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**Ronie G. Torres**

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<sup>1</sup>Isabela State University - Angadanan Campus, Angadanan-Alicia Rd, Angadanan, Isabela, Philippines



## **The Automotive Technology Courses in State Universities and Colleges in the Philippines to Cater the Industry Needs**

**Ronie G. Torres<sup>1</sup>**

<sup>1</sup>Isabela State University - Angadanan Campus, Angadanan-Alicia Rd, Angadanan, Isabela, Philippines

### **ABSTRACT**

The study was conducted to determine the status of the automotive technology programs among State Universities and Colleges in the Philippines which serves as a guide for university's program improvement. The descriptivemethod of research through convenience sampling was used and the questionnaire as the main data gathering tool for the respondents. The results showed that the courses were compliant in terms of curriculum, facilities, and supervised industrial training, but the faculty lacked industry experience and did not fully meet the requirements for trainers in automotive. The study also identified the strengths of the courses, including exposure to the industry and competent students. The recommendations include improving faculty qualification through immersion and training, developing a more relevant and updated curriculum aligned with industry needs, and conducting further studies in other trade areas.

**Keywords:**Automotive technology, National Competency, TESDA

### **INTRODUCTION**

Automotive technology plays a crucial role in a country's economic growth, as it is closely linked to the transportation industry. This technology is necessary for the production, maintenance, and repair of vehicles, which are vital components of an efficient transportation system. The Philippines has experienced significant growth in the automotive sector, resulting in an increased demand for skilled technicians. However, there is a shortage of qualified workers due to insufficient enrollment in automotive technology programs offered by state universities and colleges (SUCs) in Region 2. Studies have shown that most SUCs lack the necessary equipment, facilities, and staff to provide quality education in this field. To address this issue, the government of the Philippines has implemented programs to improve the skills of workers in the automotive industry, including training for SUCs. Enhancing the quality of automotive technology programs offered by SUCs is crucial to meeting the demands of the industry and the country as a whole, and producing skilled professionals for the automobile sector. (National Statistical Office of the Philippines, 2020)

According to National Statistical Office of the Philippines (2020), the automotive sector in the Philippines has been experiencing a period of significant expansion over the course of the past several years. According to the data provided by the Philippine Statistics Authority, the production of motor vehicles in 2019 increased by 26.4% in comparison to the production in the previous year. Because of this development, there will be a greater need for qualified automotive mechanics who are able to create, maintain, and repair these vehicles. This demand is expected to continue to climb. It is required to conduct an assessment of the automotive technology programs that are provided by state universities and colleges (SUCs) in order to guarantee that these programs meet the requirements of the industry as a whole as well as the requirements of the individual states. The education provided by public universities and colleges is a vital component in the process of creating skilled laborers.

According to the findings of a study that was carried out by the Philippine Society of Automotive Engineers (PSAE), the country of the Philippines is now experiencing a scarcity of experienced professionals in the automotive industry (Philippine Society of Automotive Engineers, 2018). This scarcity can be attributable to both the low number of students enrolling in programs that provide training and education in automotive technology and the inadequate training and education that is provided in these programs.

The Automotive Industry Federation of ASEAN (ASEAN Automotive Federation) reports that throughout the past several years, the automotive industry in the Philippines has experienced tremendous growth. When compared to the previous year, the number of motor vehicles that were manufactured in 2019 saw a 26.4% increase (ASEAN Automotive Federation, 2020). As a result of this rise, there will be an increased demand for professional automotive technicians who are able to produce, maintain, and repair these vehicles.

According to the findings of a study that was carried out by the Commission on Higher Education (CHED) in the Philippines, there is a requirement for there to be an improvement in the quality of the automotive technology programs that are offered in SUCs. According to the findings of the study, the majority of SUCs that offer degrees in automotive technology do not have the requisite equipment, facilities, or staff members to provide students with a quality education (Commission on Higher Education, 2016).

The Department of Labor and Employment (DOLE) in the Philippines has prioritized the automobile industry as a sector for the training and development of workers' skills. The Department of Labor and Employment has initiated a number of programs with the intention of strengthening the skill sets of workers in the automotive industry. One of these programs involves the provision of training to SUCs that provide automotive technology programs (Department of Labor and Employment, 2019).

According to the findings of a study that was carried out by Ong (2017), the curriculum for automotive technology in the Philippines has to be revised in order to keep up with the changes that are occurring in the automotive industry. According to the findings of the study, community colleges that already provide training in automotive technology should update their course offerings to reflect the most recent developments in the relevant industry.

According to the findings of an investigation that was carried out by Rivera (2018), the automotive industry in the Philippines is enduring difficulties as a result of a scarcity of employees who have received proper training. This scarcity is attributed to the low number of students enrolling in automotive technology programs at SUCs, as well as the inadequate training and education provided in these programs. Additionally, this scarcity is attributed to the fact that there are not enough students enrolling in these programs. In addition, this scarcity might be related to the dearth of trained automotive technicians that are now available in the workforce. It is necessary to find a solution to this problem, hence this study will investigate the current state of the automotive technology programs that are offered by SUCs in order to determine the level of instruction that is given to students. This can be done in order to find out the level of instruction that is given to students.

According to the findings of a study that was carried out by Dacanay (2019), the automotive sector in the Philippines confronts issues in terms of meeting the expectations of the market because there are not enough skilled personnel in the business. According to the findings of the study, community colleges that already offer degrees in automotive technology should update their training to reflect the most recent developments and innovations in the sector.

The Philippines' automotive sector is significantly influenced by the trends and advances occurring in other parts of the world. New technologies, such as autonomous driving and electric vehicles, are forecasted to bring about significant shifts in the sector over the next few years, as stated in a research published by McKinsey (2019). Colleges and universities that offer programs in automotive technology have a responsibility to remain current with these advances in order to guarantee that their graduates are proficient in the relevant abilities and information.

According to the findings of a study that was carried out by the World Bank (2018), there is a requirement to improve the quality and relevance of programs that are intended to provide technical and vocational education and training (TVET) in the Philippines. According to the findings of the study, state universities and community colleges (SUCs) that offer programs in technical and vocational education and training (TVET) should work to improve the overall quality of the programs they offer by introducing more recent course material, more cutting-edge equipment, and more

The Philippines is home to a sizable youth population; yet, it is anticipated that the nation will face a scarcity of competent employees in the years to come. This is despite the fact that the Philippines has a high birthrate. According to a research that was published in 2019 by the Asian Development Bank, in order to overcome this shortfall, the government should make investments in education and the development of skills. The production of skilled people for the automobile sector can be significantly aided by the efforts of SUCs that provide educational programs in automotive technology.

The automobile sector in the Philippines is being targeted by a number of training initiatives that have been initiated by the government of the Philippines. The Technical Education and Skills Development Authority (TESDA) initiated the Automotive Servicing NC III program in the year 2020. This program is designed to educate those who work in the automobile industry (Technical Education and Skills Development Authority, 2020). Students will benefit from the high-quality education and training that can be provided through a partnership between TESDA and SUCs that offer programs in automotive technology.

Courses and degree programs in automotive technology can be found at a number of the state universities and colleges (SUCs) located in Region 2 in the Philippines. On the other hand, there is a paucity of study addressing the current state of affairs of these programs. As a consequence of this, the objective of this research is to take a fresh look at the circumstance surrounding the educational programs in automotive technology that are provided by SUCs in Region 2 of the Philippines. The purpose of this study is to provide recommendations to improve the overall quality of education that is offered to students. These recommendations will be derived from an analysis of the current state of these programs, which will enable the identification of both the strengths and flaws that are associated with these programs.

## **METHODOLOGY**

### **Research Design**

The descriptive method of research was utilized in the course of this investigation. A descriptive survey involves gathering information to describe the object of study as it is, has been, or is viewed; and the normative method

of research, which involves critiquing the object of study to determine ways in which it can be improved (normative method). According to Good (1973), this form of research approach is used to explain the standards that are established via the study of what is prevalent. This study is made to determine the normal or typical practice or condition, which is then compared to local results with a state or national norm. It is an investigation that tries to establish the truth about the current situation. An interview with members of the automotive industry, TESDA, and other stakeholders was carried out so that responses that could validate the questionnaire data could be elicited. This served the aim of triangulation. The descriptive-normative method was used because it was appropriate for the purpose of the study, which was to describe and analyze how state universities and colleges in Region 2 complement each other in terms of the automotive technology courses they offer and the industry standards they adhere to.

Participants in the study included students from the Bachelor of Science in Information Technology and the Bachelor of Technology in Automotive Engineering programs who are currently enrolled in industry immersion or supervised industry training, members of the automotive technology faculties of the three (3) State Universities and Colleges (SUCs), and automotive industry partners of the aforementioned SUCs located in the provinces of Cagayan, Isabela, and Nueva Viscaya. With a confidence level of 95% and with a margin of error of 5%, the sample size for each group was estimated by using the required samples. The amount of samples obtained from SUCs was proportionately distributed across the several campuses.

ISU-Ilagan had 20 students from the BSIT and 14 students from the BTTE; ISU-Cauayan had 98 students; and ISU-Angadanan had 40 students from the BSIT and 2 students from the BTTE. The BSIT and BTTE automotive students were chosen at random to serve as the sample and were distributed as follows: CSU-Carig had 39; CSU-Appari had 17; and NVSU had 38. There are a total of 252 students enrolled in BSIT, as well as 16 students enrolled in BTTE.

The total enumeration of 26 people was used to determine the number of respondents for the automotive faculty members. 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 a total of 60 respondents who were purposefully selected from both large and small businesses. These respondents included managers, service advisors, and technicians or mechanics. The large industry group consisted of representatives from Toyota, Nissan, Mitsubishi, Kia, and Isuzu; all of these companies were in the top 10 best-selling automobile brands in the country in 2017. Carguide.ph.(2019)

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.

Frequency and percentage were also used to determine status of the Automotive Technology Program of State Universities and Colleges in Region 2 of the Philippines.

## RESULTS AND DISCUSSIONS

### Profile of the Respondents

**Table 1:Summary Profile of the Respondents**

State Universities and Colleges in R02	BSIT	BTTE	Faculty	Industries		Total
				Big	Small	
Cagayan State University (Carig)	39		5			44
Cagayan State University (Aparri)	17		2			19
Nueva Viscaya State University (Bambang)	38		5			43
Isabela StateUniversity (Ilagan)	20	14	4			38
Isabela State University (Cauayan)	98		7			105
Isabela State University (Angadanan)	40	2	3			45
Automotive Industries (Isabela, Cagayan, N.Viscaya)				30	30	60
Total	252	16	26	30	30	354

After tallying them all up, the total number of respondents from the campuses of State Universities and industry partners was 354 and was distributed as follows: CSU-Carig had 44 respondents, CSU-Appari had 19, NVSU had 43 respondents, ISU-Ilagan had 38 respondents, ISU-Cauayan had 105 respondents, and ISU-Angadanan had 45 respondents. In addition, employees from automotive industries in the provinces of Cagayan, Isabela, and Nueva Vizcaya.

**Profile of State Universities and Colleges in Region 2  
Curriculum and Instruction**

As gleaned in table 2, 100 percent of the SUC’s curriculum for automotive technology courses were CHED contents noted. The offering of additional subjects on research 1 and 2, number of units in supervised industry training, and offering of major subjects were likewise 100 percent compliant. Moreover, based on the evaluation result of CHEDRO2 as well as the curriculum provided by the SUC’s, it shows that it exceeds the minimum number of hours for supervised industrial training as well as in the offering of major subjects in automotive. These means that SUC’s were not only on the level of what is prescribed but they go beyond the minimum standards. These means further that the SUC’s has put into effect the continuing intellectual growth, the advancement of learning and research, and the education of high level and middle level intellectuals in line with how best to achieved learning outcomes in their particular context and their respective missions.

However, as to Certificate of Program Compliance (COPC), only SUC-C has no COPC yet, although in an interview, the Dean of the College stated that they were currently working on it such as certificate of national competency assessment of automotive faculty in relation to national assessment. These findings imply that the BSIT and BTTE programs and curriculum of SUC’s in the region were complying and strictly following the policies, standards and guidelines (PSG) set by CHED that ensures quality of automotive technology education, continuous existence and program sustainability.

**Table 2: Curriculum and Instruction, Laboratories and Physical Facilities**

CHED Minimum Standard	State Universities and Colleges in Region 02								f	%
	SUC-A		SUC-B					SUC-C		
	C-1 BSIT	C-2 BSIT	C-1 BSIT	C-1 BTVTE	C-2 BSIT	C-3 (BSIT)	C-3 BTVTE	C-1 (BSIT)		
<u>COPC</u>	✓	✓	✓	✓	✓	✓	✓		7	88
<u>Content noted curriculum</u>	✓	✓	✓	✓	✓	✓	✓	✓	8	100
<u>Additional Courses</u>										
Technology Research 1	✓	✓	✓	✓	✓	✓	✓	✓	8	100
Technology Research 2	✓	✓	✓	✓	✓	✓	✓	✓	8	100
Work-based learning with emphasis on Trainer's Methodology				✓				✓	2	25
<u>Supervised Industrial Training (3 Units/ 240 hours)</u>	✓	✓	✓	✓	✓	✓	✓	✓	8	100
<u>Major Courses (Automotive Technology, 36 units)</u>	✓	✓	✓	✓	✓	✓	✓	✓	8	100
<u>Laboratory</u>										
Presence of adequate laboratory facilities and equipment for each major	✓	✓	✓	✓	✓	✓	✓	✓	8	100
<u>Physical Facilities</u>										
For lecture classes, the ideal size is 35 students or less per class, and the maximum should be 50	✓	✓	✓	✓	✓	✓	✓	✓	8	100
For laboratory and research classes, the class size shall be specific to the discipline stated in the policies and standards.	✓	✓	✓	✓	✓	✓	✓	✓	8	100
Laboratories must also comply with the requirements of TESDA	✓	✓	✓	✓	✓	✓	✓	✓	8	100

On the additional courses, particularly along work-based learning with emphasis on trainer’s methodology, only SUC-B, Campus 1 and 3 have offered these subjects, wherein these two campuses were the only campuses among SUC’s in R02 that offers BTTE now BTVTED major in automotive. The SUC’s campuses offering BTTE/BTVTED were likewise compliant to CHED PSG’s, that these campuses offering technology education program are serious in attaining their program main goal which aims to develop highly competent graduates in technical and vocational education in their area of specialization. Graduates of these courses considered to have satisfied the TESDA requirement for Trainers’ Methodology as included in section 5.3 of CMO 79, s.2017.

**Laboratories and Physical Facilities**

The table shows that 100 percent of the SUC’s have achieved the minimum requirement for laboratories and physical facilities. This finding affirms the CHED issuance of Certificate of Program Compliance to the SUC’s. This means that the SUC’s has laboratory rooms and facilities with the required equipment, materials, devices, and apparatus for automotive technology.

Maintaining laboratories and physical facilities are important factors that can contribute to good performance of automotive students. Physical facilities are the fundamental factors in better learning and achievements of the automotive students and provide a comfortable atmosphere in which they work and learn. Lack of adequate facilities on the other hand have negative effect on the quality of graduates produced.

**Availability of Equipment**

Table 3 presents the automotive equipment available and used by the SUC’s in region 2. This equipment is recommended for the training of 25 trainees for automotive servicing NC-I to NC-IV. TESDA Training Regulation (2018)

**Table 3: Availability of Equipment**

Availability of Equipment	Required No. of Units/ Sets as per Training Regulation	State Universities in Region 02						Percent
		SUC-A		SUC-B			SUC-C	
		C1 %	C2 %	C1 %	C2 %	C3 %	C1 %	
Automotive Servicing NC-I	15	73	67	73	73	73	73	72
Automotive Servicing NC-II	26	35	31	27	31	35	35	32.3
Automotive Servicing NC-III	76	34	12	21	21	43	36	27.8
- For LPG Retrofitting/ Conversion& Vehicle Re-powering.	11	82	45	64	82	82	73	71.3
- Manuals	9	0	22	0	44	56	100	37
Automotive Servicing NC-IV	29	28	3	14	17	24	31	19.5
							Average	43.31

As shown in the table, only 43.31 percent of the required availability of equipment as per training regulation for automotive were complied by the SUC’s. The table also shows that 72 percent of the equipment for automotive servicing NC-I were complied while for automotive servicing NC-II,NC-III and NC-IV it has only 32.3, 27.8 and 19.5 percent respectively which evidently mean that the SUC’s were not compliant in terms of the availability of automotive equipment among automotive shops particularly on NC-II, NC-III and NC-IV. This affects the performance of the automotive faculty in teaching, the technical competencies of the automotive students, the school in general that result to skills mismatch.

Lack of training materials according to Ramos (2016) is attributed to skills shortage, a type of mismatch that continues to pose challenges to many middle and low-income Asian economies.

The SUC were in fact following the PSG’s set by CHED in terms of laboratories and physical facilities, however, when the training regulation were used to evaluate the availability of automotive equipment available in automotive shop works, it shows that SUC’s were not compliant. This means that there is different assessment among the evaluation of CHED and the required equipment in the training regulation.

This affirms the findings of Ortiz (2009) on assessment of training policies of CHED and TESDA that they differ in appreciation and response to the competency-based curriculum to be implemented in technical-vocational and higher educational schools, also, the two bodies have different appreciation of competency-based frameworks for specific job qualifications. CHED defines competency more as subject-based or fix-time-based. On TESDA’s part, competency acquisition is not strictly time-based – it is relative to how one is able to acquire and demonstrate a learning competency.

### Faculty

It is evident in table 4 that 15 out of 26 or 58 percent of the automotive faculty members have obtained their masters degree in technology education and there were 11 who are still pursuing the degree. This means that the required qualifications of faculty were not fully met. Masters degree in education or in an allied discipline is required for teaching in the tertiary level as reflected in sec.11 of CMO 56 s.2007.

The automotive students were being taught by faculty who possess no more than the level of qualification required in the CMO. Low teacher qualification inevitably leads to low standards of learning achievement among students. The quality of education depends largely on the qualifications and competencies of the faculty. Akiate (2019)

**Table 4: Profile of SUC's in Terms of Faculty**

Profile		f	% (n=26)
<u>Qualification of Technology Instructors/Professors</u>			
1	Masters Degree in Technology Education	15	58
2	Must be compliant to TR of TESDA	26	100
3	Have atleast one (1) year of very satisfactory teaching experience in any-tech-voc or technological institution.	26	100
4	Must have at least accumulated 560 hours of Industry/Job experience	22	85
<u>--Trainer's Qualification</u>			
<u>ATS NC-I</u>			
1	Holder of National TVET Trainers Certificate (NTTC) Level 1 in Automotive Servicing NC II	3	12
2	Must have at least 1 year industry experience in automotive servicing within the last 3 years	9	35
<u>ATS NC-II</u>			
1	Holder of National TVET Trainers Certificate (NTTC) Level 1 - Automotive Servicing NC II	2	8
2	Must be computer literate	26	100
3	Must have at least 2 years job/industry experience	7	27
<u>ATS NC-III</u>			
1	Holder of National TVET Trainers Certificate (NTTC) Level 1 - Automotive Servicing NC III	0	0
2	Must be computer literate	26	100
3	Must have at least 2 years job/industry experience	7	27
<u>ATS NC-IV</u>			
1	Must be computer literate	26	100
2	Must have at least 2 years job/industry experience	7	27
<u>--National Competency Assessment</u>			
1	ATS NC-I	6	23
2	ATS NC-II	24	92
3	ATS NC-III	4	15
4	Trainers Methodology-I	11	42
5	Driving NC-II	4	15
6	Driving NC-III	1	4
7	Motorcycle and Small Engine Servicing NC-II	1	4

Legend: - CMO 56, s.2018, CMO 79, s.2018

-- Training Regulation of TESDA

According to the U.S. Bureau of Labor Statistics, 18 percent of all jobs will require a master's degree by 2022. Earning a master's degree helps individual gain specialized knowledge to advance in the field. As the workforce

evolves, a graduate degree shows the dedication to enhancing the industry expertise, credibility and focus on a particular field of study, which helps them become more competitive in their field. Shulsinger (2017).

On industry/job experience, generally, the average of automotive faculty who experienced working in automotive industry is very few with 7 out of 26 or 27 percent. Majority (73%) of them have no industry experience. This means that the automotive faculty members of the SUC's in Region 2 lack of experience in terms of industry practices.

According to Ruiz and Sabio (2012) the quality of instruction depends on the quality of faculty being recruited which should conform with the minimum qualification standards, not like those from private institutions which exercises flexibility on the hiring of faculty.

Arnon and Reichel (2007) as cited by Akareem and Hossain (2016) qualifications of teaching staff are found to be one of the most important factors affecting the perception of education quality.

Morgan (n.d.) lack of industry knowledge among the instructors, and lack of industry exposure opportunities for students are among factors that contribute to the large school-industry gap in the Philippines. Thus, the SUC management should consider the industry immersion of faculty members to upgrade themselves as to the practices in industry.

### National Competency Assessment

Table 4 shows that majority with 92 percent of the automotive faculty were holders of ATS NC-II national certificate, only few with 21 percent for NC-I, 15 percent for ATS NC-III and none were holders of ATS NC-IV. For the National TVET Training Certificate (NTTC) level-I, there were few (12%) who were NTTC holders of ATS NC-I and (8%) for ATS NC-II and none were holders for NC-III and NC-IV. The NTTC certifies the bearer that he/she meet the standards.

It is evident that the qualifications of automotive faculty members in terms of national competency assessment and NTTC do not fully met what is required in the training regulation. Having a National Certificate in automotive servicing and NTTC is required for trainers in automotive as reflected in section 3.6 of the training regulation of automotive land transport sector.

The findings imply that many of the faculty members were not yet certified on the competencies such as checking, testing, replacing and repairing mechanical, electrical and electronic control system components of a motor vehicle, automatic transmission, steering and suspension and engine management system. In the competencies they were not certified, it also includes the installation and servicing of mechanical, electrical and electronic control parts, components, assemblies and sub-assemblies of LPG Kit or gas engine light-duty automotive vehicle in accordance with manufacturer's specifications.

Moreover, faculty members were not certified also along NC-IV qualification specifically, the competencies in leading a section or group of workers to service and repair various types of motor vehicles, they are not also certified in servicing and repairing electronically controlled components or devices and emission control system of a motor vehicle as well as in servicing diesel and gasoline engines.

### Students

Table 5 presents the SUC's profile according to students particularly on their education and training/trainings attended, competency assessment and industry/job experience.

### Education and Attendance to Relevant Trainings

The table shows that only few with 55 out of 268 or 21 percent have attended driving and engine overhauling, for motorcycle and small engine servicing 43 or 16 percent, and for welding 49 or 18 percent. Students have not attended other relevant trainings except those given in the questionnaire.

**Table 5: Profile of SUC's in Terms of Students**

Profile	f	% (n=268)
<u>Education</u>		
BSIT	252	94
BTTE	16	6
<u>Training</u>		
Driving	55	21
Engine Overhauling	55	21
Motorcycle & Small Engine Servicing	43	16
Welding	49	18
<u>Competency Assessment</u>		



	ATS NC-I	16	6
	ATS NC-II	77	29
	ATS NC-III	5	2
	ATS NC-IV	2	1
<u>Industry/Job Experience</u>			
	Trainee/OJT	268	100

This means that arranging skills trainings for the students is optional on the part of the SUC's and automotive students. Although this trainings were not required in the curriculum, faculty members are encourage to arrange skills trainings as part of their extra-curricular activities or regular affair in the college. Students are likewise encouraged to attend such trainings.

On students lack of training as found in the study, according to Philippine Skills Report (2010), skills acquisition is a complex process, it is important to acknowledge that skills are produced in many different ways involving pre-employment education and training (formal and informal), on-the-job training (formal and informal), work and life experience, and learning from peers at school and work. Skills acquisition is fundamentally a cumulative dynamic process starting at birth with parental education and continuing through school education, training and experience. While skills can grow over time, they can however also decay if possibilities for life-long learning are not well developed. Additionally, a share of the population can be excluded from effective skills acquisition if alternative "second chance" skill development pathways do not exist for vulnerable youth.

Strategic interlink between industry and academe is a viable strategy to address the challenges that most educational institutions are facing today. Incorporating industry training and increasing the participation of industry practitioners in academic work have proven to be very beneficial at increasing efficiency, effectiveness and capacity building of the academe. Gomez (2014)

Papademetriou (2015) governments should also take a longer-term view by investing in national training and education systems that prepare workers in accordance with common ASEAN-wide regional standards. Educational and workforce-training systems in the region need to do much better in equipping many more of the region's citizens with the knowledge and skills demanded by the labor market.

### National Certification

The table shows that 77 or 29 percent of the respondents were holders of ATS NC-II, and only few were holders of ATS NC-I, NC-III and NC-IV with only 6 percent, 2 percent and 1 percent respectively.

This means that the automotive students lack of necessary competencies along automotive servicing since the competency assessment and certification system ensures that automotive graduates and skilled workers who underwent such assessment were certified and competent enough to perform the tasks consistent with the required standards in the workplace.

The assessment involves the gathering of evidence to prove possession of competencies and seeks to determine whether the graduate or worker can perform to the standards expected in the workplace based on the defined competency standards. Certification is provided to those who met the competency standards. This ensures the productivity, quality and global competitiveness of the middle-level workers.

### Industry/Job Experience

The data in table 5 shows that all or 100 percent of the respondents both BSIT and BTTE automotive students had industry/job experience already particularly along automotive industry immersion. This means that the SUC's has strictly follow their curriculum and focused on their goal which is to produce graduates equipped not only with strong theoretical understanding of technology and teaching, but also with practical exposure in automotive industry. Specifically, producing model industrialist and future teachers with high regard for learning imbued with proper work attitude and values as practiced in automotive industry.

Practical exposure and workplace experience will complement learned technical know-how of students by providing another way of learning outside the classroom such as industry immersion. It will also provide essential knowledge, skills and personal attributes that employers look into for employment.

### The Strengths, Weaknesses, Opportunities, and Threats (SWOT)

The Strengths, Weaknesses, Opportunities, and Threats (SWOT) as shown in table 6 were drawn from the findings of the study along the profile of the SUC's and automotive industries as well as the required competencies of these industries, the required competency of automotive faculty and the competencies of students.

The indicators that complement to industry standards were considered the strengths while those that has no complementation in the industry standards means the weaknesses for the automotive technology courses.

Generally, the strengths include the compliance of the automotive technology courses with the CHED requirement concerning curriculum and instruction, laboratories and physical facilities which means that SUC's were able to comply with the CHED requirements to keep pace with the demands of global competitiveness. The extensive exposure of automotive students during their industry immersion to big and small automotive industry as reflected in the SUC's profile along students is also the strength of the automotive technology courses which provides the students the necessary skills needed in their chosen field and competencies needed in industry revolution 4.0 in general. They will be able to learn the different techniques and methods of servicing and repairing automobile from these industries.

**Table 6: SWOT Analysis**

Strengths	Weaknesses
<ol style="list-style-type: none"> <li>1. Compliance of the automotive technology courses with the CHED minimum requirement concerning curriculum and instruction, laboratory, physical facilities and equipment.</li> <li>2. Extensive exposure of automotive students to big and small automotive industries.</li> <li>3. Automotive students are competent along personal characteristics, attitudes towards the job, job performance and adherence to company policies.</li> <li>4. Competent automotive students along automotive servicing NC-I and NC-II,</li> <li>5. Competent automotive students along basic and common competencies of NC-III and NC-IV.</li> <li>6. Alignment on the assessment of automotive faculty and automotive industry as regards soft and hard competencies.</li> </ol>	<ol style="list-style-type: none"> <li>1. Many students have not attended relevant trainings in automotive.</li> <li>2. Many students were not holders of national certificate in ATS NC-I, NC-III and NC-IV.</li> <li>3. Not competent automotive students on hard skills competencies along core and elective particularly in NC-III and NC-IV.</li> <li>4. Lack of competency certification among faculty on NC-III, IV and trainer's methodology as well as seminars/trainings related to automotive</li> <li>5. Lack of industry exposure among faculty members in automotive.</li> <li>6. Non compliance of SUC's on the number of automotive equipment and automotive manuals.</li> </ol>
Opportunities	Threats
<ol style="list-style-type: none"> <li>1. Automotive servicing as prime type of business among industry-partners.</li> <li>2. Periodic maintenance, engine overhauling and repair, troubleshooting and underchassis servicing are the most offered services to customers by the industry partners.</li> <li>3. Alignment of the soft and hard skills competencies required by the automotive industry and the training regulation .</li> <li>4. Required equipment in the training regulation of automotive land transport sector.</li> <li>5. Required trainers' qualification in the training standards.</li> <li>6. Sophisticated equipment used by the automotive industries.</li> </ol>	<ol style="list-style-type: none"> <li>1. Non complementation of the required competency of industry-partner and the competencies of students along NC-III and NC-IV core competencies</li> <li>2. Advance required knowledge and skills of big automotive industry-partners along automotive electronic components.</li> <li>3. Traditional practices of the small automotive industry-partners along automotive servicing.</li> <li>4. Non-compliance of industry partners concerning national assessment.</li> <li>5. Non-availability of services of industry partners along elective competencies.</li> <li>6. High cost of sophisticated automotive tools and equipment.</li> </ol>

The immersion of students to automotive industries also shows that there is strong-linkage among SUC's and automotive industries particularly on industry immersion of students. Fostering collaboration between the academe and industry is currently regarded as imperative for the total development of globally competitive graduates both for BS Industrial Technology and BTTE which soon expose to industry and teaching. Strategic interlink between industry and academe is a viable strategy to address the challenges that most educational institutions facing today.

Competent automotive students along soft skills, automotive servicing NC-I and II, basic and common competencies of NC-III and NC-IV as reflected in the competencies of automotive students were also the strengths of the program which supports and meets the required competencies of the automotive industry.

The alignment on the assessment of automotive faculty and automotive industry along soft and hard skills competencies as required in the training regulation were likewise strength of the program, which attempts to improve the curriculum and provide automotive students the necessary competencies they need in their industry immersion.

For the weaknesses of the automotive technology courses as reflected in the profile of SUC's along students and faculty, and in the competencies of automotive students, evidently, many automotive students have not attended relevant trainings in automotive, many were not holders of national certificate in ATS NC-I, NC-III and NC-IV and they were not competent also on hard skills competencies along core and elective particularly in ATS NC-

III and NC-IV. The faculty members also lack of competency certification on NC-III, IV, trainer's methodology as well as seminars/trainings related to automotive. The faculty were likewise lack of industry exposure in automotive. The SUC's are not compliant also on the number of automotive equipment and automotive manuals. These weaknesses can contribute to the poor quality of graduates.

As to opportunities of automotive technology courses, automotive servicing such as periodic maintenance, engine overhauling and repair, troubleshooting and underchassis repair as prime type and most offered services to customers by the automotive industry partners is an opportunity for the technology courses for it will address the weaknesses such as lack of training among automotive students related to their field of specialization. It will serve as their training ground once they were deployed to these industries. These training could improve students' competencies that redound to their possible employment after their industry immersion. Moreover, since the abovementioned services by the automotive industry partners covers the competencies included in the national assessment, it could also address the weakness of the automotive technology courses such as students lack of national certificates (NC-I, NC-III and NC-IV) and non-competent students in NC-III and NC-IV core competencies. Automotive students could practice the necessary knowledge, skills and attitudes through the services offered by the automotive industries that could help them pass the national assessment.

Moreover, opportunities for the automotive technology courses is the alignment of the soft and hard skills competencies required by the automotive industries and the training regulations. Generally, this could serve as gateway for SUC's to improve the quality of automotive technology education courses.

The required equipment in the training regulation is also an opportunity for it serve as basis of SUC's management to purchase equipment in automotive technology which will be used as instructional materials of faculty and students to improve quality of instruction and thereby complement what is required in the regulation. This could also answer the non-compliance of SUC's as far as the number of equipment and automotive manuals is concern. The sophisticated equipment used by the automotive industry partners is also an opportunity for the automotive technology courses for it will address the non-exposure of students and lack of sophisticated equipment of the SUC's.

Finally in the context of threats, the non-alignment of the required competency of automotive industry partners and the competencies of students along NC-III and NC-IV core competencies and advance required knowledge and skills of big automotive industry-partners along automotive electronic components were seen, and as reflected in the industry required competency. Although the SUC's were compliant to CHED requirement, these threats, if not addressed, it will affect the quality of automotive technology courses particularly on the skills of students that the industry is looking into for employment. The alignment on the assessment of automotive faculty which was found as the strength of the automotive technology courses could address this concern by exposing the automotive students on the core competencies along NC-III and NC-IV through the automotive faculty members and technicians assigned as supervisors of these automotive students.

Threat also includes the traditional practices of the small automotive industry-partners along automotive servicing, if the SUC's deployed the automotive students in these automotive industries, the students could not experience other advance technical skills required by the big automotive industries. The exposure of automotive students to big and small industries could address this threat. The automotive students could acquire the needed knowledge, skills and attitudes both from small and big automotive industries.

The non-compliance of industry partners concerning national assessment particularly along NC-III and NC-IV wherein there were only few were holders of this qualification as reflected in the industry profile is also a threat for the automotive technology program. It is useless for the SUC's to encourage and train the automotive students along national assessment because it is not required by the automotive industry, although for employment abroad, national certificate is still necessary. In the validation made by the researcher, the automotive industries do not really require their technicians to be a holder of national certificate in automotive servicing particularly on NC-III and IV, because applicants still have to undergo trade test before they will be employed, although it is still an added point for the applicants. Shop supervisors and/or shop instructors as in-charge of trade test for applicants in the big automotive industries were more interested in the technical skills of applicants and not in their certificates. For automotive service and repair shops, they let their technicians undergo national assessment just to comply with the requirements of PD 1572 for the issuance of certificate of accreditation from the Department of Trade and Industry. In an interview with the owner of a repair shop, he mentioned that applicants have to serve as helper for the regular mechanics for him to practice all the necessary skills of a mechanic. Technical experience as well as technical expertise of an applicant is more important than the national certificate.

Meanwhile, the lack of expertise of automotive faculty and non-availability of services of industry partners along elective competencies particularly on LPG fueled vehicle is also a threat for the automotive technology courses. 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.

In the same manner, the high cost of sophisticated automotive tools and equipment used by the industry-partners is also a threat to the SUC's, especially, the most frequent mentioned need of SUC's is the procurement and /or

upgrade of equipment (JICA, Data Collection Survey for Higher Education Sector in the Philippines: Final Report, 2015). These facilities support the assumptions that insufficient school facilities were negatively impacting student performance and achievement. Limon, (2016). Lack of educational facilities was proven to pose serious ramifications on students' performance and achievement. Exposing the automotive students to the sophisticated equipment used by the automotive industry partners as strength of the automotive technology courses could address this threat.

## CONCLUSIONS AND RECOMMENDATIONS

From the findings of the results, it shows that the SUC's in region 2 were compliant with the minimum requirement of CHED, specifically, contents noted curriculum, offering of additional subjects on research 1 and 2, number of units in supervised industrial training, and the offering of major subjects. Concerning laboratories and physical facilities, the SUCs were also compliant to CHED standards. However, majority of the faculty lack of industry experience as required in CMO 76, s. 2017. Likewise, the qualification of faculty as trainers in automotive as well as the availability of automotive equipment do not fully met what is required in the regulation and only few students have attended trainings related to automotive technology. For the automotive industry, their prime type of business is servicing and all the possible automotive services were offered to customers and they value most the ATS NC-I and II competency assessment.

The SWOT analysis results revealed that the automotive technology courses in region 2 have several strengths. These include compliance with the CHED requirement regarding curriculum, instruction, laboratories, and physical facilities, as well as extensive exposure of automotive students to big and small automotive industries. Additionally, the courses produce competent automotive students who possess desirable personal characteristics, exhibit positive attitudes towards the job, perform well, and adhere to company policies. The students are also competent in automotive servicing NC-I and NC-II, as well as basic and common competencies of NC-III and NC-IV. Lastly, the alignment between the assessment of automotive faculty and the automotive industry with regards to both soft and hard competencies is another strength of the automotive technology courses in region 2. There are three major recommendations are suggested based on the results of the study.

The SUC's in region II 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 II 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.

Future researchers should delve on similar studies considering other trade areas or field of specialization in industrial technology and BTVTED courses to come up with complete curriculum for BS in Industrial Technology.

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