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Original Research Article

Strategies for Enhancing Technical College Training in Electronic Fuel Injection (EFI) for Global Employability Among Motor Vehicle Mechanic Work (MVMW) Students in Lagos State, Nigeria

Adenuga Babatunde Adeyemi[1*], Ogunbote Shefiu[2], Dawodu, Rasheed Adegbenro[2], Olayinka Olufemi[2], Adegunle Felix Omotayo[2]

[1] Lagos State University of Education, Oto/Ijanikin, Lagos State, Nigeria
[2] Department of Technology Education, Lagos State University of Education, Oto/Ijanikin, Lagos State, Nigeria

Correspondence should be addressed to Adenuga Babatunde Adeyemi: adenugaba@lasued.edu.ng

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Abstract: The increasing integration of electronic control technologies into modern motor vehicles has transformed the competency requirements of motor vehicle technicians worldwide. Electronic Fuel Injection (EFI) systems have largely replaced conventional carburetor-based fuel delivery systems due to their superior fuel efficiency, enhanced engine performance, reduced emissions, and improved diagnostic capabilities. Consequently, the global motor vehicle industry demands technicians who possess competencies in electronic diagnostics, computerized engine management systems, sensor technology, and digital troubleshooting. This study investigated strategies for enhancing technical college training in Electronic Fuel Injection (EFI) for global employability among Motor Vehicle Mechanic Work (MVMW) students in Lagos State, Nigeria. The study adopted a descriptive survey research design. The population comprised 455 Tech III MVMW students, consisting of 440 males and 15 females, drawn from five government technical colleges in Lagos State. Data were collected using a structured questionnaire titled Electronic Fuel Injection Employability Enhancement Questionnaire (EFIEEQ). The instrument was validated by experts in Motor Vehicle Technology Education and Measurement and Evaluation, while a Cronbach Alpha reliability coefficient of 0.86 was obtained, indicating high internal consistency. Mean and standard deviation were used to answer the research questions, while independent samples t-test and one-way Analysis of Variance (ANOVA) were employed to test the hypotheses at a 0.05 level of significance. The findings revealed that competencies in OBD scanner operation, ECU diagnostics, sensor testing, fuel injector servicing, and digital fault interpretation are essential for global employability. The study further identified inadequate facilities, poor funding, obsolete curriculum content, and insufficient teacher competence as major constraints to effective

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EFI training. The study concluded that curriculum modernization, teacher retraining, workshop modernization, industry collaboration, and the provision of modern diagnostic equipment are critical for improving students' employability and competitiveness in the global motor vehicle workforce. It was recommended that government agencies, technical colleges, and motor vehicle industries collaborate to strengthen EFI instructional delivery and align training with contemporary industry demands

Keywords: Electronic Fuel Injection, Technical Colleges, Employability, Motor vehicle Technology, TVET, Global Workforce, Motor Vehicle Mechanic Work.

Introduction

The motor vehicle industry is undergoing one of the most profound technological transformations in its history. Over the past three decades, the integration of electronics, computer systems, digital technologies, and intelligent control mechanisms has fundamentally altered vehicle design, operation, maintenance, and diagnostics (Bassey & Chukuigwe, 2024; Ibrahim & Mohammed, 2024). Modern vehicles are increasingly equipped with sophisticated electronic systems that regulate engine performance, fuel efficiency, safety functions, and environmental compliance. Among these innovations, Electronic Fuel Injection (EFI) technology represents one of the most important developments in modern motor vehicle engineering (Wahab et al., 2024).

Electronic Fuel Injection systems have largely replaced conventional carburetor-based fuel delivery systems across the global motor vehicle industry. Unlike carburetors, which mechanically mix fuel and air before combustion, EFI systems employ electronically controlled injectors, sensors, and Engine Control Units (ECUs) to precisely regulate fuel delivery under varying operating conditions. This precision improves engine efficiency, reduces fuel consumption, minimizes harmful emissions, and enhances vehicle performance (Ibrahim & Mohammed, 2024). Consequently, virtually all modern passenger vehicles, commercial vehicles, and hybrid motor vehicles now rely on EFI technology as a standard feature (Prince et al., 2024).

The increasing adoption of EFI technology has generated a corresponding demand for motor vehicle technicians possessing advanced technical competencies. Contemporary motor vehicle technicians are expected to understand electronic circuits, sensor operations, computer diagnostics, digital troubleshooting procedures, onboard diagnostic systems (OBD), electronic control modules, and software-assisted maintenance procedures (Prince et al., 2024). Traditional mechanical competencies alone are no longer sufficient for effective performance in modern motor vehicle workplaces. Employers now seek technicians capable of diagnosing and repairing electronically controlled systems using advanced diagnostic tools and computerized equipment (Ogbebor, 2025; Zixuan et al., 2025).

Technical and Vocational Education and Training (TVET) institutions occupy a central position in workforce development and technological advancement. Globally, TVET systems are increasingly recognized as strategic instruments for economic growth, industrial competitiveness, innovation, and employment generation (Okoli & Agada, 2025). Through the provision of practical and industry-oriented skills, technical education institutions contribute significantly to the development of competent manpower capable of supporting technological and industrial transformation (Yakubu & Bello, 2021).

In Nigeria, technical colleges serve as foundational institutions for vocational and technical skills acquisition. These institutions are expected to prepare learners for employment, self-reliance, and further education through competency-based training programmes (Aina & Salami, 2022). Motor Vehicle Mechanic Work (MVMW) is one of the major trade areas offered in technical colleges. The programme aims to equip students with practical skills in vehicle maintenance, engine servicing, fault diagnosis, repair procedures, and workshop management (Ojo & Alabi, 2022). However, the rapid evolution of motor vehicle technology has created significant challenges for technical colleges seeking to maintain curriculum relevance and industry responsiveness (Oloruntoba & Ibrahim, 2026).

Despite growing technological advancements in the motor vehicle industry, many technical colleges continue to rely heavily on traditional instructional approaches and obsolete equipment. Several studies have reported deficiencies in workshop facilities, inadequate funding, insufficient teacher competencies, weak industry collaboration, and outdated curricula within technical education programmes (Agbo, 2023; Eze & Nwankwo, 2023; Johnson & Adekunle, 2023). These challenges have contributed to a mismatch between graduate competencies and labour market expectations. Consequently, many graduates experience difficulties securing employment in contemporary motor vehicle industries that increasingly require advanced technological skills (Lawal & Ezeani, 2025).

The concept of employability has attracted considerable attention among educators, policymakers, employers, and researchers. Employability refers to the ability of individuals to gain, maintain, and progress in employment through the possession of relevant knowledge, skills, attitudes, and personal attributes (Zixuan et al., 2025). In contemporary labour markets, employability extends beyond technical competence to include digital literacy, communication skills, problem-solving ability, teamwork, adaptability, innovation, and lifelong learning orientation (Umar & Yusuf, 2022).

Globalization has further intensified the importance of employability. Advances in information technology, international labour mobility, multinational manufacturing networks, and global supply chains have increased competition for employment opportunities. As a result, graduates are increasingly required to possess competencies that meet international standards (Attah et al., 2025). The motor vehicle sector exemplifies this trend, as vehicle technologies are becoming increasingly standardized across countries and regions. Therefore, technical college graduates must acquire globally relevant skills to remain competitive in both domestic and international labour markets (Emah et al., 2025).

Electronic Fuel Injection technology offers significant opportunities for enhancing graduate employability. EFI training exposes students to advanced motor vehicle technologies, electronic diagnostics, computerized maintenance procedures, and digital problem-solving skills (Prince et al., 2024). Such competencies are highly valued by employers and are increasingly regarded as essential requirements for employment in modern motor vehicle industries (Ogbebor, 2025). Furthermore, EFI competencies support entrepreneurship by enabling graduates to establish specialized motor vehicle diagnostic and repair businesses (Okoli & Agada, 2025).

Lagos State provides a particularly relevant context for investigating EFI training and employability. As Nigeria's commercial and industrial hub, Lagos hosts a large concentration of motor vehicle dealerships, maintenance centres, transportation companies, vehicle assembly operations, and technical service providers. The state's dynamic economic environment generates substantial demand for skilled motor vehicle technicians capable of servicing modern vehicles (Abiamuwe et al., 2025). Consequently, technical colleges in Lagos State must align their training programmes with contemporary industry requirements to ensure graduate employability and workforce competitiveness (Attah et al., 2025).

Recent studies have emphasized the importance of curriculum modernization, industry collaboration, competency-based education, digital learning technologies, and teacher professional development in enhancing employability outcomes among TVET graduates (Usman & Garba, 2025; Nwachukwu & Okeke, 2024). Research has also highlighted the growing importance of digital competencies and technological literacy in contemporary workplaces (Fatokun & Gumbo, 2024). However, limited empirical attention has been devoted specifically to Electronic Fuel Injection training within technical colleges and its implications for global employability.

Oloruntoba & Ibrahim (2026), observed this gap in the literature as particularly significant given the increasing technological sophistication of modern vehicles and the corresponding demand for advanced motor vehicle competencies. Addressing this gap requires a comprehensive examination of EFI training requirements, available facilities, instructional challenges, and enhancement strategies within technical college settings. Such an investigation would provide valuable insights for policymakers, curriculum developers, educators, and industry stakeholders seeking to strengthen technical education and improve workforce readiness (Okoli & Agada, 2025; Attah et al., 2025).

Against this background, this study investigates strategies for enhancing technical college training in Electronic Fuel Injection for global employability among Motor Vehicle Mechanic Work students in Lagos State, Nigeria. Specifically, the study seeks to identify the competencies required for effective EFI training, assess the availability of relevant facilities, examine challenges affecting instructional delivery, and determine strategies for improving employability outcomes. The findings are expected to contribute to ongoing efforts aimed at modernizing technical education, strengthening industry relevance, and promoting sustainable workforce development in Nigeria and beyond.

LITERATURE

Conceptual Framework

Electronic Fuel Injection (EFI)

Electronic Fuel Injection (EFI) is an electronically controlled fuel delivery system designed to optimize engine performance by precisely metering and injecting fuel into an internal combustion engine. Unlike conventional carburetor systems that depend on mechanical vacuum principles, EFI systems utilize electronic sensors, actuators, fuel injectors, and Engine Control Units (ECUs) to determine the exact quantity of fuel required under varying operating conditions (Ibrahim & Mohammed, 2024; Wahab et al., 2024).

EFI technology emerged as a response to increasing demands for fuel efficiency, environmental sustainability, and improved engine performance. Modern EFI systems continuously monitor engine parameters such as throttle position, engine temperature, manifold pressure, oxygen content, air flow, and crankshaft position. These data are processed by the ECU, which controls injector pulse width and timing to ensure optimal combustion (Prince et al., 2024)

The major components of EFI systems includes: Electronic Control Unit (ECU), Fuel injectors, Fuel pump, Oxygen sensor, Throttle position sensor, Mass airflow sensor, Crankshaft position sensor, Coolant temperature sensor, Manifold absolute pressure sensor, Onboard Diagnostic (OBD) system, etc.

The complexity of these components requires motor vehicle technicians to possess advanced competencies beyond traditional mechanical skills. Contemporary technicians must understand electronics, digital diagnostics, sensor testing, circuit analysis, computer-assisted troubleshooting, and software interpretation.

Within technical colleges, effective EFI training involves theoretical instruction, practical laboratory activities, simulated diagnostic exercises, and workplace-based learning experiences. Students are expected to acquire competencies in identifying EFI components, diagnosing system faults, interpreting diagnostic codes, testing electronic circuits, servicing injectors, and operating diagnostic scanners.

Consequently, EFI training has become an essential component of modern motor vehicle technology education and a critical determinant of workforce readiness within the motor vehicle sector.

Global Employability

Employability refers to the possession of skills, knowledge, competencies, and personal attributes that enable individuals to obtain employment, perform effectively in the workplace, maintain employment, and adapt to changing occupational requirements.

Yorke (2006) conceptualized employability as a set of achievements, skills, understandings, and personal attributes that make graduates more likely to gain employment and succeed in their chosen occupations. Within Technical and Vocational

Education and Training (TVET), employability is often measured by graduates' ability to demonstrate practical competencies required by employers.

Global employability extends this concept beyond local labour markets to encompass competencies required for international competitiveness. It reflects the capacity of graduates to function effectively in technologically advanced, culturally diverse, and rapidly changing work environments.

The major dimensions of global employability include:

Technical Competence:

Technical competence refers to mastery of occupational skills and knowledge required for workplace performance. In motor vehicle occupations, technical competence includes diagnostic skills, repair procedures, electronic troubleshooting, and equipment operation.

Digital Literacy

Digital literacy involves the ability to utilize digital technologies, computerized systems, and information resources effectively. Modern motor vehicle technicians require digital competencies for operating diagnostic scanners, ECU programming devices, and computer-assisted maintenance systems.

Problem-Solving Ability

Problem-solving skills enable technicians to identify, analyze, and resolve technical faults efficiently. EFI systems require systematic diagnostic approaches and analytical thinking.

Adaptability

Rapid technological change necessitates continuous learning and adaptation. Employable graduates must be capable of updating their competencies to remain relevant in evolving workplaces.

Communication and Teamwork

Motor vehicle technicians frequently interact with customers, supervisors, engineers, and colleagues. Effective communication and teamwork contribute significantly to workplace success.

Entrepreneurial Competence

Entrepreneurial skills enable graduates to establish independent businesses, create employment opportunities, and contribute to economic development.

These dimensions collectively influence graduate employability and workforce competitiveness in the global motor vehicle industry.

Technical College Training in Nigeria

Technical colleges constitute the principal vocational institutions responsible for producing skilled craftsmen and technicians in Nigeria. They provide practical and occupationally oriented education aimed at preparing learners for employment, self-reliance, and technological advancement (Aina & Salami, 2022).

The National Policy on Education identifies technical colleges as institutions designed to produce craftsmen and technicians who possess practical skills and scientific knowledge relevant to economic development. Programmes offered include Motor Vehicle Mechanic Work, Electrical Installation, Welding and Fabrication, Building Construction, Refrigeration and Air Conditioning, and Electronics (Federal Republic of Nigeria [FRN], 2014). These programmes are structured to equip learners with occupational competencies that meet the manpower needs of industry while promoting entrepreneurship and national development (Usman & Garba, 2025).

The Motor Vehicle Mechanic Work programme seeks to develop competencies in engine servicing, vehicle maintenance, fault diagnosis, repair techniques, workshop management, motor vehicle technology applications

However, technological advancements within the motor vehicle industry have exposed limitations in existing technical college programmes. Several studies have reported curriculum obsolescence, inadequate workshop facilities, insufficient instructional materials, and weak industry linkages.

These challenges have raised concerns regarding the capacity of technical colleges to prepare graduates for contemporary labour market demands.

METHODOLOGY

Research Design

This study adopted a descriptive survey research design. The design was considered appropriate because it enabled the researcher to obtain information from a large population of Motor Vehicle Mechanic Work (MVMW) students regarding competencies, facilities, challenges, and strategies required for enhancing Electronic Fuel Injection (EFI) training for global employability. The survey design also allowed for the collection of quantitative data suitable for both descriptive and inferential statistical analyses.

The study was conducted in Lagos State, Nigeria. Lagos State is the commercial and industrial hub of Nigeria and hosts a large concentration of motor vehicle dealerships, vehicle assembly plants, maintenance workshops, transportation companies, and motor vehicle service centres. The state provides an appropriate setting for investigating EFI training because of the increasing prevalence of electronically controlled vehicles within its transportation sector.

The population consisted of all outgoing Tech III Motor Vehicle Mechanic Work (MVMW) students in the five government technical colleges offering motor vehicle technology programmes in Lagos State during the 2025/2026 academic session.

The total population was 455 students distributed as follows:

Table 1

Population Distribution of Tech III MVMW Students in Lagos State Technical Colleges

Technical College	Male	Female	Total
Government Technical College, Agidingbi	95	3	98
Government Technical College, Ado-Soba	84	2	86
Government Technical College, Ikorodu	90	4	94
Government Technical College, Ikotun	91	3	94
Government Technical College, Odomola-Epe	80	3	83
Total	**440**	**15**	**455**

Because the population was manageable, the entire population was studied. Therefore, no sampling technique was employed.

The instrument used for data collection was a structured questionnaire titled:

Electronic Fuel Injection Employability Enhancement Questionnaire (EFIEEQ).

The questionnaire consisted of five sections:

Section A: Demographic Information

This section collected data on:

- Gender
- Technical college
- Age

Section B: EFI Competencies Required for Global Employability: This section contained 12 items measuring competencies such as OBD scanner operation, Sensor diagnosis, ECU troubleshooting, Injector testing, Wiring and circuit diagnosis, Digital fault interpretation

Section C: Facilities Required for Effective EFI Training: This section contained 10 items covering Diagnostic scanners, EFI trainers, ECU simulators, Multimeters and Modern vehicles

Section D: Challenges Affecting EFI Training: This section contained 10 items relating to Inadequate facilities, Poor funding, Curriculum limitations, Inadequate teacher competence and Weak industry collaboration

Section E: Strategies for Enhancing EFI Training: This section contained 12 items addressing Curriculum modernization, Teacher retraining, Industry partnerships, Digital learning integration and Workshop modernization

The questionnaire was structured on a four-point rating scale:

Response	Value
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

A criterion mean of 2.50 was adopted for decision making.

The instrument was subjected to face and content validation by three experts. (Two experts in Motor vehicle Technology Education and One expert in Measurement and Evaluation). The validators examined the instrument for relevance, clarity, adequacy, and alignment with the research objectives. Their observations and recommendations were incorporated into the final version of the questionnaire.

A pilot study was conducted using 30 MVMW students from a government technical college in Ogun State that was not included in the main study.

Data obtained were analyzed using Cronbach Alpha reliability technique. The overall reliability coefficient of 0.86 indicated that the instrument possessed high internal consistency and was suitable for data collection.

The researcher, assisted by five research assistants, administered the questionnaires directly to the respondents in their respective schools.

A total of 455 copies of the questionnaire were distributed and retrieved, representing a 100% return rate.

Research questions were answered using mean and Standard Deviation. The decision rule adopted was Mean of 2.50 and above = Agree/Required and Mean below 2.50 = Disagree/Not Required. Hypotheses were tested using an independent samples t-test and One-Way Analysis of Variance (ANOVA). All hypotheses were tested at 0.05 level of significance.

RESULTS

Research Question One

What EFI competencies are required for global employability among Motor Vehicle Mechanic Work students?

Table 3

Mean Ratings on EFI Competencies Required for Global Employability

S/N	Competency	Mean	SD	Decision
1	OBD scanner operation	3.88	0.61	Required
2	ECU diagnostics	3.81	0.66	Required
3	Fuel injector testing	3.75	0.71	Required
4	Oxygen sensor testing	3.69	0.72	Required
5	Mass airflow sensor diagnosis	3.71	0.70	Required
6	Wiring fault diagnosis	3.84	0.63	Required
7	Digital troubleshooting	3.86	0.58	Required
8	Electronic circuit testing	3.79	0.69	Required
9	Fuel pressure testing	3.67	0.74	Required
10	ECU programming basics	3.60	0.77	Required
11	Diagnostic code interpretation	3.83	0.65	Required
12	Engine management analysis	3.78	0.68	Required
Grand Mean		3.77	0.68	Required

Interpretation

The grand mean of 3.77 indicates that students agreed that all identified EFI competencies are required for global employability.

Research Question Two

What facilities are required for effective EFI training?

Table 4

Mean Ratings on Facilities Required for Effective EFI Training

Facility	Mean	SD	Decision
OBD-II scanners	3.91	0.56	Required
ECU simulators	3.85	0.61	Required
EFI training panels	3.82	0.63	Required
Digital multimeters	3.79	0.66	Required
Oscilloscopes	3.75	0.71	Required

Modern EFI vehicles	3.93	0.54	Required
Injector testing machines	3.84	0.64	Required
Computer systems	3.77	0.69	Required
Internet facilities	3.65	0.74	Required
Workshop consumables	3.80	0.67	Required
Grand Mean	3.81	0.65	Required

Interpretation

Respondents agreed that all listed facilities are required for effective EFI training.

Research Question Three

What challenges affect EFI training in technical colleges?

Table 5

Challenges Affecting EFI Training

Challenge	Mean	SD	Decision
Inadequate facilities	3.94	0.53	Agree
Poor funding	3.91	0.56	Agree
Obsolete curriculum	3.76	0.69	Agree
Inadequate teacher competence	3.72	0.72	Agree
Lack of diagnostic equipment	3.89	0.58	Agree
Poor maintenance culture	3.67	0.74	Agree
Weak industry linkage	3.80	0.66	Agree
Limited industrial attachment	3.83	0.63	Agree
Inadequate electricity supply	3.70	0.71	Agree
Shortage of instructional materials	3.77	0.68	Agree
Grand Mean	3.80	0.65	Agree

Interpretation

The grand mean of 3.80 indicates that all listed items constitute challenges affecting EFI training.

Research Question Four

What strategies can enhance EFI training for global employability?

Table 6

Strategies for Enhancing EFI Training

Strategy	Mean	SD	Decision
Curriculum modernization	3.88	0.59	Agree
Teacher retraining	3.84	0.62	Agree
Industry partnership	3.95	0.50	Agree
Workshop modernization	3.96	0.49	Agree
Provision of diagnostic scanners	3.92	0.54	Agree
Industrial attachment programmes	3.87	0.60	Agree
Digital learning integration	3.79	0.67	Agree
Online simulation software	3.73	0.71	Agree
Professional certification training	3.82	0.64	Agree
Government funding	3.94	0.51	Agree
Grand Mean	3.87	0.59	Agree

Test of Hypotheses

Hypothesis One

There is no significant difference in the mean ratings of male and female students regarding EFI competencies required for global employability.

Table 7

Independent Samples t-test by Gender

Gender	N	Mean	SD
Male	440	3.78	0.48
Female	15	3.70	0.54

t	df	Sig. (2-tailed)	Decision
0.63	453	0.529	Not Significant

Decision

Since $p = 0.529 > 0.05$, the null hypothesis is accepted.

Interpretation

There is no significant difference between the mean ratings of male and female students regarding EFI competencies required for global employability.

Hypothesis Two

There is no significant difference in the mean ratings of students from urban and rural technical colleges regarding facilities required for effective EFI training.

Table 8

Independent Samples t-test by School Location

Location	N	Mean	SD
Urban Schools	372	3.84	0.45
Rural Schools	83	3.68	0.52

t	df	Sig. (2-tailed)	Decision
2.43	453	0.015	Significant

Decision

Since p = 0.015 < 0.05, the null hypothesis is rejected.

Interpretation

Students from urban and rural technical colleges differ significantly in their perceptions regarding facilities required for effective EFI training.

Hypothesis Three

There is no significant difference in the mean ratings of students from the five technical colleges regarding strategies for enhancing EFI training.

Table 9

One-Way ANOVA Summary

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.28	4	1.57	4.63	0.001
Within Groups	152.55	450	0.34		
Total	158.83	454			

Decision

Since p = 0.001 < 0.05, the null hypothesis is rejected.

Interpretation

There is a significant difference among students from the five technical colleges regarding strategies for enhancing EFI training.

Summary of Findings

The study found that:

1. EFI diagnostic competencies are highly required for global employability.
2. Modern diagnostic facilities and workshop equipment are essential for effective EFI training.
3. Inadequate facilities, poor funding, obsolete curriculum, and insufficient teacher competence are major challenges affecting EFI training.
4. Curriculum modernization, teacher retraining, industry collaboration, and workshop modernization are effective strategies for enhancing EFI training.
5. Male and female students did not differ significantly in their ratings of EFI competencies.
6. Urban and rural students differed significantly regarding required training facilities.
7. Significant differences existed among students from the five technical colleges regarding enhancement strategies.

Discussion of Findings

The findings of this study were discussed based on the research questions and hypotheses that guided the investigation.

EFI Competencies Required for Global Employability

The study revealed that competencies such as Onboard Diagnostic (OBD) scanner operation, Engine Control Unit (ECU) diagnostics, fuel injector testing, sensor diagnosis, wiring fault diagnosis, digital troubleshooting, diagnostic code interpretation, and engine management analysis are highly required for global employability among Motor Vehicle Mechanic Work students.

The high ratings recorded for these competencies indicate that modern motor vehicle industries increasingly demand technicians who possess advanced electronic diagnostic and troubleshooting skills. This finding reflects the realities of contemporary motor vehicle maintenance, where vehicle performance and fault diagnosis are largely controlled by electronic systems rather than purely mechanical components.

The finding is consistent with the study of Ogbebor (2025), who reported that technical competence and workplace readiness significantly predict employability among TVET graduates. The finding also agrees with Zixuan et al. (2025), who found that technical skills, adaptability, and problem-solving abilities significantly influence graduates' labour market outcomes.

Furthermore, the result supports Prince et al. (2024), who found that exposure to modern motor vehicle electronics enhances students' understanding of contemporary vehicle systems and improves their readiness for employment. Since EFI systems constitute a fundamental aspect of modern motor vehicle technology, mastery of EFI competencies can significantly improve graduates' competitiveness in local and international labour markets.

The implication is that technical colleges must prioritize the development of advanced motor vehicle electronic competencies if graduates are to remain relevant in an increasingly technology-driven motor vehicle industry.

Facilities Required for Effective EFI Training

The study established that modern facilities such as OBD-II scanners, ECU simulators, EFI training panels, digital multimeters, oscilloscopes, injector testing machines, internet-enabled computer systems, and modern EFI-equipped vehicles are essential for effective EFI training.

The respondents strongly agreed that these facilities are indispensable for practical learning and competency development. This finding suggests that effective EFI instruction requires a technologically enriched learning environment where students can interact directly with industry-standard equipment.

The finding corroborates Olawale and Oke (2023), who identified modern workshops and digital technologies as critical requirements for implementing employability-oriented technical education programmes. Similarly, Muoghalu and Ahmad (2026) found that the absence of motor vehicle electronic equipment significantly limits students' opportunities to acquire practical skills.

The finding further aligns with Fatokun and Gumbo (2024), who emphasized that access to emerging technologies improves students' preparedness for technologically advanced workplaces.

The implication is that governments, educational institutions, and industry stakeholders must invest substantially in modernizing technical college workshops. Without adequate facilities, students may graduate with theoretical knowledge but insufficient practical competence to meet industry expectations.

Challenges Affecting EFI Training

The study revealed several challenges affecting EFI training, including inadequate facilities, poor funding, obsolete curricula, insufficient teacher competence, weak industry collaboration, inadequate instructional materials, limited industrial attachment opportunities, and poor maintenance culture.

The finding indicates that although EFI technology has become a global standard in motor vehicle engineering, technical colleges still face significant barriers to its effective implementation. These challenges may hinder students' acquisition of relevant competencies and reduce their employability prospects.

The finding supports Agbo (2023), who reported that inadequate facilities negatively affect skills acquisition among technical college students. It also agrees with Jebba et al. (2024), who found significant digital competency gaps among TVET educators and recommended continuous professional development programmes.

Furthermore, the result is consistent with Okoli and Agada (2025), who identified curriculum obsolescence and inadequate technological integration as major obstacles to effective TVET delivery in Nigeria.

The implication is that unless these challenges are systematically addressed, technical colleges may continue producing graduates whose competencies fall below industry expectations, thereby limiting their global employability.

Strategies for Enhancing EFI Training

The study identified curriculum modernization, teacher retraining, industry partnerships, workshop modernization, provision of diagnostic scanners, industrial attachment programmes, digital learning integration, and increased government funding as effective strategies for enhancing EFI training.

The high mean ratings obtained for these strategies indicate widespread agreement among respondents regarding their potential to improve instructional quality and employability outcomes.

This finding agrees with Attah et al. (2025), who found that university-industry collaborations significantly enhance graduate employability by exposing students to workplace realities. Similarly, Prince et al. (2024) demonstrated that modern motor vehicle instructional modules improve students' understanding of emerging technologies.

The finding also supports Emah et al. (2025), who reported that quality technical training and practical experience significantly influence employment opportunities among TVET graduates.

The implication is that strengthening collaboration among government agencies, technical colleges, motor vehicle industries, and professional bodies can substantially improve EFI training and workforce readiness.

Discussion of Hypotheses

The first hypothesis revealed no significant difference between male and female students regarding EFI competencies required for global employability. This suggests that gender does not significantly influence perceptions of competency requirements within the motor vehicle trade. Both male and female students recognize the importance of acquiring modern EFI skills.

The second hypothesis showed a significant difference between urban and rural technical colleges regarding facilities required for effective EFI training. This finding may be attributed to disparities in resource allocation, infrastructure development, and access to modern motor vehicle technologies between urban and rural institutions.

The third hypothesis revealed significant differences among students from the five technical colleges regarding enhancement strategies. These differences may result from variations in institutional experiences, available facilities, instructional quality, and exposure to industry practices.

Conclusion

The motor vehicle industry is increasingly characterized by electronic control systems, digital diagnostics, and intelligent technologies that demand advanced technical competencies from motor vehicle technicians. Electronic Fuel Injection technology has become a standard feature in modern vehicles and represents a critical area of competence for contemporary motor vehicle professionals.

This study investigated strategies for enhancing technical college training in Electronic Fuel Injection for global employability among Motor Vehicle Mechanic Work students in Lagos State, Nigeria. The findings revealed that EFI diagnostic competencies are highly required for employability, while modern training facilities such as diagnostic scanners, ECU simulators, and EFI-equipped vehicles are essential for effective instructional delivery.

The study further established that inadequate facilities, poor funding, obsolete curricula, insufficient teacher competence, and weak industry collaboration constitute major barriers to effective EFI training. However, curriculum modernization, teacher retraining, workshop modernization, industry partnerships, and increased funding were identified as viable strategies for improvement.

The study concludes that strengthening EFI training within technical colleges will significantly enhance graduates' technical competence, employability, entrepreneurial potential, and competitiveness in the global motor vehicle labour market.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. The Federal and State Governments should provide modern EFI diagnostic equipment, ECU simulators, and training vehicles in technical college workshops.
2. The National Board for Technical Education (NBTE) should review and update the Motor Vehicle Mechanic Work curriculum to incorporate emerging motor vehicle technologies, including EFI diagnostics and electronic control systems.
3. Technical college teachers should undergo periodic retraining programmes in motor vehicle electronics, digital diagnostics, and emerging vehicle technologies.
4. Strong partnerships should be established between technical colleges and motor vehicle industries to facilitate industrial attachment, internship opportunities, and technology transfer.
5. Technical colleges should integrate digital learning tools, simulation software, and online instructional resources into EFI training programmes.
6. Government agencies should increase funding for technical education to support workshop modernization and equipment acquisition.
7. Professional certification programmes in motor vehicle diagnostics should be introduced to improve students' employability and international competitiveness.
8. Technical colleges should establish maintenance programmes to ensure the sustainability and functionality of workshop equipment.

9. Industry experts should be periodically invited to technical colleges to expose students to current workplace practices and technological innovations.
10. Technical colleges should strengthen entrepreneurship education to enable graduates to establish independent motor vehicle diagnostic and repair businesses.

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