Senior High School Technical-Vocational Livelihood Automotive Servicing Students of Sorsogon City

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Abstract— This study aimed to determine the academic performance and level of competencies of Senior High School Technical-Vocational-Livelihood Automotive Servicing (TVL-AS) students in the city of Sorsogon for the school year 2021-2022. It employed descriptive survey design. Survey questionnaire and documentary analysis were utilized to determine the academic performance and the level of competency along core competencies inn automotive servicing. Additionally, a survey and documentary analysis used to collect information from the 51 Grade 12 students of Mercedes B. Peralta Senior High School in Guinlajon, Sorsogon City. The data were analyzed and interpreted using appropriate statistical tools and measures such as frequency count, percentage, weighed mean and ranking. It was revealed that the Grade 12 students performed exceptionally well academically, with a high percentage earning Very Satisfactory ratings and exhibiting notable competence in automotive servicing, particularly in safety and adherence to protocols. However, challenges such as learning ability, school distance, and budgetary constraints indicated a need for a comprehensive action plan to support these students and address areas of moderate competency for further improvement.

Keywords— academic performance, automotive servicing, competency, technical-vocational, senior high school

I. INTRODUCTION

Education is experiencing ongoing transformations due to the influence of globalization. The rapid pace of globalization has created a new reality in which nations must constantly innovate and adapt in order to survive. It has ushered in a new era of freer permeability of human resources among countries. This has allowed the more fluid movement of workers between countries, enriching the workforce in each country by bringing in new skills and perspectives. It has also created a more open and interconnected labor market, making it easier for workers to find jobs in countries where their skills are in demand.

To remain competitive in the global landscape, a country must be fueled by innovation, creativity, and 21st-century skills for its workforce. Today, both students and teachers are grappling with the challenges of adapting to technology and acquiring the necessary skills to meet international standards. It is vital to cultivate a generation that is well-prepared to thrive in a highly competitive industry and create an environment conducive to sustainable learning. Smartly managing and facilitating the transfer of knowledge and skills through competencies will boost morale and help identify the factors that may hinder learning and performance.

Technical and Vocational Education Training (TVET) is designed mainly to provide learners with the practical skills, know-how, and understanding necessary for direct entry into a particular occupation or trade. UNESCO (2023) has developed a Strategy for TVET (2016-2021) in alignment with Sustainable Development Goal 4 and the Education 2030 Framework for Action to strengthen TVET systems of Member States and advance youth employment, access to decent work, entrepreneurship and lifelong learning opportunities in specific national contexts. TVET comprises education, training and skills development relating to a wide range of occupational fields, production services and livelihoods. To achieve its aims and purposes, TVET focuses on the learning and mastery of specialized techniques and the scientific principles underlying those techniques, as well as general knowledge, skills and values(Njenga, 2022).

The Technical-Vocational stream includes a wide range of programs with various ranges of programs with various levels of work-based content, extended to work-based training and skills development after the duration of compulsory basic education, in elementary and high school. Hence, at one end of the spectrum is school-based learning which includes familiarization and practical exercises designed primarily to prepare students for work or for post-secondary Technical-Vocational training(Syjuco, 2006).

The education system in the Philippines adopts both formal and non-formal education approaches. While it shares similarities with the American mode of education, it distinguishes itself in terms of the duration

of schooling. Unlike many other countries that follow a 12-year basic education, the Philippine system consists of 6 years of elementary education and 4 years of secondary education, forming the formal education system along with tertiary education. On the other hand, non-formal education includes education opportunities, even outside school premises, that facilitate achievement of specific learning objectives for particular clienteles, especially the out-of-school youths or adult illiterates who cannot avail of formal education.

Republic Act 7796 known as the Technical Education and Skills-Development Act of 1994 or the TESDA Act of 1994 declared the policy of the State to provide relevant, accessible, high quality and efficient technical education and skills development in support of the development of high quality Filipino middle-level manpower responsive to and in accordance with Philippine development goals and priorities.

By the school year 2012-2013, the Department of Education implemented the biggest transition in education through the Republic Act No. 10533, otherwise known as the Enhanced Basic Education Act of 2013. The introduction of the K-12 educational system in the Philippines since 2012 has induced mixed perceptions, reactions, and realizations of different stakeholders. The competencies of senior high school students in the Philippine K-12 educational system has brought with it several concerns, primarily, with their mismatch with the expectation set for the program.

Competency-based education is gaining popularity in K-12 education to address learning goals. In this approach, students advance to the next level only when they have demonstrated mastery of specific learning targets aligned with standards (Wolfe, 2012). This is in contrast to traditional education by Brodersen (2017), where students earn credit based on the time spent in a course and meeting minimum criteria.

Specialist training is essential in the automotive industry, both in highly industrialized and developing countries. In subjects like Science, Industrial Arts, Home Technology, Physical Education, and Music, where performance is a key objective, evaluating students' abilities in tasks like automotive servicing involves assessing the product, the procedure used, and the time taken. While knowledge can be tested through written exams, it does not guarantee the ability to actually perform the required behavior, such as being able to sing a music scale or drive a car (Jimenez, et. al. 1990).

The Philippine Government and policy makers are striving to create standardized instruments that measure both cognitive and psychological factors related to academic competence and skills (Ocampo, 2020). Student grades serve as a measurement of academic standing and achievement of learning goals, providing insights into their academic performance. Conducting research on academic performance can aid in predicting students' success in future semesters, improving faculty members' performance, enhancing the curriculum, and implementing effective instructional strategies tailored to students' competency and readiness (Manuel, 2018).

Sorsogon Province boasts a dynamic and evolving educational landscape, emphasizing both traditional academic pathways and technical-vocational training to meet diverse student needs. Home to a mix of public and private institutions, the province offers a broad array of undergraduate and graduate programs. The DepEd promotes quality education through various initiatives, ensuring well-equipped schools and continuously trained teachers. Technical-vocational schools, like Mercedes B. Peralta Senior High School in Sorsogon City, provide specialized training in agriculture and fisheries, reflecting the province's economic strengths. This school not only equips students with practical skills for further education and employment but also fosters a sense of community and responsibility towards sustainable practices, contributing to both local and broader economic contexts.

Despite the need to streamline the K-12 curriculum, there are limited studies focusing on measuring academic performance in major areas and how it is associated with competency level in automotive servicing along given operational variables. Given the above current trends, the researcher is interested in adapting indicator system for evaluating academic performance formulated by experts that are yet to be explored. These indicators can be used to prepare vocational manpower planning and development, practice skills, problem solving skills and actual work skills by which students adapt them to automotive training innovations.

The research aims to identify challenges students face in learning automotive servicing, including their own capabilities, learning abilities, and the suitability of instructional tools, teaching strategies, and facilities in

schools offering automotive servicing in Sorsogon province. Understanding these trends is crucial for students to be empowered and for teachers to make informed decisions about individual assessments based on students' needs and the learning environment.

Generally, this study aimed to determine the academic performance and level of competency of Senior High School Technical-Vocational-Livelihood Automotive Servicing (TVL-AS) students in the city of Sorsogon for the school year 2021-2022. Specifically, it aimed to: (1) describe the academic performance of Senior High School TVL-AS students; and (2) determine the level of competency of the students in automotive servicing along performing Gas Engine Tune-up (PGET), performing Diesel Engine Tune-up (PDET), Removing and Replacing Electrical/ Electronic Units/ Assemblies (RREE), Removing and Tagging Engine System Components (RTES). Removing and Tagging Steering Suspension and Brake System Components (RSSB), and Removing and Tagging Transmission System components (RTTS)

II. METHODOLOGY

Research Design
The study aimed to determine the academic performance and level of competencies of Senior High School Technical-Vocational-Livelihood Automotive Servicing (TVL-AS) students in the city of Sorsogon for the school year 2021-2022.

This study employed descriptive survey design. Survey questionnaire and documentary analysis were utilized to determine the academic performance and the level of competency along core competencies inn automotive servicing. Descriptive research in quantitative studies focuses on naturally occurring individuals, events, or conditions (Siedlecki, 2020). In this study, challenges met by the students also tackled before the year ends.

Additionally, a survey and documentary analysis used to collect information from the informants, the 51 students of Mercedes B. Peralta Senior High School in Guinlajon, Sorsogon City. The data were analyzed and interpreted using appropriate statistical tools and measures such as frequency count, percentage, and ranking.

The Sample
The primary source of data were the 51 Grade 12 senior high school automotive servicing students of Mercedes B. Peralta Senior High School in Guinlajon, Sorsogon

City. These students were enrolled in the Technical-Vocational-Livelihood Automotive Servicing (TVL-AS) track during the school year 2021-2022. They were selected as respondents because their school was the only one in Sorsogon City offering the automotive servicing TVL strand, and having graduated from the program, they were familiar with the assessment processes in automotive servicing.

The Instrument
Survey questionnaires and documentary analysis were utilized as the study's instrument following the panel's recommendation to use a quantitative approach. The instruments were adapted from the TESDA Competency Assessment, tailored to align with the study's objectives and variables, and designed with the target participants and designed with the target participants and research goals in mind. Ethical considerations were paramount throughout the development process. Once crafted, the instrument was reviewed by panel members and the adviser for corrections and suggestions. After incorporating the necessary revisions, the refined instruments were prepared for administration.

The survey questionnaire comprised two parts. Part 1 assessed the level of competencies of senior high school Technical-Vocational Automotive Servicing students along those core competencies: a)Performing Gas Engine Tune-up (PGET), b) Performing Diesel Engine Tune-up (PDET), c) Removing and Replacing Electrical/ Electronic Units/ Assemblies (RREE), d) Removing and Tagging Engine System Components (RTES), and e) Removing and Tagging Transmission System components (RTTS). Part II addressed the challenges faced by the students before completing their senior high school TVL-Automotive servicing.

Data Collection Procedures
To facilitate the conduct of the study, permission was sought from the Sorsogon State University – Graduate School to conduct the said study. The researcher sought permission to conduct the study from the Sorsogon City Division Superintendent last January 9,2023. After the approval from the SDS, the research also sought the approval from the Graduate School last February 28, 2023 signed by the panel members and the program chair, followed by the permission also to conduct the said study to the principal in the Mercedes B. Peralta Senior High School in Guinlajon, Sorsogon City last March 2, 2023 to gave the questionnaires and be answered by the senior high school students.

Confidentiality and informed consent were observed during the distribution of survey. Researcher prioritized the protection of participants' rights and well-being.

The researcher distributed the questionnaires on March 6, 2023 and collected them within two weeks. However, some students were absent from school due to scheduling conflicts, so their questionnaires were given to other students to onhand it over to them. Additionally, one informant completed the questionnaire through a google form because they were studying in Manila and working at different places at the time. To ensure the confidentiality of the Google forms used in the research, several measures were implemented. First, participation was voluntary, and informed consent from the group chat of all the participants, clearly explaining the purpose of the study and the confidentiality measures in place. Access to the Google form and the collected data was restricted only to the researcher using his own google account. Data was stored in a secure manner, to maintain confidentiality.

Data Analysis Procedures
The researcher used survey questionnaire and documentary analysis which more of quantitative data. The answer on the survey questionnaire and documentary analysis were consolidated and analyzed by the following statistical treatment.

The frequency count and percentage were used to determine academic performance of senior high school students. On the other hand, in the level of competencies, weighed mean was used. The 5 – point Likert scale was used to determine the level of competencies level of competencies of the students in automotive servicing along core competencies: a)

Performing Gas Engine Tune-up (PGET), b) Performing Diesel Engine Tune-up (PDET), c) Removing and Replacing Electrical/ Electronic Units/ Assemblies (RREE), d) Removing and Tagging Engine System Components (RTES) and e) Removing and Tagging Transmission System components (RTTS). The following scale was used in the interpretation of results: 4.50-5.00 (Highly Competent); 3.50-4.49 (Competent); 2.50-3.49 (Moderately Competent); 1.50-2.49 (Fairly Competent); 1.00-1.49 (Not Competent).

III. RESULTS AND DISCUSSION
1. Academic performance of Senior High School Technical - Vocational Livelihood Automotive Servicing students
Table 1 presents the Academic Performance of Grade 12 students. As reflected, 92% of the students gained Very Satisfactory ratings, while only 8% obtained an Outstanding rating. Generally, it can be asserted that the Grade 11 students have performed very satisfactorily with an overall mean performance of 88%.

Table 1 implies that the students who had a rating of 90 – 100 shows that their learning abilities were fast, these are the students who were fast learners and can adapt easily to their learning environment. Effectiveness of teaching methodology and some techniques to catch student attention also can be a factor that teacher practices as an approach that results to outstanding rating of 4 students. While students who got the very satisfactory rating are the usual students who is perfectly fine whatever the results of their academic performance. They process information, activity and task in the most normal way related to academics. Student ability to learn may depend on their focus, innate skills and motivation that may affect the learning experience.

TABLE 1. *Academic Performance of Grade 12 Students*

Rating	Average	f	%
90-100 (Outstanding)	90	4	8
85-89 (Very Satisfactory)	88	47	92
TOTAL		51	100
Mean Performance	88 (VS)		

2. Level of Competency of the Students in Automotive Servicing
Performing Gas Engine Tune-up (PGET). Table 2A shows the competencies of the Grade 12 students in Performing Gas Engine Tune-Up (PGET). It can be

gleaned from the table that the Grade 12 respondents are generally competent in PGET as indicated by the overall weighted mean of 3.78.

In performing the Gas Engine Tune up, there is a process to fulfill the competencies from basic, common to core

competencies. Because of the level of competency, the process may take for several attempt to successfully complete the task. The table shows some of the highest results for the competencies, including the test sparkplug that has a weighted mean of 4.02 implies that testing sparkplug is a basic competency to asses, the student needed only the right tool to perform the competency. The process of testing sparkplug is using the multimeter and the prescribed wrench, disconnect the spark plug lead, clean the area around the spark plug to avoid getting debris in the combustion chamber when you remove the plug. Remove the spark plug using a spark plug socket. Inspect the spark plug for very stubborn deposits, or for cracked porcelain or electrodes that have been burned away. If any of these conditions exists, replace the spark plug. Check the spark plug gap and adjust as necessary and use multimeter to check the

continuity of the sparkplug. If it seems in working order, replace the plug, taking care not to over-tighten (15 ft. lbs. MAXIMUM) and re-attach the spark plug lead.

In table 2A for the result in competency Check advance mechanism and adjust ignition timing is 4.10 implies that the students are performing the safety precautions and observing safety in using equipment. Performing safety is number 1 rule in any skills assessment, practicing occupational safety and health is necessary in all shop laboratories including engine tune up. Safety also shows in the result in Performing compression test for Conducting test without damage or injury to person or a property with a weighted mean of 4.14. Meaning in conducting and performing any task and activity safety should be prioritize to achieve a positive result without any harm and damage to person and property involved.

TABLE 2A. Performing Gas Engine Tune-up (PGET)

Competency	Indicators	Weighted Mean	Description
Inspect/ test spark plug	• Adjust spark plug clearance • Test spark plug • Analyze spark plug test results and prescribe	3.76 4.02 3.74	Competent Competent Competent
Check/replace fuel filter and air cleaner	• Replace fuel filter and air cleaner • Free fuel filter from sediments and impurities	3.76 3.64	Competent Competent
Inspect/ replace contact	• Inspect contact point • Test and replace condenser	3.52 3.40	Competent Moderately Competent
Test and adjust dwell angle and ignition setting	• Adjust dwell angle • Set ignition timing	3.46 3.90	Moderately Competent Competent
Adjust engine idle speed and mixture	• Check idle speed in RPM • Adjust ignition timing	3.70 3.68	Competent Competent
Check advance mechanism and adjust ignition timing	• Observe safety in using equipment • Check advanced timing	4.10 3.94	Competent Competent
Perform compression testing	• Conduct compression test • Conduct test without damage or injury to person or property • Interpret compression test result and prescribe recommendations	3.92 4.14 3.84	Competent Competent Competent
Overall		3.78	Competent

Majority of the items are along the competent description. It is also worth noting that the top 3 with the highest weighted means from the list are 4.14, Conduct test without damage or injury to person or property;

4.10, Observe safety in using equipment; and 4.02, Test spark plug.

On the other hand, the 3 indicators where the Grade 11 students are moderately competent are: Test and replace

condenser with 3.40 weighted mean; Adjust dwell angle with 3.46; and Inspect contact point with 3.52. It is important to note that 2 of the 3 items with the lowest means, particularly the Adjust dwell angle and Inspect contact point items, are both under Inspect/ replace contact although the latter has a weighted mean of 3.52 which is still considered competent.

This holds true since our educational institutions have gradually focused on how to improve vocational curricula and classroom instructions (McGrath & Yamada, 2023) in anticipation of the growing demand of skilled workers in the automotive industry (Ab.Hadi, Hassan, Razzaq, & Mustafa, 2015). We see a conscious effort to integrate actual practice in classroom instruction as this prepares students in the automotive practice. As such, student-respondents affirm the importance of gas-engine tune ups as this prevents technical shortcomings of engines as well as wear-related tear (Rao, Sheng, Guo, & Yuan, A review of online condition monitoring and maintenance strategy for cylinder liner-piston rings of diesel engines, 2022). These skills would improve the performance of vehicles amidst possible harsh conditions that it may be subjected with.

The result of 3.78 in performing gasoline engine tune up in table 2A implies that the students can perform the competency well with consistent practice, meaning it maintains the momentum of the process.

Performing Diesel Engine Tune-up (PDET). able 2B shows the respondents' level of competency on Performing Diesel Engine Tune-up (PDET). It can be asserted from the table that the skills of the Grade 12 learners in PDET is described as competent, particularly in all the items, with an overall weighted mean of 3.77.

The items Check fuel level line leakage and fuel trainer and others; Use injection plug timing device without error; and Tighten mounting bolts following tongue sequence, pattern and specification in the manual obtained the highest weighted means.

It can be gleaned from the Table 2B that students are also skilled in tuning-up diesel engines. Students are aware that diesel engines have certain attributes that differ from gasoline engines (i.e., emissions, combustion process quality, fuel economy); hence, may require different tune-up techniques.

TABLE 2B. Performing Diesel Engine Tune-up (PDET)

Competencies	Indicators	Weighted Mean	Description
Set injection timing	• Position injection parts as required in setting injection timing	3.66	Competent
	• No error in detecting/ reading injection pump timing	3.72	Competent
	• Recheck injection timing setting by following instructional manual	3.78	Competent
Install injection pump	• Check timing, marks, tongue and injection pump moving parts before installation	3.72	Competent
	• Set up injection pump requirement before installation	3.86	Competent
	• Tighten mounting bolts following tongue sequence, pattern and specification in the manual	3.88	Competent
Inspect injection timing	• Use injection plug timing device without error	3.88	Competent
	• Interpret injection pump timing result correct	3.60	Competent
	• Check advance timing operation	3.66	Competent
Bleed injection system components	• Check fuel level line leakage and fuel trainer and others	3.94	Competent
	• Determine air lock in the system without error	3.62	Competent
Conduct compression testing	• Set up engine requirements in compression testing	3.72	Competent
	• Read and interpret specific compression test result	3.84	Competent
	• Give corresponding recommendation/ prescription based on test results	3.86	Competent
Overall		3.77	Competent

(Zhao, Cheng, & Ji, 2017). Engine tune-ups are necessary to prevent failures in certain components such as wear and tear of valve train and overheating (Mohanty, Hazra, & Paul, 2020). This could also enhance the serviceability of cylinder liner and piston rings because they can reduce frictional losses, oil consumption, and emissions (Rao, Sheng, Guo, & Yuan, Effects of thread groove width in cylinder liner surface on performances of diesel engine, 2019).

Table 2B implies that the students can perform in diesel engine tune up in the same way in performing gasoline engine tune up with consistent practice, breaking the task from basic to complex.

Removing and Replacing Electrical/Electronic Units/Assemblies (RREE). Table 2C shows the level of expertise of the respondents on Removing and Replacing Electrical/Electronics Units/Assemblies (RREE). It can be observed from the table that the Grade 11 learners are competent in all the indicators under each competency with a 3.79 overall weighted mean.

As shown in Table 2C, the items under Preparing for Work category obtained the highest weighted means, while items under Replace electrical/ electronic units/assemblies competency had the lowest ratings. Specifically, respondents appear to be most skilled in Using work instruction to determine job requirements, including method, material and equipment; Observing OHS requirement throughout the work; and Determining proceeds to minimum waste material to maximize.

TABLE 2C. Removing and Replacing Electrical/Electronics Units/Assemblies (RREE)

Competency	Indicators	Weighted Mean	Description
Prepare for work	-Use work instruction to determine job requirements, including method, material and equipment	4.12	Competent
	-Read and interpret job specifications	4.02	Competent
	-Observe OHS requirement throughout the work	4.12	Competent
	-Select material for work appropriate to application	4.06	Competent
	-Identify equipment and tooling for safe and effective operation	3.94	Competent
	-Check equipment and tooling for safe and effective operation	4.02	Competent
	-Determine proceeds to minimum waste material to maximize energy efficiency	4.10	Competent
Remove electrical/ electronic units assemblies	-Access correct information from manufacturer/ component supplier specifications	3.84	Competent
	-Interpret correct information from manufacturer/ component supplier specifications	3.82	Competent
	-Remove electrical/ electronic unit/ assemblies using approved methods, tooling and equipment	3.88	Competent
	-Seek assistance from a licensed person in relation to air conditioning and LPG/NGV system/ components removal	3.66	Competent
	-Complete the removal without causing damage to component or system	3.90	Competent
	-Carry out removal activities according to company procedure/ policies	3.54	Competent
	-Handled units/ assemblies in accordance with manufacturer/ component supplier requirements	3.64	Competent
	-Store units/ assemblies in accordance with manufacturer/ component supplier requirements	3.56	Competent
Replace electrical/ electronic units/ assemblies	-Replace electrical units/ assemblies using approved methods, tooling and equipment	3.60	Competent
	-Seek assistance from a licensed person in relation to air conditioning and LPG/ NGV system/ components removal	3.60	Competent

	-Complete the replacement without causing damage to component or system	3.50	Competent
	-Carry out replacement activities in accordance with company procedures/ policies	3.58	Competent
Clean up work area and maintain equipment	-Collect and store materials that can be reused	3.66	Competent
	-Remove waste and scrap following workplace and environmental procedures	3.54	Competent
	-Complete operator maintenance in accordance with manufacturer/ component supplier specifications and site procedures	3.62	Competent
	-Maintain tooling in accordance with workplace procedures	3.84	Competent
Overall		3.79	Competent

Car electronics may account for about half of a vehicle's costs (Restrepo, Løvik, Widmer, Wäger, & Müller, 2020) such that one cannot discount their utility. Some of which mainly facilitate the power requirements of the vehicle (Lee, et al., 2008) and is connected to multiple terminals that deliver electrical power to various equipment. Some also make use of organic light emitting diode (OLED) that caters the automotive lighting requirements such as in headlights, rear, and signal lights, and even dashboard interface (Yelten, Güney, Fernahoğlu, & Kahraman, 2020).

Hence, students should consider the materials used in these systems to ensure optimal electrical resistance which prevents electrical failures. And because of a vehicle's complex wiring system (Kloch, Kozak, & Mlyniec, 2021), it is imperative that one must also be knowledgeable on how to check and repair them if necessary.

Removing and Tagging System Components (RTES).

Table 2D reveals the skills of the respondents in Removing and Tagging Engine System Components(RTES). As shown, the Grade 12 respondents are generally described as energy efficiency- all of which are under 'Prepare for work' competency competent in RTES. Noticeably, the respondents exhibited a high degree of competency in the Processing report in accordance with workplace procedures on communication with a weighted average of 4.74 which was followed by a 4.00 weighted mean on Identifying engine system components, and 3.86 in Carrying out inspection of components, all under the Remove system engine components competency.

TABLE 2D. Removing and Tagging Engine System Components(RTES)

Competency	Indicators	Weighted Mean	Description
Prepare to remove and tag engine system	• Identify and confirm the nature and scope of work requirements including individual national/ local/ territorial regulatory requirements and personal protection needs throughout the work	3.76	Competent
	• Source out procedures and information such as workshop manuals and specification and required tools and equipment	3.40	Moderately Competent
	• Analyze method options and ensure that those most appropriate to the circumstances are selected prepared	3.74	Competent
	• Observe dangers associated with working on the removal and tagging of engine components	3.62	Competent
Remove system engine components	• Identify engine system components	4.00	Competent
	• Implement methods for the removal and tagging in accordance with manufacturer/ component supplier specifications	3.68	Competent
	• Remove components without damage	3.78	Competent
	• Carry out inspection of components	3.86	Competent
		4.74	

	• Process report in accordance with workplace procedures on communication		Highly Competent
Tag engine system components`	• Identify tagging procedures	3.72	Competent
	• Identify material requirements for tagging and prepare support equipment	3.60	Competent
	• Tag components without damaging	3.72	Competent
Overall		3.80	Competent

On the contrary, the Grade 12 students were moderately competent in Sourcing out procedures and information such as workshop manuals and specification and required tools and equipment with a weighted average of 3.40.

As automotives become more modernized, vehicle components nowadays would have improved mechanical transmissions, increased automated parts, and more efficient engine systems (Nefed'ev & Sharonov, 2016). Engines would now be more efficient because of the absence of gear overlapping and stream power failures. Even gearboxes can now be controlled by microprocessors which allows better regulation of output power and gear shifting. But this does not mean that the engine should be haphazardly handled. Students should also know how to properly identify and tag engine parts as this would aid them in fault diagnostics (Jung & Safdäl, 2022). This would ensure the safety of the engine as well as properly identifying interventions necessary to repair it.

Removing and Tagging Steering Suspension and Brake System Components (RSSB).

Table 2E shows the competence of the Grade 12 students on Removing and Tagging Steering Suspension and Brake System Components (RSSB). In general, it can be asserted that the respondents are competent in RSSB.

TABLE 2E. Removing and Tagging Steering Suspension and Brake System Components (RSSB)

Competency	Indicators	Weighted Mean	Description
Prepare to remove and tag steering, suspension and brake system components	• Identify and confirm the nature and scope of work requirements	3.80	Competent
	• Observe OHS requirements, including individual/ national/ local and territorial regulatory requirements and personal protection needs	3.78	Competent
	• Sources of procedures and information such as workshop manuals and specifications and required tools and equipment	3.66	Competent
	• Select methods by techniques most appropriate to the circumstances	3.76	Competent
	• Observe damages associated working with the removal and tagging of steering	3.42	Moderately Competent
Remove steering, suspension and brake system components`	• Identify steering, suspension and brake system components for removal	3.52	Competent
	• Implement methods for the removal and tagging in accordance with manufacture/ component supplier specifications	3.44	Moderately Competent
	• Remove components without damage	3.64	Competent
	• Carry out inspection of components	3.76	Competent
	• Process report in accordance with workplace procedures on communication	3.92	Competent

Tag steering, suspension and brake system components	• Identify tagging procedures	3.90	Competent
	• Identify material requirements for tagging and prepare support equipment	3.58	Competent
	• Tag components without damage	4.00	Competent
Overall		3.80	Competent

Among the top-ranking items in RSSB are Tag components without damage, 4.00 weighted average; Process report in accordance with workplace procedures on communication, 3.92; and Identify tagging procedures, 3.90. Specifically, it can be noted that two of the top 3 ratings were from the competency Tag steering, suspension and brake system components.

Meanwhile, observing damages associated working with the removal and tagging of steering, and Implementing methods for the removal and tagging in accordance with manufacture/ component supplier specifications are the only two indicators where the respondents were identified as just moderately competent.

Students should also be familiar with the steering mechanism of vehicles because if this were installed erroneously, then this can gravely affect how drivers maintain lateral positions in the lane where they are driving (Pawar & Velaga, 2021). As such, students should also evaluate if the steering mechanism has defective parts (i.e., ball pins), indications of system fatigue, or consequential damage due to prior accidents. This holds true even for self-driving cars as they would still require the basic mechanics for the steering system (Guo, Xue, & Deng, 2018; Mohammadi, Jamshidi, Shahbazi, & Rezai, 2023). Students should also recognize the various components of the brake system and how its deceleration dynamics work. A properly working steering and brake system would materially ensure a safe driving environment for a responsible driver.

Removing and Tagging Transmission System Components (RTTS). Table 2F shows the competencies of the Grade 11 respondents in Removing and Tagging Transmission System Components(RTTS). As presented in Table 2F, the respondents are generally capable in terms of Removing and Tagging Transmission System Components. It is also worth emphasizing from the table that the category Prepare to remove and tag transmission component has the three indicators with the highest ratings namely Observe OHS requirements including individual, national/ local/ territorial regulatory requirements and personal protection needs (4.00); Select method and techniques most appropriate to the circumstance (3.84); and identify and confirm nature and scope of work requirements (3.82).

TABLE 2F. Removing and Tagging Transmission System Components(RTTS)

Competency	Indicators	Weighted Mean	Description
Prepare to remove and tag transmission component	• Identify and confirm nature and scope of work requirements	3.82	Competent
	• Observe OHS requirements including individual, national/ local/ territorial regulatory requirements and personal protection needs	4.00	Competent
	• Sources of procedures and information such as workshop manuals and specifications and required tools and equipment	3.62	Competent
	• Select method and techniques most appropriate to the circumstance	3.84	Competent
	• Be aware of damages associated working with the removal and tagging of transmission components	3.76	Competent
	• Identify transmission components for removal	3.78	Competent
		3.78	Competent

Remove transmission system components	• Implement methods for the removal and tagging in accordance with manufacturer/ component supplier specifications	3.52	Competent
	• Remove components without damage	3.76	Competent
	• Carry out inspection of component	3.78	Competent
	• Process report in accordance with workplace procedures in communication		
Tag transmission components	• Identify tagging procedures	3.78	Competent
	• Identify material requirements for tagging and prepare support equipment	3.78	Competent
	• Tag components without damage	3.74	Competent
Overall		3.77	Competent

Meanwhile, while still being described as competent, the respondents reported the lowest ratings for Removing components without damage; Sources of procedures and information such as workshop manuals and specifications and required tools and equipment; and Tag components without damage.

Transmission systems converts power from a car's engine to its wheels (Bera, 2019) through a system of gearbox, clutch, differential, and drive shafts. Students then should understand the delicate design of this system in a manner that balances the load requirements of the vehicle and engine speed profile. This requires that students should be able to maintain the proper gear ratio in its gearbox when they handle the transmission. This would also ensure efficient fuel consumption with the maximum drag that the vehicle can accommodate given the load it has (Barathiraja, Devaradjane, Paul, Rakesh, & Jamadade, 2019).

IV. CONCLUSION AND RECOMMENDATIONS

This study concluded that the Grade 12 students displayed outstanding academic performance, with the majority achieving Very Satisfactory ratings and an overall performance mean performance indicating a highly satisfactory outcome. The Grade 12 students demonstrated competence across various competencies in Automotive servicing, with strengths particularly evident in specific tasks such as conducting tests safely and adhering to safety protocols, while some areas showed moderate competency, indicating room for improvement.

It was recommended that considering the remarkable academic performance of the students, it is advisable to continue providing supported resources to maintain and further enhance their achievements. Based on the demonstrated competence in Automotive Servicing, it is better to focus on targeted training and support to bolster

proficiency in areas showing moderate competency, ensuring comprehensive skill development across all competencies.

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