

Research Article

Psycho-Productive Skill Test Items Construction and Validation in Motor Vehicle Mechanic Work for State Wide Assessment in Technical Colleges

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Abstract

The technical colleges in Nigeria face challenges in assessing the psycho-productive skills of motor vehicle mechanic students due to a lack of standardized assessment tools. This study focused on the development and validation of psycho-productive multiple-choice skill tests (PMCST) for assessing the practical performances of technical college students in motor vehicle mechanic work across Ekiti and Ondo States. Adopting an instrumentation research design, instrumentation research design was considered appropriate because the study developed an instrument for assessment of practical skills of students. The study targeted a population of 350 National Technical Certificate (NTC) III students, encompassing three ability groups: 57 high, 201 average, and 92 low ability students. A draft copy of the PMCST, comprising 180 items, was generated and utilized as the instrument for assessment in five technical colleges across both states. Data analysis was performed using the split-half technique and Kuder-Richardson (K-R20), yielding a reliability coefficient of 0.84 for the test. Significant differences were found in the mean scores of the three ability groups. Among the recommendations arising from the study is the suggestion that examination bodies such as NABTEB, WAEC, and NECO integrate the PMCST into their certification processes for NTC students.

Keywords

Motor Vehicle Mechanic Work, State Wide Assessment, Psycho Productive Multiple-Choice Skill Test Items, Validation, Reliability, Item Construction

1. Introduction

In order to effectively monitor and evaluate the progress made by vocational and technical education students, it is incumbent upon teachers to acquire a valid instrument for evaluating each student's performance as well as accurate and trustworthy data regarding the skill level needed by each student [1]. Teachers must collect reliable evaluation data in order to evaluate their students' performance and determine

whether the skills they have taught are necessary for the student's certification [2].

When conducting evaluations of student performances on a state-wide level or over a very large population of students from different schools, the term "state-wide assessment" often refers to all activities teachers employ to assist students learn and to quantify or monitor student development [40]. Similar

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to this, Osinem, E. C. [35] claimed that assessment is the confirmation of the teacher's actions in the classroom and the learning that occurs there. Assessment is intended to ascertain a student's level of performance in a unit of instruction or their overall progress through the school system to a specific point in time [5]. Similarly, Ogbu [27] defined assessment as the act of witnessing and documenting learning as well as gathering, recording, scoring, describing, collecting, recording, scoring and interpreting information about a student or one's own learning process for the purpose of determining placement, promotion, graduation, retention and performance [8].

One of the Vocational and Technical Education programs provided at Nigerian technical colleges is Motor Vehicle Mechanic Work. This program aims to produce master craftsmen at the advanced craft (post secondary) level and craftsmen at the secondary level [23]. The National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC) in Motor Vehicle Mechanic Work are intended to be awarded at the craftsman and master craftsman levels, respectively, based on the programs offered by technical institutions. The goal of the Motor Vehicle Mechanic Work program according to FGN (2014, 2020) [15, 16] is to provide instruction and transfer the skills needed to produce technicians, craftsmen, and other skilled workers who will be entering the business world [27]. Motor Vehicle Mechanic Work at the crafts level for the award of the National Technical Certificate (NTC) is the focus of this study.

The goal of the Motor Vehicle Mechanic Work program is to train skilled auto mechanics for Nigeria's economic and technical advancement. At the crafts level, motor vehicle mechanic work is developed in modules and further subdivided into several modular trades, including auto electricity/electronics, diesel and gasoline engine reconditioning, service station mechanics, and motor vehicle mechanics [23]. According to the National Board for Technical Education Curriculum (NBTE) for Motor Vehicle Mechanic Work, each of these modular trades includes a practical work component as well as specific objectives and performance goals. The goal is to produce craftsmen who should perform general maintenance work on motor vehicles. The focus of this study is only on Service mechanic work, Petrol engine maintenance work, Diesel engine maintenance work and Engine reconditioning (Petrol and Diesel engine).

According to Manitoba Trade [19], a motor vehicle mechanic diagnoses and fixes problems in vehicles, including cars, buses, lorries, and SUVs (sport utility vehicles), so that they operate safely and dependably. Together with these, they also work on engines, braking, steering, and drive trains, vehicle suspensions and frames, air conditioning, electrical, and cooling systems, power steering units, clutched and automatic transmission systems, four-wheel drives, body and chassis, electrical components, oil, temperature, and gas regulating components [19]. The Technical Colleges' Motor Vehicle Mechanic Work program is a skill-oriented course intended to help students become proficient in the repair and

maintenance of motor vehicles using relevant tools, such as multiple-choice psycho-productive skill test items.

According to Aworefa [6], instruments are well-standardized measuring tools that are either designed or chosen for a particular assessment. Tests including interviews, observations, projects, questionnaires, essays with an inventory rating scale, fill-in-the-blank (structured) questions, matching tests, and multiple-choice tests can all be produced as instruments [10]. In every teaching-learning environment, tests are a key tool for assessing students' performance, knowledge, and abilities. Tests, according to Daramola [14] are standardized or non-standardized assessments of a person's reaction to a systematic sample of stimuli or behavior from which conclusions about the person's general behavior can be drawn. Nkemakolam [26] further explains that test could be either teacher made or standardized test or both and could take the form of oral or written tests and essay tests or objective test which include multiple-choice test as the case may be.

Ombugus [34] stated that psycho-productive multiple-choice skill test measures students' practical competency in motor vehicle mechanic work by having them respond to production process skills multiple-choice items. It implies that students will be presented with a series of process skills multiple-choice questions to answer on their own, without having to attend a workshop [12]. Accordingly, the purpose of this study is to create and validate psycho-productive multiple-choice skill test items to supplement the current product rating method that teachers and NABTEB use to help students demonstrate their acquisition of production skills in motor vehicle mechanic work.

The assessment of psychomotor skill or manipulative skill in skill-oriented programs such as Motor Vehicle Mechanic Work cannot be successfully completed through written essays or interviews [42]. Nevertheless, among the various methods used to evaluate or assess skills in Vocational and Technical Education, one of the most effective methods for figuring out a student's skill level is to administer a Psycho-productive multiple-choice skill test items [30]. Okoro [28] further confirmed Olaitan and Ali [30] by noting that while objectives in the cognitive domain can be adequately tested using written tests, objectives in the psychomotor domain require the use of Psycho-productive multiple-choice process skill test. Psycho productive multiple choice skill test is often used in testing the psychomotor skill possessed by students. Psycho productive multiple choice skill test is often used in testing the psychomotor skill possessed by student when paper and pencil test would not be a valid predictor because of the nature of the aptitude or skill to be tested [38].

Psycho-productive multiple-choice skill test items are used to measure the intellectual talents connected or related to real work performance, hence predicting a student's capacity to execute an actual job [24]. The next best option is to test behaviors that enable performance of the desired skill (enabling learning objectives), and from that information, make a pre-

dition as to whether the student would be able to perform the operational task, if the actual operational behavior required for job performance (terminal learning objective) cannot be tested in the instructional systems using either the project method, essay, or any other assessment instrument or tool [3].

In order to identify students who have mastered a particular skill and those who have not, it is necessary for the psycho-productive multiple-choice skill test instrument to be valid and reliable. Igbo [18] stated that assessment of student psycho-productive or manipulative skills calls for higher teacher competency in designing appropriate instrument for assessing the performance of students behavior and information about the standards attained by the student relative to set standards.

The usage of a psychoproductive multiple-choice skill test instrument has become necessary in order to evaluate students' skills since it is necessary to determine their performance rather than what they have learned or accomplished. The method used currently to evaluate students' motor vehicle mechanic skills Paper-and-pencil tests are deemed inappropriate for this type of skill-oriented learning program. Process and product evaluation processes are the types of instruments that NABTEB uses to assess candidates' skills during their practical evaluation [6].

While Aworefa [6] draws a distinction between the product and process evaluations used by NABTEB, she notes that in the former, the completed work is graded by the designated practical examiners, whereas in the latter, the examiner or verifier must rate the steps of the task that the candidates perform in accordance with. Mayberry and Carrey [20] noted that the product type of evaluation may be detrimental because all processes or procedures are not measured and assessed from the outset, and the process evaluation, which involves rating each individual procedure, was also criticized because of the bias of the raters in the actual skills to be rated [21, 25, 22].

Given that psychomotor skills and manipulative skills are heavily stressed in Motor Vehicle Mechanic Work courses, it is sufficient to say that the current method of evaluating students' skills needs to be changed or modified. Against this backdrop, a valid and reliable performance-based psycho-productive multiple-choice skill test needs to be developed in order to evaluate students' abilities in Motor Vehicle Mechanic Work courses at technical colleges [25].

The Technical College in Nigeria offers programs that are intended to equip students with the skills they need to either become self-employed or secure employment in the industry. In other words, the graduates of the Motor Vehicle Mechanic Work program should be sufficiently skilled to begin working in their chosen field and advance in it [29].

According to [31], many graduates of the Technical College's Motor Vehicle Mechanic Work programs lack the skills and competence necessary for their profession, making them unemployed or underqualified for self-employment. But this might be due to things like using the incorrect kind of evaluation tool or improperly measuring the student's competence [31].

In particular, the study developed and established the reliability of psycho-productive multiple-choice skill test items in motor vehicle mechanic work [Petrol engine maintenance work, Service station mechanic work, Diesel engine maintenance work, Engine rebuilding (Petrol and Diesel engines)]. Two research questions were answered by the study, and one hypothesis was tested. The study's main goal is to develop and validate psycho-productive multiple-choice skill test items in motor vehicle mechanic work for the purpose of assessing skills.

2. Literature Review

2.1. Classification of Psychomotor Objectives in Performance Learning

A comprehensive and intricate taxonomy of learning aims, known as the Taxonomy of Educational or learning objectives, was established by Ayuba [7] categorized into three basic domains: psychomotor, affective, and cognitive. The affective domain of learning involves acquiring values at a very low level of awareness to the highest level of characterization, the cognitive domain is concerned with intellectual talk that measures knowledge and understanding, and the psychomotor domain of learning is concerned with manipulative skills [7].

Several authors have produced the categorization of the psychomotor objectives, which is the focus of this study. Some of these authors are evaluated in this study in order to determine which one will be most appropriate and pertinent for creating the specification table. The many writers and their classifications consist of the following: the classifications of Ragsdale, Dave, Harrow, Padelford, Hauenstein, Singer, Ezewu, and Simpson.

The psychomotor goals, according to Simpson [35], are concerned with the development and usage of the modules as well as the body's coordination of movement. This study used Simpson's taxonomy of the psychomotor domain. Because the other classifications previously reviewed were adaptations and modifications of the Simpson's classifications, which were also regarded as most appropriate, most frequently cited, and most popular, the Simpsons' classifications were highly regarded as the more acceptable ones [11, 30, 38]. The main components of Simpson's classification—perception, set, guided reaction, mechanism, complex overt response, adaptation, and origination—were expounded upon by all writers and test development professionals.

2.2. Operations in Motor Vehicle Mechanic Work at the Technical College

The Technical Colleges in Nigeria provide Motor Vehicle Mechanic Work at both the craft and advanced levels [23]. The program's objective is to provide the necessary training and skills to produce skilled technicians and craftsmen in

motor vehicle mechanic work. These individuals will possess strong theoretical and practical knowledge and will be able to diagnose, repair, and maintain all varieties of diesel and gasoline motor vehicle systems and units [34].

The motor vehicle mechanic work at the technical college is offered at two levels: the first is craft level one, which leads to the National Technical Certificate (NTC), and the second is one that leads to the Advanced National Technical Certificate (ANTC), also known as the Master craftsmen. This study's concentration is on the crafts level one, or the first program that leads to the National Technical Certificate (NTC) being awarded. In order to be eligible for the craft level, a trainee must be at least 16 years old and have successfully finished three years of junior secondary schooling or an equivalent program.

The programme of NTC is run for three years and the trainee on completion of the programme should have the options of;

- 1) Securing employment in automobile industries.
- 2) Setting up personal Motor Vehicle Mechanic workshops.
- 3) Pursuing further education in advanced craft/technical programme and in higher institutions. The curriculum at the NTC is in modular form and broadly divided into three components:
- 4) General Education, which accounts for 30% of the total hours required for the programme.
- 5) Trade theory, Trade Practice and Related Studies which accounts for 65%.

Module is defined by Olaitan and Ali [30] as a unit course or a body of knowledge and skills capable of being utilized in its own as a foundation or prerequisite knowledge for more advanced work in the same or other fields of study. Each trade module when successfully completed can be used for employment purpose.

Automobile mechanic Work operations are based on real jobs rather than made-up ones, thus the training program should be designed to provide the learner with the productive skills necessary to get or keep a work and benefit from it. The achievement of such high goals of productive skill training requires the provision and use of appropriate instructional and training resources. Motor vehicle mechanic operations in the technical college's curriculum includes work is related to service station mechanics, engine reconditioning (for both gasoline and diesel engines), and maintenance on gasoline and diesel engines [36].

In accordance with the specific and performance objectives removed from the National Technical Certificate in Motor Vehicle Mechanic Work curriculum, psychoproductive multiple-choice test items were created based on the operations in Motor Vehicle Mechanic Work at the Technical College that resulted in the award of the NTC. Since the Psycho productive multiple choice skill test items in this study will include a wide variety of topics, content validity will be ensured while also serving the aim of assessing performances in Motor Ve-

hicles Mechanic Work.

3. Methodology

The study made use of instrumentation research design, which is concerned with creating instruments to evaluate students' performance [4] The research, which covered five technical institutions in each of the two states—Ekiti and Ondo—was conducted in Nigeria. In the five technical colleges in the two states—Government Technical College, Ado-Ekiti, Government Technical College, Ido-Ekiti in Ekiti State, and Government Technical College, Owo and Government Technical College, Akure Federal Government Technical College Ikare Akoko in Ondo State—350 NTC III students were the study's population.

Three ability categories made up the study's population: High, Average, and Low. Due to the comparatively tiny population size, there was no sampling. The data collection instrument comprises 180 psycho-productive multiple-choice skill test items related to motor vehicle mechanic work at technical colleges. These items are divided into 60 categories: service station mechanic work, diesel engine maintenance, petrol engine maintenance, and engine reconditioning (both petrol and diesel). The specification table and Simpson's taxonomy of the psychomotor domain served as the foundation for the development. NBTE following the classifications by Simpson [37] listed the following levels for each of the following jobs: mechanic work at service stations; maintenance work on gasoline engines; maintenance work on diesel engines; and engine rebuilding (both diesel and petrol engine).

The Simpson classification of psychomotor objectives is as follows: 1/3 of 5–10% of perception, 1/3 of 5–10% of set, 1/3 of 5–10% of adaptation, and 1/3 of 5–10% of origination, which is 1/3 of 20–40%. This means that in order for a student's performance at these four levels to be deemed satisfactory, the student must receive a minimum of 5% in each level of perception/set, adaptation, and origination.

A student is considered to have obtained satisfactory performance in the guided response, mechanism, and complex overt response levels if they score at least 2/3 of all the items in the three levels, which translates to 2/3 of 20–30% guided responses, 2/3 of 20–30% mechanism, and 2/3 of 20–25% complex overt response. This means that, in order for a student to be considered to have obtained satisfactory performance, they must score at least 2/3 of 60–85, or 40–50% of all the total items in guided response, mechanism, and complex overt response. If a student's performance is below 1/3 of performance, set, adoption, and origination, as well as below 2/3 of guided response, mechanism, and complex overt response, then they are considered unsatisfactory, provided the items meet the psychometric properties standards.

There were three different kinds of validation involved: Face, Content, and Criterion-referenced. Experts in the relevant fields were given copies of the psycho-productive mul-

multiple choice skill test items, the specification table, the highlighted sections of the NTC Motor vehicle mechanic job curriculum, and a four-point rating scale questionnaire. Three specialists from the University of Nigeria's Department of Industrial Technical Education and two experts from the college of education's measurement and evaluation division are located in Nsukka, Enugu State, Nigeria.

An internal consistency of the scores was ascertained by using the split half method and Kuder-R20. The respondents were asked to rate the items using a four-point response scale or option of Highly essential, averagely essential, slightly essential, and not essential, i.e. 4,3,2,1 respectively. A mean of 2.5 was used for each item on the questionnaire to possess face and content validity. The criterion-referenced validity of the instrument was determined by comparing the student's scores to the predetermined Simson's recommendation as discussed above using Simpson's classification of the psychomotor domain.

The instrument's reliability is demonstrated by the correlation, which produced co-efficients of 0.87, 0.86, 0.88, and 0.87 for service station mechanic work, diesel engine maintenance work, gasoline engine maintenance work, and engine rebuilding (diesel and gasoline engines). Expert commentary on the face validation outcome addressed research question 1. Research question 2 was addressed using Kuder-Richardson KR-20, and the hypothesis was tested at the 0.05 level of significance using an analysis of variance (ANOVA).

4. Results

The results for this study are presented according to the headings that correspond to the research questions and hypothesis as indicated below.

4.1. Research Question 1

What are the Process skill items that are essential for developing Psycho-productive skill test items for assessing students skills in Motor vehicle mechanic work [Service station mechanic work, Petrol engine maintenance work, Diesel engine maintenance work, Engine rebuilding (Petrol and Diesel Engine)] at NTC III level?

In answering research question one, all the 180 skill test items in Motor vehicle mechanic work were considered based on face, content and criterion-referenced validation exercise, the researcher administered the validated items on a sample of candidates. [Table 1](#) revealed the distribution of the final test items utilized in developing Psycho-productive skill multiple choice test for assessing NTCIII students in Motor vehicle mechanic work.

[Table 1](#) revealed that out of the 180 skill test items, none were discarded, all the 180 skill test items were retained and used for the development of the Psycho-productive multiple-choice skill test items.

Table 1. Distribution of items according to task as specified in the curriculum after validation and as specified in the table of specification using Simpson's classification of the Psychomotor domain.

S/N	Task	Number of items	Number of items discarded	Number of items retained
	Service station mechanic work			
1.	Identify the principal components, auxiliaries of motor vehicle e.g., engine, gear box, clutch, chassis, rear and back axle.	2	None	2
2.	Perform sealing and locking methods, seal and lock motor vehicle components parts efficiently	3	None	3
3.	Carry out basic services involved in motor vehicle and routine services on different types of motor vehicle	5	None	5
4.	Carry out basic construction of a battery and preventive maintenance.	8	None	8
5.	Carry out basic general service and maintenance of a motor vehicle	7	None	7
6.	Maintain tyres in good condition, checking toe and camber and wheel alignment to specification	7	None	7
7.	Perform task in combustion process in spark and compression engines	8	None	8
8.	Carry out forecourt services station operation and procedures.	7	None	7
9.	Carry out and identify specific fuel, oil and lubrication procedures	7	None	7
10.	Observing safety precautions relating to the handling, usage and storage of fuel, oil and lubricants.	5	None	5

S/N	Task	Number of items	Number of items discarded	Number of items retained
	Petrol engine maintenance work			
11.	Observed general safety precautions in handling of all various types of equipment and tools and observe good house keeping	7	None	7
12.	Tune up petrol engine and rectify observed faults and restore to peak performance	5	None	5
13	Sets valves, valve clearance and camshaft and carry out necessary adjustment.	15	None	15
14	Check the fuel systems and service faulty injectors	12	None	12
15	Identify Operate and repair faulty ignition systems, repair and carry out adjustment.	17	None	17
16	Identify and Carry out operations on faulty cooling systems and restore faulty cooling systems to acceptable standard of performance	5	None	5
	Diesel engine maintenance work			
17	Carry out repairs on the compression ignition engine and repairs of the components of the fuel delivery systems	4	None	4
18	Carry out repairs on inline and rotary fuel injection and fuel pumps, effect overhaul and repairs	4	None	4
19	Carry out engine tune ups and test for efficiency.	6	None	6
20	Carry out the fuel bleeding procedure	8	None	8
21	Carry out operations involving fuel injection pumps and governors.	8	None	8
22	Carry out the engine wet sump lubrication and method of oil distribution	6	None	6
23	Carryout operations involving dry sump lubrication systems, crankcase ventilation, action of pressure gauge and oil warning lights	8	None	8
24	Perform operations on cams and camshaft drive arrangements for side overhead camshaft.	5	None	5
25	Carry out valve and valve port timing operations on compression ignition system/ engine	6	None	6
26	Perform operations involving crankshaft balancing and vibration damping.	5	None	5
	Engine Reconditioning (Petrol and Diesel engine)			
27	Identifying and setting up of equipment and necessary tools for automobile engine removal from the motor vehicle and observing safety procedures.	5	None	5
28	Setting up the workstation ready for automobile engine disassembling and reconditioning	5	None	5
29	Identification of worn-out parts of the automobile engine using appropriate tools required for engine reconditioning to good condition and manufacturer's specification	10	None	10
30	Carry out cylinder re-boring, valve grinding and engine block re-boring manufacturer's specification	10	None	10
31	Carry out grinding of the crankshaft to fit well into the engine block to manufacturer's specification	10	None	10
32	Carry out the automobile engine assembling procedure in a specified sequence in line with the manufacturer's specification	10	None	10
33	Carry out the process of placing the reconditioned engine back into the vehicle using appropriate equipment and procedure while observing safety precautions.	10	None	10

4.2. Research Question 2

What is the reliability of the developed Psycho-productive Multiple-choice test skill items for assessing student's skills Motor vehicle mechanic work [Service station mechanic work, Petrol Engine maintenance work, Diesel Engine maintenance work and Engine Reconditioning (Petrol and Diesel engine)] at the NTCIII level?

Table 2. Reliability of the Psycho-productive Multiple-choice test skill items based on six levels of Simpson's taxonomy of the psychomotor domain as obtained from the scores on the test in Motor vehicle mechanic work using Kuder-Richardson KR-20 $N= 350$.

S/N	Level of Simpson's Taxonomy of Psychomotor domain	Number of items	Number of Even items	Number of Odd items	KR-cal
Service station mechanic work: 60					
1.	Perception	5	2	3	0.88
2.	Set	6	3	3	0.82
3.	Guided response	5	2	3	0.84
4.	Mechanism	16	8	8	0.92
5.	Complex Overt Response	14	7	7	0.85
6	Adaptation	14	7	7	0.83
Petrol engine maintenance work:60					
1.	Perception	7	4	3	0.88
2	Set	5	2	3	0.94
3	Guided response	15	7	8	0.89
4.	Mechanism	10	5	5	0.81
5	Complex Overt Response	16	8	8	0.85
6	Adaptation	7	4	3	0.91
Diesel Engine Maintenance work:60					
1	Perception	4	2	2	0.87
2	Set	6	3	3	0.83
3	Guided response	8	4	4	0.80
4	Mechanism	22	11	11	0.99
5	Complex Overt Response	10	5	5	0.84
6	Adaptation	10	5	5	0.81
Engine Reconditioning:60					
1	Perception	2	1	1	0.80
2	Set	2	1	1	0.88
3	Guided response	11	5	6	0.86
4	Mechanism	14	7	7	0.80
5	Complex Overt Response	14	7	7	0.84
6	Adaptation	17	8	7	0.82

Decision: Standard correlation coefficient = 0.72 or above but less than unity [41] (Zimmerman et al, 1990) and (Federer, 1992).

The analysis of data in Table 2 revealed that the reliability coefficients of the instruments in Service station mechanic

work, Petrol engine maintenance work, Diesel engine maintenance work and Engine reconditioning (Petrol and Diesel engine), based on the six levels of Simpson's taxonomy of psychomotor domain. Service station mechanic work with 60 items had the following reliability coefficient, 0.88, 0.82, 0.84, 0.92, 0.85, 0.83; Petrol engine maintenance work with 60 items had the following reliability coefficient, 0.88, 0.94, 0.89, 0.81, 0.85, 0.91; Diesel engine maintenance work with 60 items had the following reliability coefficient, 0.87, 0.83, 0.80, 0.86, 0.84, 0.81; while Engine reconditioning (Petrol and Diesel engine) with 60 items had the following

reliability coefficient, 0.81, 0.88, 0.86, 0.80, 0.84, 0.82.

These coefficients were greater than 0.81 and judge to be high correlation [17, 41]. They are also greater than 0.06 than unity [13]. From the above coefficient, the Psycho-productive multiple-choice test items can be said to have high reliability.

HO: There is no significant difference in the mean responses based on the performance of the three ability groups of students (High, Average, Low) on the Psycho-productive multiple choice skill test items in Service station mechanic work. The data for testing the hypothesis are presented in Table 3.

Table 3. Analysis of variance of the mean performance of High, Average and Low ability students in the Psycho-productive multiple-choice test in Service station mechanic work based on the six levels of Simpson's taxonomy of the psychomotor domain.

Level of Simpson's taxonomy	Number of items	Sum of squares	Mean square residual	df	f-ratio	E ²	P-value	Rmk
Perception	5	Between:30,759	11.929	2	3.792	0.993	0.023	S
		Within:2,222.111	3,146	672				
		Total:3,138.700	15.075	674				
Set	6	Between:27.070	12.247	2	4.161	0.992	0.016	S
		Within:2,185.840	3.253	672				
		Total:2,212.910	16.788	674				
Guided response	5	Between:28.777	12.247	2	4.023	0.991	0.034	S
		Within:2,388.312	3.237	672				
		Total:2,316.112	14.978	674				
Mechanism	16	Between:43.917	21.959	2	3.572	0.993	0.029	S
		Within:4,131.157	6.148	672				
		Total:4,175.075	28.107	674				
Complex Overt response	14	Between:45.253	22.627	2	3.541	0.993	0.030	S
		Within:4,293.665	6.389	672				
		Total:4,338.918	29.016	674				
Adaptation	14	Between:39.188	19.594	2	4.008	0.992	0.019	S
		Within:3,285.395	4.889	672				
		Total:3,324.585	24.483	674				

F-critical = 3.031 E² = Correlation ratio

Data in Table 2 revealed that the P-values of the student's performance in Service station mechanic work based on the six levels of Simpson's taxonomy of the psychomotor domain were 0.023, 0.016, 0.029, 0.030, 0.019 and 0.015. These values were less than the P-value of 0.05 indicating that there is significant difference in the mean performance of the three groups of students (High, Average and low ability) on the Psycho productive multiple choice skill test in service station mechanic work in the six levels of Simpson's taxonomy of the

psychomotor domain.

The table also showed that the calculated F-ratios for the six levels of Simpson's taxonomy were 3.792, 4.161, 3.572, 3.541, 4.008 and 4.225. These F-ratios were greater than the F-critical value of 3.0317 at 2 and 672 degrees of freedom. This indicated that there is significant difference in the mean performance of the three groups of students (High, Average and Low ability) on the Psycho productive multiple choice skill test in service station mechanic work in the six levels of

Simpson's taxonomy of the psychomotor domain.

Therefore, the null hypothesis of no significant difference in the mean performance of the three groups in service station mechanic work was rejected for the six levels of Simpson's taxonomy of the psychomotor domain.

Post-hoc analysis using Tukey-Kramer multiple comparison test was carried out to determine the direction of difference of the mean performance of the three groups (High, Average and Low ability) [33]. The test revealed that the difference was significant between the high and low ability but was not significant between the high and average abilities when compared. The implication of the result of Tukey-Kramer post-test is that the psycho productive multiple-choice skills test in motor vehicle mechanic work was able to distinguish between high and low ability groups in terms of their performance on the test which is a measure of the validity of the test.

5. Discussion of Findings

In a study on the Development and Validation of Decision-Making Skills Inventory for secondary school principals in Plateau state, [37] found that 24 items of the DMSI were found to be properly loaded and therefore dependable with a minimum factor loading index of 0.35, revealing the content validity of 24 items of the DMSI. These findings corroborated the findings that 180 skill items with content validity were considered suitable for inclusion in the psycho productive multiple choice skill test. This result was consistent with that of [37] who examined the factorial validity of a psycho-productive skill test for senior secondary school students in woodworking in Ondo State. In that study, it was discovered that the items' content validity ratio in woodwork in Ondo State, where it was found out that the content validity ratio of the items confirmed the content validity.

The results of this study showed that the psycho-productive multiple-choice skill test satisfied Okoro (2012) [28] recommendations for test content and internal validity since it required performance on psychomotor goals. How successfully the exam assesses the manipulative learning outcomes in motor vehicle mechanic work covered within the three-year NTC program was the focus of the psycho-productive multiple-choice skill test. The themes, subject matter, and behavioral outcomes that were to be measured were determined by the psycho-productive multiple-choice skill test. The test was designed to precisely fit within the table of specifications, following a specification table that detailed the sample of products to be utilized. This agreed with [36] who stated that for a test to meet the content validity criteria, it must identify the subject matter topics, behavior outcome to be measured and be constructed following a table of specification which has been built to specify the sample of items to be measured [39].

Additionally, the study discovered that across the six levels of Simpson's taxonomy of the psychomotor domain, the

psychoprodutive multiple-choice skill test questions exhibited reliability co-efficiencies ranging from 0.81 to 0.97. This suggested that the items in the six examined levels of the psychomotor domain's Simpson taxonomy were dependable. These results are consistent with those obtained by [30] in a study on the creation and validation of multiple-choice tests on psycho-productive skills for agricultural science students in secondary schools in Kogi state. The instrument showed good reliability, with a Cronbach alpha coefficient of 0.83. The findings are also in conformity with the findings of [25] in a study on development and factorial validation of Basic Electricity Interest Inventory where it was found out that the inventory had a high reliability with Cronbach alpha coefficient of 0.74. The findings of this study on reliability is in consonance with the findings of [9] in a study on Development of an instrument for evaluating practical project in electronics in Kaduna polytechnic, where it was found out that the 50 items in IEPPE had a Kuder-Richardson K-R20 reliability estimate of 0.85, which is a measure of inter-item homogeneity.

The study by Okeme (2011) [32] discovered that the three student groups' mean scores on the psychoprodutive multiple-choice skill exam for motor vehicle mechanic work differed significantly (High, Average, and Low ability). When comparing the high and low ability, there was a significant difference, but not between the high and average ability, according to Tukey Kramer multiple comparison tests. The aforementioned results are consistent with those of [18] who conducted a study on the development and factororial validation of a mathematics test anxiety scale for senior secondary school students in Nasarawa state. The study revealed that SS 3 students scored higher on the MTAS than SS 2, with mean scores of 63.5 and 61.9 for SS 3 and SS 2 respectively.

6. Conclusion

The achievement of the motor vehicle mechanic work curriculum at the National Technical College (NTC) level requires assessment of all domains (cognitive, psychomotor, and affective). Current assessment methods make skill development in students unachievable, leaving them with limited occupational entry-based skills. This situation calls for the development of a psychoprodutive multiple choice skill test to fill the gap created by teaching and learning in this field. This test could provide a basis for accurate judgment on whether all objectives have been achieved, allowing for more accurate evaluations through the internet.

7. Recommendation

The study recommended the following for implementation; 1) The external examination bodies (NABTEB, WAEC and NECO) should integrate psycho productive multiple choice skill test in their examination for certification of

NTC students.

- 2) Teachers should be encouraged by government to make use of psycho productive multiple choice skill test items during teaching and assessing students in motor vehicle mechanic work especially the curriculum content areas that relates to production such as service station mechanic work, petrol engine maintenance work, diesel engine maintenance work and engine reconditioning (Petrol and Diesel engines).

Abbreviations

NBTE	National Board for Technical Education
NTC	National Technical Certificate
NECO	National Examination Council
NABTEB	National Business and Technical Examination Board
WAEC	West African Examination Council

Conflicts of Interest

The authors declare no conflict of interest.

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