



Skills Upgrade for By Automobile Electricians for Maintenance of Modern Vehicle in Jigawa State Nigeria

Umar Alhaji Idris¹ and Muhammad Shuaibu Birniwa²

Dept of Mechanical Engineering Hussaini Adamu Federal Polytechnic,
Nigeria

E-mail:- idrisu604@gmail.com , muhammdshuaibubirniwa@yahoo.com

ABSTRACT

Automobile technicians popularly called roadside mechanics are technical personnels that repairs most of the automobile vehicles in Nigeria. Majority of these mechanics acquired their skills through apprenticeship training. Modern vehicle imported into the country posed greater challenges to the present roadside automobile mechanics in the area of carrying out maintenance repairs of these modern vehicles (autotronic vehicle) due to their inability to acquire autotronic skills competency. Automobile electricians are not exempted from these challenges. Therefore research is carried out in Jigawa state to ascertain the skills upgrade needed by these technicians for successful maintenance repair of the autotronic vehicles that are plying on Nigerian roads. The research conducted revealed that; majority of automobile electricians (15 out of 19) attained educational status above junior secondary school level, 16 out of 19 interviewees cannot repair autotronic vehicles due to lack of skills in the use of OBD and computerized tools. All the 19 automobile electricians interviewed from 19 different workshops across Jigawa state indicate their readiness to participate in skills upgrade training on modern automobile vehicle maintenance repairs. This indicates that there is an urgent need to upgrade skills in the maintenance of autotronic vehicles in the State. The skills upgrade training conducted by Federal Government in collaboration with SURE-P, NAC and SMEDEN was not successful because the educational status of the target population was not considered in drafting the training modules. The mode of training used does not also take cognizance of the theoretical aspect of the trainees, especially basic science which rendered the programme ineffective and insufficient for the tasks on ground.

INTRODUCTION

Automobile Technology is an area of study under mechanical engineering which covers areas like cars, lorries, buses, trucks and other machineries that use internal/external combustion engines (gasoline engines) to propel them. This field of specialization experiences rapid/complex technological development which poses great challenges to the present automobile electricians in Nigeria.

Automobile trade like any other discipline is experiencing a very high level of technological advancement which led to a new area of specialization called Automotive Mechatronics. Lamar (2010) explains Mechatronics as “the automation of machines by introducing computers and other electronics equipment to develop a system which provides new functions and capabilities with more accuracy at a lower cost”.



Automobile Mechatronics (automobile system), more technically refers to as Autotronic, is an area of specialization from a body of knowledge called Mechatronics. With the rapid advancement in technology, the automobile electrician's job has evolved from purely electrical to include electronics and computer technologies (Wikipedia, 2011). Vehicles of nowadays possess complex computer and electronic systems. For this reason automobile technicians need to have a broader base knowledge and skills than in the past. This means that the present practicing roadside automobile electricians need to acquire knowledge of today's computerized and electronics equipped vehicles, in order for them to be relevant with the present maintenance system, **due to** tremendous change in modern car technology (RMRDC 2000). They use sophisticated computer technology, advanced wiring, intricate circuitry and complex engineering. From 1985 to 1995 cars were equipped with first and second generation on-board diagnostic (OBD 1 and OBD 2) systems. The development went further from mild hybrid to strong hybrid vehicles according to New York State Automobile Dealers Association (NYSADA, 2006). Another powerful invention was extra sensory perception (ESP). It is recommended by many lawmakers and carmakers to be a standard feature in all cars sold in the European Union countries (Wikipedia, 2006). Fully autonomous vehicles also known as robotics cars or driverless cars already exist in prototype and are expected to be commercially available around 2020 (Wikipedia, 2011).

Jalal (2009), stressed that over two million Nigerian automobile roadside technicians with inclusion of automobile roadside electricians may be rendered unemployed, by the influx of new cars into the country. He explained that it is because the type of vehicles that they are trained to fix are getting extinct and in their place are wide range of fanciful/sophisticated vehicles imported into the country by individuals, firms and various governments, which they are not conversant with.

In a country, where majority of the practicing automobile roadside mechanics cannot interpret drawing and sketches, does not possess knowledge of electronics devices and computers, the high sophisticated combination of mechanical, electronic, computer and electrical parts put them at a disadvantage. Their knowledge of most new system in modern vehicles is generally low, while their inability to read and interpret electronics circuit diagrams is also a big problem (Jalal, 2009). He added that most of the automobile technicians cannot repair many of the vehicles plying the Nigerian roads today. Automobile roadside electricians of today, therefore, must be well and specially trained and equipped for an on-board diagnostic technology, if at all they want to remain in the profession. For the professional electricians to effectively service and repair modern cars, he/she must have training and experience in a diverse range of subjects, which includes motor vehicle mechanics work, electrical and electronics craft practice, chemistry, physics and many more. NYSADA (2006) posited that, automobile roadside technicians must have an extensive knowledge in motor vehicle mechanic work, electrical and electronic plus computer craft practices, and the knowledge must be updated constantly to keep with rapid changes.

The automobile roadside electricians must understand not only the parts, nomenclature and operation, but also understand the diagnostic and service procedure for each system in the vehicle.



The high technological nature of today's vehicles necessitates the need for regular mechanics training. It is highlighted by Jalal (2009) that Nigerian automobile roadside technicians need to be re-trained to enable them cope with the high level of technological advancement particularly in the field of automobile. Abasa (2014) explained that many cars are now fully automated, requiring that any automobile roadside technician who handles them must possess basic computer knowledge to diagnose faults and rectify them.

From the survey conducted by News Agency of Nigeria (NAN), an automobile roadside mechanic said it was unfortunate that Nigerian automobile mechanics were among the most laidback in automobile knowledge. He said that although many vehicles were now fully automated, the average technician in Nigeria had yet to catch up with the technology of cars manufactured eight or ten years ago, not to talk of the more recent models and latest technology. He said, "There are vehicles that sometimes require your automobile technician accessing the server of the manufacturer via the internet to re-programme the software. "Nigerian automobile repair craftsmen are going through the second leap of technical disconnection with global trends in automobiles." He urged government to encourage young graduates in science and technology with interest in this field to acquire relevant skills because it would make them self-employed and reduce unemployment (Vanguard, 2014).

STATEMENT OF THE PROBLEM

The present day automobile electricians possessed their competencies in maintaining older models of vehicle, because the vehicle were equipped with electrical wiring, circuits and components that were electrically and mechanically operated. But today's vehicles were equipped with electronics and computer gadgets such as sensors, actuators, signals and advance circuitry which make the technicians incompetent in repairing them. Jalal (2019) stated that over two (2) million roadside mechanics in Nigeria will be rendered jobless due to their inability to repair autotronic vehicles moving on the roads.

This give birth to this research work, for the purpose of finding out the needed skills required by Jigawa State automobile electricians which will equip them to carry out efficient, effective and reliable maintenance repair of the autotronic vehicle in the State, thereby contributing toward the economic, social development and curtailing the security problem in the State.

RESEARCH QUESTIONS

The following research questions guided the study;

1. What is the educational status of the Jigawa State automobile electricians?
2. What are the skills upgrades needed by the automobile electricians in Jigawa State?
3. How many automobile electricians can repair autotronic vehicles in Jigawa State?
4. How many automobile electricians that are ready to participate in autotronic skills upgrade in Jigawa State?



RESULTS AND DISCUSSIONS

Discussion and analysis of the stated research questions are explained below

Research Question One:- *What is the educational level of the Jigawa state automobile electricians?*

Table 1. Educational Status

Educational Status	Frequency	Percentage
Apprenticeship/ No Formal Education	0	-
Primary	4	21.05
JSS/Vocational/Trade Test	0	-
SSS/Technical/TC/Trade Test	10	52.63
ND/NCE	5	26.32
B. Sc/HND	0	-
Others (Specify)	0	-
Total	19	100%

Table 1 shows the educational level of the automobile electricians. Four electricians have primary school leaving certificate as their highest educational qualification, which is 21.05% of the respondents. Ten (10) of the respondents possess senior secondary school certificate as their highest educational attainment, which is 53.63%. Five (5) out of 19 technicians obtained ND/NCE as their highest qualification which represents 26.32%. The table also indicates that five (5) out of the nineteen (19) respondents obtained tertiary certificates at NCE/ND level. The educational status of the electricians is very encouraging, what are required are good training modules and mode of training that will upgrade their skills for efficient and reliable maintenance repairs of modern automobile vehicles plying on Nigerian roads.

Table 2. Ability to explain engine performance with sketches

Explain engine performance with sketch	Frequency	Percentage
Yes	2	10.53
No	17	89.47
Total	19	100%

Table 2 shows that only two (2) out of nineteen (19) technicians can explain the engine performance using sketches and diagrams. This number represents only 10.53%. Seventeen (17) of the interviewees, which represents 89.47%, cannot explain the performance of an engine with the aid of sketches and drawings. This means a lot have to be done in bridging the existing gap, as some scientific knowledge are needed in acquiring autotronic skills for modern vehicle maintenance which indicates that the automobile electricians lacked these competencies.

Research Question Two: - *What are the skills upgrades needed by the automobile electricians in Jigawa state?*



Table 3. Car specialization

Car specialization	Frequency	Percentage
Non OBD Compatible	13	68.42
OBD Compatible	3	15.79
Non OBD / OBD compatible	3	15.79
Total	19	100%

Table 3 reveals the type of vehicle the technicians are competent to fix or repair. Thirteen (13) out of 19 interviewed are competent to diagnose and repair only the non OBD compatible vehicles which represent 68.42%. Three (3) respondents each can repair OBD and non OBD compatible vehicles, the numbers each represent 15.79% respectively.

The table also shows that more than two third (2/3) of the independent workshop service technicians in the area of automobile electricity cannot diagnose and repair the modern vehicle (OBD compatible), which are on the increase every day, therefore the need to address the problem is highly required.

Table 4. Membership with profession body

Association Membership	Frequency	Percentage
Yes	18	94.74
No	1	5.26
Total	19	100%

Table 4 discusses the respondents membership with an association. It shows that 18 of the technicians (94.74%) belonged to an association. It is only one (1) respondent out of nineteen (19) automobile technicians that have not registered with any professional body, which represent 5.26% of the interviewees. It revealed that an association can be used to obtain assistance whether from government or non government organizations (NGO's) in bridging the existing gap.

Table 5. Name Association

Name of the Association	Frequency	Percentage
NATA	18	94.74
No Membership with any association	1	5.26
Total	19	100%

Table 5 explains the name of the association that the automobile electricians belong to. Eighteen (18) of the electricians, which represents 94.74% are registered members with the Nigerian Automobile Technician Association (NATA). One of the electricians does not register with any association, which represents 5.26% of the respondents. It is very encouraging to have this large number of automobile electricians that have registered with professional body, as it will assist government and any NGO in providing upgrade training and tools for proper maintenance of latest automobile vehicle that are in the increase in Nigerian roads.



Table 6. Assistance rendered in skill development

Assistance in Skill Development	Frequency	Percentage
Yes	2	10.53
No	16	84.21
Not a Member of any association	1	5.26
Total	19	100%

Table 6 reveals the number of automobile electricians that benefited from skills upgrade training assisted by NATA. Two (2) technicians which represent 10.53% of the interviewees have benefited from the trainings provided through assistance by NATA. Sixteen (16) out of nineteen (19) technicians which represents 84.21% have not benefited from any skills upgrade training. One (1) electrician from the table above . (5.26%) has not registered with any association. The table also shows that large number of the electricians apart from being registered with NATA have not benefited from any skill upgrade training assisted by NATA for them to boost their businesses and contribute to the development of the State (Jigawa) and Nigeria in general.

Table 7. Skills acquired from assisted training

Skills Acquired from Assisted Training	Frequency	Percentage
OBD Training (NAC/SURE-P/SMEDEN)	2	10.53
Not Assisted	16	84.21
Not a Member	1	5.26
Total	19	100%

Table 7 discusses the skills that have been acquired by the independent workshop service technician through NATA assisted programmes. Two (2) out of nineteen (19) interviewees that attended on – board diagnostic (OBD) training programme organized by National Automotive Council (NAC), which is 10, 53% of the automobile electricians. Sixteen (16) which is 84.21% of the mechanics did not attend any additional skills upgrade training. One (1), equivalent to 5.26% of the respondents has not registered with any association talkless of acquiring assisted skills upgrade training from such association.

The NATA is not doing well as sixteen (16) out of nineteen (19) of the interviewed electricians have not received any assistance for skills upgrade training from the association, NATA in collaboration with NGO's and government should assist in bridging the existing skills gap in the automobile maintenance services.

Table 8. Skill relevance

Is Skills Relevant to the Profession	Frequency	Percentage
Yes	2	10.53
No	0	-
Not Attended the training	17	89.47
Total	19	100%

Table 8 explains the relevance of training acquired after graduation. Two (2), which is 10.53% interviewed automobile electricians agreed that the additional training for skills upgrade is very relevant to the area of their specialization. Seventeen (17) out of nineteen (19) interviewed automobile electricians which represent 89.47% did not attend any skills upgrade after graduation, therefore withheld comment on this item.

From the table, it can be realized that only two (2) out of nineteen (19) interviewed automobile electricians have acquired additional training after graduation. This means the existing problem (incompetent to repair modern cars) is still not solved.

Table 9. Adequacy of training

Adequacy of the Training	Frequency	Percentage
Adequate	0	-
Not Adequate	2	10.53
Does not attend the training	17	89.47
Total	19	100%

Table 9 shows the responses of the interviewed independent workshop service technicians specialized in automobile electricity in respect to whether the additional training provided by NAC is adequate or not to execute a business in modern cars diagnosing practices. Two (2) electricians, which represent 10.53% of the automobile electricians that have attended skills upgrade training, agreed that the training acquired is not adequate. Seventeen (17) of the interviewed which is equal to 89.47% of the electricians did not attend the training, therefore have no comments.

Research Question Three:- *How many automobile electricians that can repair autotronics vehicle in Jigawa state?*

Table 10. Use of OBD tool

Do you use digital Tools	Frequency	Percentage
Yes	3	15.79
No	16	84.21
Total	19	100%



Table 10 indicates the number of rewire (automobile electricians) that are using OBD/electronics tools in vehicle fault diagnosing. Two (2) of the electricians, which represent 10.53% uses OBD equipment in diagnosing vehicle fault. The table also show that seventeen (17) out of nineteen (19), which represent 89.47% of the respondents narrated that they do not use OBD/electronic tools in fault diagnosing of modern cars which mostly leads to part or component damaging of present day automobile vehicles.

Table 11 Using Computer in fault diagnosing

Using Computer in fault diagnosing	Frequency	Percentage
Yes	4	21.05
No	15	78.95
Total	19	100%

Table 11 indicates that only four (4) out of nineteen (19) interviewees are using computer in fault diagnosing of modern cars which represent 21.05%. Fifteen of the respondents are not using computer to diagnose modern vehicles (78.95%). By implication it shows that majority of the automobile electricians cannot service modern vehicles.

Research Question Four:- *How many automobile electricians that are ready to participate in autotronic skills upgrade in Jigawa state?*

Table 12 Ready to participate in skill upgrade

Ready to participate in skill upgrade	Frequency	Percentage
Yes	19	100
No	0	00
Total	19	100%

Table 12 above shows that all the respondents are ready to participate in skills upgrade.

CONCLUSION

The research conducted revealed that the majority of the automobile electricians interviewed in Jigawa State are literate. This is very encouraging and it shows positive signal that the electricians possess the potentialities of receiving the training in modern vehicle maintenance. From the data it shows that majority of the interviewed automobile electricians are not science based graduates.

Large number of automobile electricians require skills upgrade training in an on-board-diagnosis (OBD 2), electronic tools and computer usage in fault diagnosing of autotronic vehicles. Four (4) out of nineteen (19) automobile electricians interviewed are the ones using electronics and computerized tools in diagnosing and repairing autotronic vehicles faults in the State. All the nineteen (19) automobile electricians that were interviewed have shown their interest in participating in skills upgrade training on autotronic vehicle maintenance and repairs.



RECOMMENDATIONS/SUGGESTIONS

The following recommendations will be useful if implemented:

1. Government should consider the educational and basic science status of the automobile electricians in Jigawa State before drafting any module for their skill upgrade training. This will assist the government in knowing where to start and suitable module for each category of trainees.
2. Formal training should be organized for the electricians to equip them with the basic science knowledge for them to cope with the technological development of today's vehicle.
3. The training modules should be drafted in simpler form and should be easy to interpret.
4. Electronic/computerized tools should be provided to the trained automobile electricians at subsidy cost in order to improve their maintenance repair services of modern vehicles.
5. Soft load should be given to the trained car electricians without interest.
6. Automobile companies should be encourage to fully participate in the skill upgrade training in cash or in kind.

It is hoped that if these recommendations and suggestions were fully adhered to and implemented the existing gap will be completely eliminated or curtailed to a minimal level.

REFERENCES

- Abasa, B.O.** (2014) *Nigeria's legion of illiterate auto mechanic*, Punch Newspaper, Retrieved from <http://www.punchng.com/feature/supersaturday/nigeria-legion-of-illiterate-auto-mechanics> on 20th February, 2014.
- Jalal A.** (2019). *The auto Mechanics alarm*, Retrieved on 07th July, 2011 from IDocuments9620and9620settings/USER/My9620Documents/NAC.ht
- Jalal, A.** (2009), *Strategies in Place to Rescue Auto Sector*, retrieve from <http://www.autosinsight.com/file/85997/strategies-in-place-to-rescuautos-sector.html> on 26/08/2010
- Lamar S.** (2010). *Mechatronics history*, retrieved on 9th July, 2011. From <http://www.Brightlwb.com/engineers/mechanical/article.aspx>
- New York State Automobile Dealers Association (2006).** Auto Jobs. Retrieved on 07th July, 2011, from <http://www.nyaauto.jobs.com/career.htm>
- Raw Materials Research and Development Council** (2000). *Multi-disciplinary task force of techno-economic survey on motor vehicles and miscellaneous sector*, Abuja: Federal Ministry of Science and Technology.



Vanguard,(2014).*Auto mechanics seek computer training to repair modern vehicle survey*, News Agency of Nigeria, retrieved from <http://www.vanguardngr.com/2013/10/auto-mechanics-seek-computer-training-repair-modern-vehicles-survey> on 12th March, 2014.

Wikipedia (2011).*Automobile History*, the free encyclopedia. Retrieved on 07th July, 2011, from <http://en.wikipedia.org/wiki/automobile>.

Wikipedia (2006).*Hybrid Vehicles*, the free encyclopedia retrieved on 08th July, 2011 from <http://en.wikipedia.org/wiki/hybridvehicles>.

Wikipedia (2019) *Mechatronics the free encyclopedia* retrieved on 07th July, 2011, from <http://en.wikipedia.org/wiki/mechatronics>.