Technical Teacher Education. Retrieved on September 11, 2019 at <https://ched.gov.ph/cmo-56-s-2007/>
5. CHED Memorandum Order no. 79 series of 2017. Policies, Standards and Guidelines for the Bachelor of Technical-Vocational Teacher Education (BTVTeD). Retrieved on September 11, 2019 at <https://ched.gov.ph/2017-ched-memorandum-orders/>
6. Clavert, M. (nd) Industry 4.0 Implications for Higher Education Institutions. The Universities of the future. Retrieved on August 19, 2019 from [www.universitiesofthefuture.eu](http://www.universitiesofthefuture.eu)
7. De Jesus, G.et.al.(2018). Pre-service Competencies and Required Job Competencies of Automotive Interns. Isabela State University-Ilagan Campus, City of Ilagan, Isabela.
8. Majid, S. et,al.(2012). Importance of Soft Skills for Education and Career Success International Journal for Cross-Disciplinary Subjects in Education (IJCDSE), Nanyang Technological University, Singapore Special Issue Volume 2 Issue 2, 2012.
9. Morgan, J.P. (N.D.) Managing Skills Challenges in Asean-5. Singapore Management University. Singapore <https://www.jpmmorganchase.com/corporate/Corporate-Responsibility/document/ASEAN5-executive-summary-final.pdf>
10. National Center for Education Evaluation and Regional Assistance (NCEE) home: part of the U.S. Department of Education (ED). (2001, March 21). National Center for Education Evaluation and Regional Assistance (NCEE) Home Page, a part of the U.S. Department of Education. <http://ies.ed.gov/ncee/>
11. Philippines Skills Report (2010). Skills for the Labor Market in the Philippines, Report No. 50096-PH. Document of the World Bank. Human Development Department, East Asia and Pacific Region.
12. Prosser and Allen, (1925) Prosser's Sixteen Theorems, <https://slideplayer.com/slide/717213/>
13. PTTQF pdf. Teachers and Trainers in Adult Education and Lifelong Learning Professional Development in Asia and Europe 29-30 June 2009 in Bergisch Gladbach/Germany
14. Republic Act 10968 (2017) "An Act institutionalizing the Philippine Qualifications Framework" Official Gazzete Retrieved on September 30, 2019 at <https://www.officialgazette.gov.ph/downloads/2018/01jan/20180116-RA-10968 RRD.pdf>
15. Republic Act 7686. (1994) "Dual Training System Act of 1994." Philippine Copyright, Chan Robles Publishing Company. Retrieved on September 11, 2019 at <http://www.chanrobles.com/republicactno7686.htm#.XZG32EYzbIU>

16. Republic Act No. 10533. (2013) "The Enhance Basic Education Act of 2013." Official Gazette Retrieved on September 30, 2019 at <https://www.officialgazette.gov.ph/2013/05/15/republic-act-no-10533/>
17. Republic Act No. 10647. (2014) "Act Strengthening the Ladderized Interface between Technical-Vocational Education and Training and Higher Education." Official Gazette retrieved on September 30, 2019 at <https://www.officialgazette.gov.ph/2014/11/21/republic-act-no-10647/>
18. Republic Act No. 3742. (1963) An Act Creating A Bureau of Vocational Education, Defining Its Functions, Duties And Powers, And Appropriating Funds Therefor Philippine Copyright, Chan Robles Publishing Company. Retrieved on September 11, 2019 <http://www.chanrobles.com>
19. Republic Act No. 7796. (1994) "An Act Creating The Technical Education and Skills Development Authority, Providing For Its Powers, Structure and For Other Purposes Philippine Copyright, Chan Robles Publishing Company. Retrieved on September 11, 2019 at <http://www.tesda.gov.ph/uploads/File/REPUBLIC%20ACT%20NO.%207796.pdf>
20. TESDA (2013) Training Regulations Automotive Servicing NC-II Automotive/Land Transport Sector. Retrieved on September 1, 2019 at [http://www.tesda.gov.ph/Download/Training\\_Regulations?Searchcat=Training%20Regulations](http://www.tesda.gov.ph/Download/Training_Regulations?Searchcat=Training%20Regulations)
21. TESDA (2013) Training Regulations Automotive Servicing NC-III Automotive/Land Transport Sector. Retrieved on September 1, 2019 at [http://www.tesda.gov.ph/Download/Training\\_Regulations?Searchcat=Training%20Regulations](http://www.tesda.gov.ph/Download/Training_Regulations?Searchcat=Training%20Regulations)
22. TESDA (2013) Training Regulations Automotive Servicing NC-IV Automotive/Land Transport Sector. Retrieved on September 1, 2019 at [http://www.tesda.gov.ph/Download/Training\\_Regulations?Searchcat=Training%20Regulations](http://www.tesda.gov.ph/Download/Training_Regulations?Searchcat=Training%20Regulations)
23. TESDA (2018) Training Regulations Automotive Servicing NC-I Automotive/ Land Transport Sector. Retrieved on September 1, 2019 at [http://www.tesda.gov.ph/Download/Training\\_Regulations?Searchcat=Training%20Regulations](http://www.tesda.gov.ph/Download/Training_Regulations?Searchcat=Training%20Regulations)
24. TESDA (2018). Competency Standards, Basic Competencies (Integrated 21st Century Skills) Promulgated October 2018 retrieved on September 1, 2019 at [http://www.tesda.gov.ph/Uploads/File/21st%20Century/BC21st\\_updated.pdf](http://www.tesda.gov.ph/Uploads/File/21st%20Century/BC21st_updated.pdf)
25. V12 Data (2019). A Look at Trends and Statistics in the Automotive Aftermarket Industry. Retrieved on September 3, 2019 at <https://v12data.com/blog/a-look-at-trends-and-statistics-in-the-automotive-aftermarket-industry-2017/>
26. Ways Poor Personal Hygiene at Work Can Stunt Your Career 28th January 2017 <https://www.jobberman.com/blog/personal-hygiene-workplace/>