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Research Article

Assessing Resources For Automotive Servicing Qualification At Nemsu: A Needs-Based Analysis And Proposed Intervention

Joseph M. Josoy [1]

[1] North Eastern Mindanao State University

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Abstract

This study investigates the current state of laboratory facilities essential for Automotive Servicing qualification, focusing on the perspectives of students and instructors at North Eastern Mindanao State University. Utilizing a self-made questionnaire, data were gathered from 80 student participants and 6 instructors to assess the accessibility and usability of tools, equipment, and materials. The results indicate that the institution possesses most of the necessary resources for the qualification; however, specific gaps remain that require addressing. Participants rated the majority of tools and equipment as highly useful, with materials consistently being acknowledged as very useful. Based on these findings, the study suggests obtaining the lacking resources, implementing proper maintenance protocols, and periodically evaluating the state of existing resources. The study proposes that continuous assessment and improvement initiatives are necessary for optimizing the learning experience.

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[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

Introduction

Effective instruction within a technical-vocational context relies heavily on the interaction between educators and learners within a practical learning setting. In the context of automotive servicing, a skilled instructor cannot successfully deliver training without the presence of suitable, functional tools, equipment, and machinery. Furthermore, the educational environment needs to be conducive to active learning. Effective vocational and technical education relies on the availability and utilization of functional instructional resources for skill development; however, inadequate resources and underutilization can hinder program effectiveness and student readiness for entrepreneurial careers (Edokpolor, 2019; Ehimen & Onyia, 2017; Owoh, 2016; Peter et al., 2024). The quality of these resources directly impacts learners' skill growth, highlighting the importance of sufficient provisions and efficient use in vocational training programs (Jin et al., 2024; Edokpolor, 2019; Edokpolor & Dumbiri, 2019).

Effective technical training is a key contributor to the development of any nation as it produces a workforce that is productive and able to compete in the industry. Technical and vocational education faces challenges due to shortages of essential equipment and facilities, along with the poor functionality of outdated and inadequately maintained resources which affects student learning (Olojuolawe & Adeoluwa, 2022; Okenwa, 2017; Oviawe et al., 2019; Van Nguyen et al., 2023). Collaboration with industry and robust maintenance practices is essential to securing funding, maintaining resources, and enhancing the overall training experience for students, which is crucial for student employability and national development (Audu et al., 2013; Edokpolor, 2019; Okenwa, 2017).

Students in automotive laboratories often experience significant issues with material and tool availability, mainly due to the disparities in laboratory facilities and inefficient resource management systems that restrict student's practical learning (Asniwaty et al., 2020; Jordan et al., 2011; Zarifin et al., 2020). The availability of quality materials, and proper management systems are important for students to gain practical skills and innovative problem-solving ability (Zarifin et al., 2020; Jordan et al., 2011). This may be because much of the main equipment is imported, leading to issues of supply and high cost. While existing literature highlights the importance of resources in technical and vocational education, there is a gap in understanding the specific state of these resources at NEMSU-Cantilan Campus, particularly in its Automotive Servicing program, therefore prompting this research. This study is meant to aid the facilitators and administrations to supply enough laboratory resources for automotive technology to maximize the learning potential of the students enrolled in Automotive Technology Program.

This study is mainly based on the constructivist theory by Piaget (1896), which says that educators act as a facilitator, supporting student-centered learning approaches. In this view, students learn more effectively when they actively participate in the learning process individually. Therefore, suitable training resources such as tools and equipment become essential for the effective practice of constructivist methods. Technical and vocational education resources include physical facilities, equipment, and instructional materials; the lack of which has a profound impact in vocational training programs and can affect students' abilities to participate in learning (Akinfolarin et al., 2012; Edokpolor, 2019). The adequacy, availability and alignment of these resources with the curriculum are crucial to ensure the effectiveness of teaching and learning to properly prepare students for a career and improve quality of vocational education (Samoilenko et al., 2021; Wu & Ye, 2018).

[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

This study aims to evaluate the accessibility and operational status of tools and equipment within the Automotive Laboratory of a North Eastern Mindanao State University during the academic year 2023-2024.

Specifically, this study seeks to address the following:

1. What are the profiles of the end-user participants regarding:
    1.1 Age,
    1.2 Location, and
    1.3 Grade in Shop
2. What resources are accessible for instruction in the Automotive Servicing program?
3. What is the degree of functionality of these resources (tools, equipment, and machines) that are being used in the Automotive Servicing program?
4. What intervention measures can be suggested in light of these results?

This study is limited to an evaluation of the availability and operational status of training resources, including tools, equipment, and materials, specifically within the Automotive Technology Laboratory of a North Eastern Mindanao State University. The study focuses solely on the Automotive Servicing qualification. The results may not be applicable to other programs or institutions due to the variability of available resources.

Materials and Methods

This study employs a descriptive research design, which is suitable for quantifying the availability and functionality of tools and equipment in the automotive laboratory. This design is ideal for addressing the research questions of this study and for the realization of the study's purpose. This approach aims to provide an overview of current conditions, without any manipulation of variables, but rather documenting the existing state of resources in the lab.

The study will take place at North Eastern Mindanao State University in the Philippines, which offers the Automotive Servicing qualification. This institution was selected for its alignment with the goals of the research. The institution is expected to provide a relevant context and ample information for the study due to the presence of an established Automotive Servicing program. The researchers chose this setting because of the institution's capacity to support the study and to give substantial insights for the research.

The respondents for this study will consist of 80 students in their second year of the Automotive program, and 6 instructors in the same institution. The selection of second-year students is based on their direct involvement with the automotive servicing qualification. The instructors will also be included because they are essential in using the training facilities, and their experiences will give a better understanding of the facilities from a teaching perspective. This purposive selection method will ensure data is collected from participants who possess a deep awareness of the resources used in the program, and thus providing a holistic insight into the state of these facilities.

This research utilizes a questionnaire based on the guidelines provided in the TESDA regulations regarding standard tools and equipment for the automotive servicing qualification. The questionnaire was designed to objectively assess the tools and equipment in the laboratory based on the objective of the study. Prior to its use, the questionnaire underwent a validation process to ensure its content validity and clarity. This included review by subject matter experts in automotive technology and technical-vocational education. The reliability of the questionnaire was assessed using Cronbach's alpha, which yielded a value of 0.82, indicating acceptable internal consistency. The questionnaires will be the

[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

main tool of investigation that will provide an unbiased assessment of the resources available.

The researchers will first seek permission from the Campus Director of the institution. Upon approval, further permission will be obtained from the Department Chair of the Bachelor of Science in Industrial Technology (BSIT) program and the head of the training facility. The questionnaires will then be distributed to the identified participants. After collection of the completed questionnaires, data will be compiled, analyzed, and interpreted with the aid of the research adviser and a statistician to ensure precision.

The data collected will be analyzed using frequency counts, which will determine the number and percentage of responses to each question, specifically about the availability of the tools, equipment, and material. These frequency counts will help in determining the extent of availability and the level of functionality of the tools and equipment within the laboratory and align it to the statements of the problem.

Results

Table 1. Profile of the Student Respondents

Profile	Items	Frequency	Percentage
AGE	16-17 years old	8	10%
	18-19 years old	52	65%
	20-21 years old	18	23%
	22 years and above	2	2%
	Total	**80**	**100%**
LOCATION	Magasang	5	6.25%
	Pag-antayan	28	35%
	Linintian	19	23.75%
	Magosilom	20	25%
	Calagdaan	7	8.75%
	San Pedro	1	1.25%
	Total	**80**	**100%**
GRADE IN SHOP	1.0 - 1.5	50	62.5%
	1.6 - 2.0	26	32.5%
	2.1 - 2.5	4	5%
	2.6 - 3.0	0	0%
	Total	**80**	**100%**

Table 2. Available Tools and Equipment for teaching Automotive Servicing Laboratory at NEMSU

Description	Required Quantity (TESDA)	Available Quantity	Remarks
TOOLS			
Micrometer Caliper	2 set	2 set	complete
Box Wrench	2 set	2 set	complete
Socket Wrench	2 pcs	3 sets	complete
Pliers	2 pcs	5 sets	complete
Screw Driver	2 set	6 sets	complete

[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

Wire Stripper	2 pcs	3 pcs	complete
Mechanic's Hammer	2 pcs	1 pc	Lack 1
Apron	5 pcs	4 pcs	Lack 1
Goggle	5 pcs	4 pcs	Lack 1
Glove	5 pcs	5 pcs	complete
Torque Wrench	1 set	1 set	complete
Feeler Gauge	1 set	1 set	complete
Battery Tester	1 set	2 sets	complete
Hydrometer	1 set	1 set	complete
Dial Gauge	1 set	2 sets	complete
Bore Gauge	1 set	3 sets	complete
EQUIPMENT			
Motor Vehicle	1 unit	1 unit	complete
Engine	1 unit	3 units	complete
Hydraulic Jack/lift	1 set	1 unit	complete
Growler Tester	1 unit		Lack 1
Ignition Timing Light	1 set	1 set	complete
Tachometer	1 set	1 set	complete
Differential and Front Axle	1 set		Lack 1
Multimeter	2 pcs	4 pcs	complete
MATERIALS			
Engine Oil	1 gallon	1.8 liters	Lack 2.2 liters
Grease	1 liter	300 ml	Lack 700ml
Sealant/Adhesive	3 liters	0.8 liters	Lack 2.2 liters
Hydraulic oil	3 liters	650 ml	Lack 2.35 liters
Automatic Transmission	3 liters	1.7 liters	Lack 1.3 liters
Wheel Wedges	2 pcs	2 pcs	Complete
Test Lamp	2 pcs	4 pcs	complete

Table 3. Extent of Usefulness of the Tools and Equipment for teaching Automotive Servicing Laboratory at NEMSU

Description	Weighted Mean	Verbal Description
TOOLS		
Micrometer Caliper	4.5	Very Useful
Box Wrench	4.4	Very Useful
Socket Wrench	4.6	Very Useful
Pliers	4.7	Very Useful
Screw Driver	4.6	Very Useful
Wire Stripper	4.1	Very Useful
Mechanic's Hammer	3.7	Useful
Apron	2.9	Useful
Goggle	3.1	Useful
Glove	3.3	Useful
Torque Wrench	3.4	Useful
Feeler Gauge	3.5	Useful
Battery Tester	4.1	Very Useful
Hydrometer	4.2	Very Useful

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[*]Corresponding Email: jjosoy@nemsu.edu.ph

Dial Gauge	4.0	Very Useful
Bore Gauge	4.0	Very Useful
EQUIPMENT		
Motor Vehicle	4.5	Very Useful
Engine	4.7	Very Useful
Hydraulic Jack/lift	3.8	Useful
Growler Tester	3.5	Useful
Ignition Timing Light	3.9	Very Useful
Tachometer	3.8	Useful
Differential and Front Axle	4.0	Very Useful
Multimeter	4.0	Very Useful
MATERIALS		
Engine Oil	4.8	Very Useful
Grease	4.7	Very Useful
Sealant/Adhesive	4.7	Very Useful
Hydraulic Oil	4.7	Very Useful
Automatic Transmission	4.8	Very Useful
Wheel Wedges	4.6	Very Useful
Test Lamp	4.2	Very Useful

Legend: 3.9 – 5.0 = Very Useful; 2.7 – 3.8 = Useful; 1.0 – 2.6 = Not Useful

Discussion

The data in Table 1 shows that the majority of the student respondents (65%) are between 18 and 19 years old, followed by 23% between 20 and 21. This indicates a student body primarily composed of young adults at NEMSU. The location data reveals that most students come from Pag-Antayan (35%), followed by Magosilom and Linintian (25%, and 23.75% respectively), which may indicate the geographic accessibility of NEMSU in the area. The students' shop grades show a considerable number of respondents with grades ranging from 1.0 to 1.5 (62.5%) which indicates high performance in the practical component of the Automotive Servicing program, with a lesser number having grades of 1.6 to 2.0 (32.5%). This distribution underscores a strong emphasis on practical competence and may be attributable to the learning environment at NEMSU and the effectiveness of the implemented program, which emphasizes the importance of resources in technical and vocational education (Owoh, 2016). Additionally, the alignment of practical training with relevant equipment can enhance student performance, which directly impacts their ability to develop skills necessary for the industry (Jin et al., 2024).

Table 2 indicates that NEMSU has most of the required tools and equipment for the Automotive Servicing program, as indicated by their compliance with TESDA standards. Some resources, such as the Mechanic's Hammer, Apron, Goggle, Growler Tester, Differential and Front Axle are not fully available which highlights existing resource gaps. The lack of consumable materials such as engine oil, grease, sealant, hydraulic oil, and automatic transmission can negatively impact the instructional capabilities. This confirms the views of Crotty (2005), stating that the absence of necessary resources negatively impacts educational performance, and it is supported by findings of Oviawe et al. (2019), noting that resource availability is crucial for vocational training programs. Furthermore, similar issues, such as outdated or broken equipment due to poor maintenance, also hamper the provision of effective instruction (Okenwa, 2017).

As indicated in Table 3, most tools, equipment, and materials used for instruction at NEMSU are rated "Very Useful" by the respondents. Notably, items like Micrometer Caliper, Box Wrench,

[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

Socket Wrench, Pliers, and Screw Driver are deemed highly beneficial. The data indicates that tools like the Mechanic's Hammer, Apron, Goggles, Glove, Torque Wrench and Feeler Gauge, as well as the Growler tester and Tachometer are only rated as "Useful". This underscores that the tools and equipment are generally perceived as effective in enhancing the teaching and learning process. The positive ratings of materials support the idea that these resources are highly appropriate for the program as suggested by Martin, Fritzsche, & Ball (2006) that adequate resources result in effective learning. However, the lower scores for some items highlight areas that may need further evaluation and improvement, thus highlighting that specific resources are needed for effective teaching (Ehimen & Onyia, 2017). Furthermore, the quality of the resources and their effective management is needed for students' learning (Zarifin et al., 2020).

Proposed Intervention Program

Title: Improving Automotive Servicing Program at NEMSU Through Enhanced Resource Management and Updated Curriculum

Background:

The study reveals that, despite most tools and equipment being available and rated as useful, some significant gaps still exist, including the lack of specific equipment and materials, at NEMSU. This proposed program aims to address these gaps and improve the quality of the Automotive Servicing program by implementing the following objectives, thereby confirming the need to act based on the data, as mentioned in the research of Darling-Hammond (2000; 2007).

Objectives:

1. To guarantee that the program has all of the necessary tools, equipment, and materials required for effective student learning by complying to TESDA standards.
2. To improve instruction by ensuring that faculty has adequate access to the necessary resources.
3. To ensure that the Automotive Servicing curriculum aligns with industry standards and available resources to improve the quality of education.

Methods:

1. Conduct a thorough inventory of existing tools, equipment, and materials used in the Automotive Servicing program at NEMSU.
2. Procure all identified missing tools, equipment, and materials necessary for the program.
3. Repair or upgrade existing tools and equipment to ensure they are fully functional and up-to-date.
4. Provide training for instructors to efficiently use all tools and equipment, including newly procured or upgraded ones.
5. Review and update the Automotive Servicing curriculum, aligning it with industry standards and available resources.

[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

Expected Outcomes:

1. Students will gain access to complete and up-to-date learning resources which will enhance their learning experience.

2. Instructors will have the means to deliver high-quality, comprehensive training.

3. NEMSU will produce highly competent graduates who are well-prepared for a career in the automotive industry and will be competitive in the workforce.

Budget:

The budget for this program will be determined based on the costing of the materials needed to bridge the gaps in resources. A detailed inventory will be conducted to ensure that a precise cost will be available. Furthermore, the budget will also include training for educators to utilize the resources to their maximum potential.

Conclusions

Based on the findings, it is concluded that while NEMSU possesses a largely adequate set of resources for the Automotive Servicing qualification, significant gaps remain, including specific tools, equipment, and consumable materials. The study revealed a positive perception of the available resources, particularly materials, alongside high student performance in practical assessments, yet highlighted the need for improvement in specific tools and equipment. Addressing these resource gaps and ensuring effective teaching is essential to enhancing the learning experience and maximizing student career readiness. The proposed intervention program, therefore, seeks to improve resource management and update the curriculum to fill these gaps by securing needed resources, upgrading equipment, training instructors, and ultimately enhancing student preparation for a career in the automotive industry, thereby ensuring adherence to TESDA guidelines for technical-vocational programs.

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[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

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[*]Corresponding Email: jjosoy@nemsu.edu.ph

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[*]Corresponding Email: jjosoy@nemsu.edu.ph

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[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph

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[1]Corresponding Author: Joseph M. Josoy
[*]Corresponding Email: jjosoy@nemsu.edu.ph