

NEW INNOVATION IN VOCATIONAL EDUCATION: CHALLENGES IN THE TEACHING
OF AUTOMOBILE TECHNOLOGY IN KWARA STATE COLLEGE OF EDUCATION,
ILORIN, NIGERIA

BY

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Abstract

Globally, new innovation in automobile technology is faced with great challenges. It has been a disturbing issue and caused incessant change in curriculum in colleges of education in Nigeria. Innovation is very prominent in automobile technology in Kwara State and Nigeria as a nation. It became a matter of serious concern as Nigeria is beset with lot of challenges in technological advancement. The main objective of this paper is to examine the challenges that automobile technology confronts with new innovation in automobile. It is within this framework that the paper examined the adequacy of workshop training facilities, identify retraining needs of automobile technology teachers, and find out competencies needed by automobile technology teachers in the study area. The methodology of the study is qualitative in nature and utilises secondary sources of data like textbooks, journal articles, magazines and newspapers. The study is premised on the linear model of innovation. The study realised that inadequate facilities, dearth of opportunity to training and retraining, and incompetency on the part of automobile technology teachers serve as banes to the teaching of new innovation in automobile technology in Kwara State College of Education, Ilorin. It was recommended that adequate facilities should be made available in automobile technology workshop; teachers of automobile technology should be encouraged to undergo training and retraining programmes; and incentive should be given to the teachers of automobile technology in colleges of education.

Keywords: *Innovation, Automobile technology, Challenges*

Introduction

Innovation is a new idea, creative thoughts, and new imaginations in form of device or method. It is viewed as new requirements. It is the application of ideas that are novel and useful. Creativity, the ability to generate novel and useful ideas, is the creation, development and implementation of a new product, process or service with a view to improving efficiency, effectiveness or competitive advantage. Innovation is used as a broad concept. In general, the term is used to describe new or improved products, services, processes or practices that differ significantly from previous experiences. In this study, the term innovation is used in two different perspectives. Innovation can refer to new products, services, processes or practices developed by external factors such as private companies such as the development of new technical software that are made available for clients and markets. These types of innovations usually have important impacts on skills demands and labour markets that must be addressed by Technical Vocational Education and Training (TVET) systems. On the other hand, innovation in TVET can also refer to substantial changes in the way TVET is practised, making it more relevant to the needs of the economy, society and the environment. The purpose of innovation is to come up with new ideas and technologies that increase productivities and generate greater output with the same input.

It is noteworthy, as observed by Jan (2019), that the transition to green economies, the implementation of digital technologies in the world of work and the emergence of new forms of entrepreneurship, among others, are not only changing the profile of jobs but are also creating new possibilities for generating solutions for technical, social and economic problems. The speed and scale of change calls for a broad process of transformation, with technological institutions increasingly acting as drivers of innovation in their local ecosystem, and in parallel innovating the learning processes and products offered to youth and adults and increasing citizens' potential to innovate. Automobile technology is one of the Technical Vocational Education (TVE) programmes which involve the acquisition of scientific knowledge in design, selection of materials, construction, operation and maintenance of motor vehicles (Audu, Aede, Musta'amal, Muhammad & Inti, 2014). Innovation in technology is a vital component of technological and economic development of nations. The first nations have realised this long enough and it has put them on the frontiers of technological sophistry. In fact, the newly industrialising economies of the Asia are capitalising on it to join the league of developed nations (Oluwale, Ilori & Oyebisi, 2013). Technological innovation is the ability to exploit what modern technology can contribute to the economic development of any country. In this line of thought, Oluwale, Ilori and Oyebisi opined that technological innovation is the ability to make effective use of technological knowledge in efforts to assimilate, use, adopt, and change existing technologies.

In Nigerian school system, the programmes for the education and training of teachers of automobile technology are carried out in colleges of education. However, several studies conducted all revealed that the products of these programmes lacked the basic skills needed for gainful employment in today's automobile industry (Odigiri & Emmanuel, 2010). The curriculum was blamed for not being adequate and relevant to offer enough of the skills needed to meet the challenges that are involved in the maintenance of modern automobiles on Nigerian roads. The incorporation of new technologies with new subsystems and system components into modern automobiles have changed their configurations and made their maintenance a more complex task, even though some of the new systems make them easier to maintain (Odigiri & Emmanuel, 2010). The curriculum for the college programmes that train the service personnel for maintaining these vehicles has however, remained rigid since 1985, thus far removed from the recent technological innovation in automobiles (Odigiri & Emmanuel, 2010). The gaps created between the curriculum and the new technological innovations have made the needed skills for effective maintenance of these new breed automobiles to continue to elude the products of these programmes.

The result has being that, the graduates of these programmes are often unemployable or underemployed while most automobiles with these new innovations either suffer disrepair or have the new systems replaced by the classical substitute systems that the new ones were meant to improve upon. Yet some are even completely grounded just barely into their expected service lives because of lack of competent personnel for their effective maintenance. As measures to keep education and training in tune with the knowledge and skills needed in the world of work, school courses and curricula must be reviewed, enriched and updated regularly in line with changes that are taking place in the industries. Thus, it was imperative to investigate the new technological innovations in automobiles with the view to identifying those that posed new challenges to the maintenance personnel in Nigeria for integration into the curriculum for their training programmes.

Thus, Nigeria as a nation needs to look for a way to benefit from the opportunities that new innovation in vocational education presents to the field of technology. In spite of the immense opportunities and benefits of new innovation in vocational education, there are great challenges in the teaching of automobile technology in Nigerian colleges of education. This paper therefore sets out to determine the challenges that confront new innovation in teaching of automobile technology in colleges of education in Kwara and Kogi States, Nigeria. Specifically, the study intends to examine the adequacy of workshop

training facilities, identify retraining needs of automobile technology teachers, and find out competencies needed by automobile technology teachers in the study areas.

Conceptual Clarification

Innovation

The concept is described by the OECD/Eurostat 2018 Oslo Manual as ‘a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)’ (OECD/Eurostat, 2018). This broad definition reflects the multiple uses of the term – innovations can be found in nearly all dimensions of social life and workplaces, including in government, business and non-profit organisations. As a consequence, many new concepts of innovation have been developed in the last decades. Innovation can take several forms: in products, production processes or management systems (Olumuyiwa, Kazeem & Yusuff, 2014). Innovating products is tied to consumer’s needs and are oriented towards creation of products with higher performance. With the emphasis on environmental issues gaining ground, product innovation is aimed at generation of products that are environmentally friendly, efficient in energy usage, safe to operate and have larger links to social systems. On the other hand, innovating with processes relate to changes in machinery and other elements not directly related to employees and has the aim of increasing productivity, that is, increasing quality and reducing costs. In the management angle, it has the aim of adapting these systems to new environmental conditions and improving the way in which people are managed and work organized. Innovation can be perceived as a critical aspect of technological catch-up even though it does not depend on inventions which are new to the world (Olumuyiwa, Kazeem & Yusuff, 2014).

Innovation in Technical Vocational Education and Training (TVET) refers to the wide range of initiatives and projects developed and implemented by TVET systems, networks and schools identified by the trends mapping study (Mujika & Intxausti, 2018). In some cases, it is possible to perceive a focus on a specific dimension of innovation in TVET such as the introduction of entrepreneurial education as a significant change in teaching and learning processes. However, innovative practices are usually shaped by the deployment of different types of internal activities in all four dimensions of innovation in TVET. For example, while introducing a new type of automobile technology service such as the use of computer, TVET systems, networks and schools also usually adopt changes in human resource management, external engagement, and teaching and learning processes.

Wahab (2015) asserted that the innovations in modern automobiles like Emission Control System, Petrol Injection System Unit, Auto heating/Air conditioning System, automation in the operation and maintenance of various systems and safety devices among others incorporated creates gap between the manual (old practical skills) approach to problems solving and modern practical skills needed by automobile technology teachers like: the use of automation diagnostic tools/equipment for the repair of faulty vehicles among others.

Automobile Technology: Heather (2002 in Wahab, 2015) stated that automobile technology involves the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of the motor vehicle. Automobile according to Wahab (2015) means vehicles particularly one for passengers, carrying its own power-generating and propelling mechanism, for travel on ordinary road. Mechanism means any mechanical means for the conversion of control of motion or the transmission or control of vehicle. It is the structure or arrangement of parts of a machines or similar device or of anything analogous. For proper mechanism of automobile, the automobile technology teacher requires conventional skills and modern technology in order to impart or convey the required saleable practical skills to automobile technology graduates. That is, the automobile technology teachers need to improve themselves with the currents ways, methods and procedures or producing cars, designing, servicing, repairing an overhauling of vehicles. The automobile services field offers many career

opportunities for anyone who is mechanically inclined and has the educational background. This background includes: servicing of injector, vulcanizing, engine repair, gear repair, refrigeration and painting, body build and electrical repair.

The development of the automobile was undoubtedly a prime mover in the phenomenal collapse in time and space of travel, an important element of what has come to be known as globalization. Automobile technology as Wahab (2015) further explained focuses on the understanding the practical application of automobile and automobile practical skills and the technological process inherent in the production of products, services and system in order to improve the quality of life. He further suggested that, the automobile technology is very crucial and significant to any automobile technology teachers as automobile products specifications are changing rapidly stimulated by environmental and economic factors.

An individual needs improve their acquired skills in automobile technology education to enable them set-up a firm and meet dynamic challenge of automobile technology sector, meet their own aspirations and prepare for higher responsibilities and future needs. Relationship between technical education and automobile industry is vital for preparing graduates to be passionate and efficient entrepreneur, such partnership is a positive response to educational initiatives to strengthen links with the commerce and industry sub-sectors. The part of ultimate goal of automobile technology is preparing the individual through acquisition of appropriate mental, physical and social skills and competencies he/she will undertake in automobile industry work. Work is the exertion of strength or faculties to do or perform something (Wahab, 2015).

Automobile technology education deals on methodology of imparting knowledge of automobile education to learners and graduates; this should be done using on-the-job training. The automobile technology teachers should improve themselves by retraining with modern machines, equipment, tools that will enable them to prepare a solid background for automobile technology graduates to meet the required saleable skill in the automobile industry. There should be training of pre-service teachers and retraining of in-service teachers of automobile technology to meet-up with the modern ways of imparting automobile technology skills.

Theoretical Framework

The paper is anchored on linear model of innovation. The first systematic effort by an economist to analyse the process of innovation was undertaken by Joseph Schumpeter in the first half of the twentieth century. He identified three stages of the process: invention, innovation and diffusion. For Schumpeter, invention is the first demonstration of an idea; innovation is the first commercial application of an invention in the market; and diffusion is the spreading of the technology or process throughout the market. Typically, the diffusion process is represented by an S-shaped curve, in which the take-up of an innovative process or technology starts slowly with the focus on market positioning, then gathers momentum achieving rapid diffusion, before slowing down as saturation level is reached, with the focus shifting to incremental improvements and cost reductions (Schumpeter, (1911/1934)); (Stenzel, 2017). S-curves of technological improvement have been well documented in a range of technologies, including disk drives, cars, sailing ships, semiconductors, steam engines and many more (Schilling & Esmundo, 2009).

This three-stage journey of slow start-up, gathering momentum, and finally diminishing returns underlies what is often referred to as the “linear model of innovation”, a more-or-less continuous flow through the three stages, from basic research to applied research to technology development and diffusion. The model suggests that advances in scientific understanding determine the rate and direction of innovation and that the optimal way to increase the output of new technologies is to increase the input of new inventions by

simply putting more resources into research and development (Nemet, 2017). This is the process of *technology - or supply-push*.

In his analysis of the drivers of innovation, Schumpeter's early work stressed the importance of the individual entrepreneur (Xu, 2017). Later work gave more emphasis to the role of large firms with the resources to conduct extensive research and development and support new technologies. Schumpeter's concept of "creative destruction" which describes the replacement of old firms and old products by innovative new firms and products has been widely influential in inspiring more recent understandings of the innovation process. However, critics argue that Schumpeter was more interested in the consequences of innovation than its causes and that none of his works "contain anything that can be identified as a theory of innovation" (Ruttan, 2011). The relevance of the theory to this work can be seen in the fact that innovation has to do with the take-up of an innovative process or technology which starts slowly with the focus on market positioning, then gathers momentum achieving rapid diffusion, before slowing down as saturation level is reached, with the focus shifting to incremental improvements and cost reductions.

Overview of Nigeria Automobile Industry

A historical account indicates that automobiles appeared on Nigerian roads in the 1920s and the country has since remained a veritable market for all kinds of automobiles, ranging from cars to vans and articulated trucks (Olumuyiwa, Kazeem, & Yusuff, 2014). Auto production, as part of a strategic national development plan of the government was not given a priority attention until the establishment of six assembly plants (two for cars and four for trucks) beginning with the establishment in 1975 of Peugeot Automobile Nigeria Limited (PAN), Kaduna. The other automobile assembly plants to follow were; Volkswagen of Nigeria Limited (VWON), Lagos; Anambra Motor Manufacturing Limited (ANAMMCO), Emene-Enugu in 1980; Steyr Nigeria Limited, Bauchi; National Truck Manufacturers (NTM, Kano); and Leyland Nigeria Limited, Ibadan (Moses, 2010).

The automobile industry is composed of various sections including, design, manufacture, assembly, sales and maintenance. The whole of the Nigerian auto industry is in a crisis phase except for the sales and maintenance sub sector, which is buoyed by the growing middle income class. Like the moribund textile industry or the already comatose solid minerals and mining industry, the nation's automobile industry is virtually on the edge of a precipice waiting its eventual fall (Chijioke, 2012). As accessed on Business-travel-Nigeria.com (2012), while the global economic meltdown has forced car sales to decline globally, the Nigerian auto sales has retained its lucrative status, still selling large units at attractive sales margins. In addition, sole distributorship arrangements exist with major car makers and their Nigerian partners. The BMW brand of cars is solely distributed in Nigeria by Coscharis. Toyota which is the leading car brand in Nigeria has Elizade Motors and Toyota Nigeria Ltd as its main distributors. Honda cars are distributed by Stallion Motors. Mitsubishi is distributed by CFAO Motors, while KIA is distributed by KIA Motors. Apart from the Peugeot Automobile Nigeria (PAN) Limited and perhaps the Anambra Motor Manufacturing Company Limited (ANAMMCO), all other hitherto known indigenous automobile manufacturing outfits such as Steyr and Volkswagen Nigeria Limited have long died. Efforts in recent times, especially of the current government under the economic transformation agenda has not yielded any noticeable outcome as these assembly plants still remain shut.

The six auto companies performed remarkably well in their first few years of operation. For instance, both PAN and VWON met the local demand for cars to a very considerable extent, while ANAMMCO with an installed capacity of 7,500 vehicles per annum (in a single shift) along with NTM and Steyr, could make about 50,000 trucks. The local industry then, had an installed capacity of 10,000 tractors per annum, Moses (2010). The boom lasted up till the mid-80s; PAN had local input manufacturers and suppliers in all parts of the country. Regrettably, a few years down the road, the industry began to witness a recession which was made worse by a series of unfavorable economic policies, especially the exchange rate regimes. Several causes have been identified by experts leading to the collapse of the industry. The

leading cause has been the inadequate patronage of locally-assembled automobiles and lack of export outlets for automobiles assembled in Nigeria SMJ, (2007) cited most Nigerians' inability to afford them as a reason. Other challenges include poor capital base, high cost of production, poor performance of local content suppliers, poor operating environment, as well as obsolete technology. However, the maintenance sub sector supported by standardized automotive maintenance and service centres deploying modern technology and innovative driven SC strategy continue to blossom.

Challenges Confronting Teaching of New Innovation in Automobile Technology

Generally, new innovation confronts challenges in Nigeria education system. However, teaching of automobile technology specifically confronts challenges which make new innovation to be of little or no effect in automobile technology. The following are some of the challenges observed:

Adequacy of Workshop Training Facilities: Innovation in automobile technology makes the training capital intensive. Where training facilities are grossly inadequate the teaching of automobile technology in thread with new innovation would be difficult. Continuous changes in the design, structure, models and system of automobiles requires changes in the equipment and tools needed for the teaching of automobile technology. Meeting up with the changes in automobile technology requires timely change from the use of tools and equipment.

Retraining Needs of Automobile Technology Teachers: As new innovation is introduced to automobiles, the teaching of automobile technology would definitely require retraining of automobile technology teachers. This cannot be accomplished unless the funding of automobile technology is adequate. Information about new innovation in automobile technology is shared among the teachers in seminars, symposia, workshops and conferences. Thus, retraining needs of automobile technology teachers is also capital intensive and lack of training serves as impedance to the effect of new innovation in automobile technology.

Competencies Needed by Automobile Technology Teachers: In the same vein, the quality of skills and knowledge that automobile technology teachers need changes from time to time. Inadequate competent teachers of automobile technology; no doubt, is a bane to new innovation in automobile technology. With new innovation, some automobile are grounded when faced with rectifiable fault because of incompetent technicians. This is majorly as a result of incompetent teachers.

Conclusion

From the foregoing, it would be seen that new innovation in automobile technology has become a matter of concern globally. However, it is even more worrisome in Nigeria where its incidences are on the increase. Millions of naira has been lost by victims of grounded automobile, industrial lost due to non-functioning automobile, and economic lost as a result of replacement of parts that could be repaired. In some other cases, some automobile technicians and graduates of automobile technology are jobless, because new innovation renders previous skills and knowledge useless. It is also worth mentioning that automobile technology is capital intensive if its effect would be felt in the nation's economy and its aims and objectives achieved in Nigeria.

Recommendations

- i. As a way of meeting up with new innovation in automobile technology in Nigeria, adequate facilities should be made available in automobile technology workshop. This can be done by putting more effort in funding automobile technology. Government should not also relent in encouraging skill acquisition. Colleges of education that offer automobile technology should source for public intervention in funding automobile technology.
- ii. Teachers of automobile technology should be encouraged to undergo training and retraining. They should be encouraged to attend seminars, symposia, workshops and conferences where their skills and knowledge could be improved on new innovation in automobile technology.

- iii. Colleges of education should employ only teachers that are competent to teach automobile technology. More so, teachers of automobile technology should be encouraged through incentives and motivation.

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