

**THE CHALLENGES OF COMPUTER DIAGNOSTIC DEVICES IN THE SKILLS OF  
AUTO TECHNICIANS IN TECHNICAL COLLEGES IN KOGI STATE**

**BY**

**ADEGBOYEGA SAMUEL OYEWALE**

**MATRIC NUMBER 2005/21337BT**

**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF INDUSTRIAL**

**AND TECHNOLOGY EDUCATION, SCHOOL OF SCIENCE AND SCIENCE**

**EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY**

**MINNA, NIGER STATE.**

**IN PARTIAL FULFILMENT OF THE REQUIREMENT OF THE AWARD**

**OF BECHELOR OF TECHNOLOGY (B.TECH) IN INDUSTRIAL AND**

**TECHNOLOGY EDUCATION**

**OCTOBER 2012**

## **CERTIFICATION**

I ADEGBOYEGA SAMUEL OYEWALE, Matric Number 2005/21337BT as undergraduate student of the department of industrial and technology Education certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other University.

Name

Signature/Date

## **APPROVAL PAGE**

This project has been read and approval as meeting the requirement for the award of B. Tech degree in Automobile Technology of the department of Industrial and Technology Education. School of Science and Science Education Federal University of Technology Minna.

Supervisor

Signature/Date

Head of Department

Signature/Date

External Examiner

Signature/Date

## **DEDICATION**

This project is dedicated to almighty GOD whom in his infinite mercy has granted me life to see the end of this programme; he generously gave me strength, Health and all other resources to successfully accomplish this research amid and other Competing demands.

His love, protection, provision and above all His mercy saw me through. Not forgetting my lovely parent ENGR AND DNS A. A. ADEGBOYEGA for their effort, prayer and full support.towards the success of this programme.

## ACKNOWLEDGEMENTS

It is practically impossible to acknowledge all those that assisted me during the period of schooling but few people will be mention because of their contribution. First and famous, my sincere thank and adoration goes to my creator GOD for the protection of my life and making my efforts crowned with success. I wish to express my gratitude to my supervisor Mr K. I KALAT for is encouragement and immeasurable assistance he gave me in the process of writing the research work without which a work of this kind would have been very difficult. Special thanks to the H.O.D Dr E.J. OHIZE, not forgetting all other lecturers of I.T.E department for their kind gesture

I wish to acknowledge the contribution of my family who gave me total support and encouragements towards my pursuit to obtain a First Degree. My special thanks go to my lovely parents ENGR and Dns A.A. ADEGBOYEGA my brother and my sisters (yemi, toyin and dami), I also acknowledge the family of Mr and Dns BALOGUN for their suppot morally, prayer and their cash. I wish to acknowledge my friends Kasimu Abbass, samson oluwole, gbola arinola, andrew,saba, benjamin joseph,andrew,lucky ,usman,seun mustpha, tuji bassey, ibukun, e.t.c . I also appreciate my effort of my class mates of industrial and technology Education students and all the staff of the department.

Lastly I cannot conclude without acknowledgedging my sweet heart Pleasant Grace Evita Udeh, her family members and friends for her prayers and love. Apologies to all those who feel that their names should have been includeed, I say “A millions thanks” to you all. My sincere prayer is that God will reward all of you in the name of Jesus (Amen).

## TABLE OF CONTENTS

<b>CONTENTTS</b>	<b>PAGES</b>
Cover page	
Title page	i
Certification	ii
Approval page	iii
Dedication	iv
Acknowledgement	v
Table of contents	vi
List of table	x
Abstract	xii

## CHAPTER I

## **INTRODUCTION**

Background of study	1
Statement of the problem	6
Purpose of the study	7
Significance of the study	7
Scope of the study	8
Assumption of the study	8
Research question	8
Hypotheses	9

## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

Development of technical education in Nigeria	10
Computer aided devices in technical education	17
Method of teaching and learning technical subjects	20
Summary of related literatures	33

## **CHAPTER III**

### **METHODOLOGY**

Research design	35
Area of study	36
Population	36
Sample	36
Instrument for data collection	36
Validation of instrument	37
Administration of instrument	37
Method of data Analysis	38

#### **CHAPTER IV**

##### **PRESENTATION AND ANALYSIS OF DATA**

Research question I	39
Research question II	40
Hypothesis I	41
Hypothesis II	42
Discussion of findings	48

#### **CHAPTER V**

##### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**



Summay of the study	50
Conclusion	50
Recommendation	51
Implication of study	52
Suggestions for further research	52
References	53
Appendix I	55
Appendix II	56
Appendix III	60

## **LIST OF TABLE**

**TABLES**

**PAGES**

1. Significance of difference between the mean score on previous achievement test of experimental and control groups	39
2. Anova (2 x2) showing differences between mean scores on post test of higher and lower achievers of experimental and control groups.	40
3. Significance of difference between the mean score on previous achievement test of experimental and control groups	41
4. Anova showing difference between mean score of males and females of experimental group and control group on previous achievement test.	42
5. Significance of difference between the mean score on previous achievement test of experimental group and control group.	42
6. Significance of difference between the mean score on achievement test of males and females of experimental group	43
7. Significance of difference between the mean score of high achievers of experimental and control groups on previous achievement test.	44
8. Significance of difference between the mean score of low achievers of experimental and control groups on previous achievement test.	44
9. Significance of difference between the mean score on post test of males and females of experimental group.	45
10. Anova (2 x2) showing differences between mean score on post test of males and females of experimental and control group.	46
11. Significance difference between the mean score on post test of high achievers of experimental and control groups.	46
12. Significance difference between the mean score on post test of low achievers of experimental and control groups	47

## **ABSTRACT**

**This study was undertaken to identify the challenges of compute diagnostic in the skills auto technicians in technical colleges of Kogi State. The research was an experimental involving a 2 x 2 factorial design, with a population of 80 students. The sample of the study comprised of 40 first year motor vehicle mechanic trade students, sampled from government technical college Minna. Sampled students were assigned to two groups of 20 students each. Group A, experimental group and group B, control group. Both groups were equated on basis of their achievement scores in previous terms in the subject of motor vehicle mechanic trade. Furthermore, 2 research questions were formulated and 2 hypotheses of the research were tested at (0.05) level of significance. The following research results were obtained, There is no significant difference between the mean score of students taught motor vehicle mechanic trade with CAD as supplementary strategy and without CAD. There is no significant difference between the mean score of high achievers and low achievers of experimental and control groups: and There is no significant difference between the mean scores of male and female students of experimental and control groups. Based on the research findings, recommendations were made on the need to develop relevant CAD packages for motor vehicle mechanic trade at technical colleges.**

# CHAPTER I

## INTRODUCTION

### **Background of the Study**

The word computer is an old word that has changed its meaning several times in the last few decades. Originating from the Latin by mid 17<sup>th</sup> century, it meant “someone who computes”. The American heritage dictionary (1980) gives its first computer definition as a “person who computes”.

The computer remained associated with human activity until about the middle of 20<sup>th</sup> century when it becomes applied to “a programmable electronic device that can store, retrieve and process data” (Webster`s dictionary 1980). Today, the word computer refers to computing devices, whether or not they are electronic, programmable, or capable of storing and retrieving data. The encyclopedia (2003) define computer as “general purpose machine that processes data according to a set of instruction that are stored internally either temporarily”.

The computer and all equipment attached to it are called “hard ware” A program is a detailed set of humanly prepared instruction that directs the computer to function in specific way. The encyclopedia Britannica (2003) defines computer as “the contribution of major individual’s machine and ideas to development of computing”. This implies that the computer is a system. A system is a group of computer components that work together as a unit to perform common objectives.

Furthermore, Onasanya (2000) stated that computer at this time where used for elementary task of calculation and where looked upon as devices to help mankind move some data and do some calculation. Today auto mobile teacher advancement is computer based. The use of computer

however covers various activities in education such as e-teaching, e-learning, e-book, e-journals e-registration, e-exam etc Hooper (1975) provided a classification of five (5) uses of the computer in education, which are in research, the teaching of computing, administration, and management of learning and as learning resources.

According to Colwell in Yusuf and Onasanya (2004). The value of computers cannot be over emphasized in research design and implementation of experiment and descriptive studies. In addition, computer aided devices which aids teaching process are designed for students at all level of education in this regards computer has therefore served the purpose of re-tooling education.

However, the use of computer aided devices in the teaching and learning of motor vehicle mechanic (MVM) trade can never be ignored. In a normal classroom the delivery of instruction in this trade mostly depends on reading of selected textbooks copying of notes regularly and attending of lectures. The modern technological development has enable teachers or instructors on additional means for teaching motor vehicle mechanic trade content and practical. Using computer aided devices which will give more advantage and save energy and time. The use of computer aided devices guarantees students independence and task based teaching ( Spirilli 2000). Moreso, computer aided devices are very useful and beneficial delivery.

Philip, (1984) stated that computer can be programmed to present the needed skills to be learned in a program format. Computer has the ability to contribute to learned tasks in different areas the programmed format. Computer have the ability to contribute to learning tasks in different areas; the programmed format in the computer involves a sequence of didactic presentation, written examples to be under taken by the student step by step. The use of computer assisted instruction

(CAI) is an automated instruction technique in which a computer is used to present an instructional program to the learner through an interactive process on the computer. Merrill (2002) stated that programmed instructions have a positive effect on students level of academic achievements, since the computer assisted instruction (CAI) assumes a direct role in instruction .Also there is interaction between the learner and the computer as the learner response to the instruction that the computer presents.

Furthermore, instructional delivery methods are the tools of the teacher for reaching the set goals and objectives. The effective teacher has multiplicity of methods at its disposal and must be prepared to select the ones, which will be most effective for leading the learners to desired behavior. The instructional material which is the method adopted for the delivery of instruction can be made suitable by the use of computer aided devices. The use of program instruction is seen as the innovation in education, involving self instruction strategy. It is an innovative delivery system in modern education which has emerged as the first valid system of education and instructional strategy which our society has ever had.

According to Morall (1999), the present use of education methods and classroom teaching has increase across variety of disciplines. In many cases the uses of media for instruction for instruction has been proved to be effective due to the content and organization of learning material using the computer Durosaro,(2002) stated that education methods sometimes called technique are ways and means adopted by teachers to direct the learners'activities towards an objective. It is therefore a process of cognitive, effective and psycho motive development whose aim is to mould the learner towards a total contribution to the development of the learner and the community. Programmed learning materials have been used in formal and non- formal education settings due to its material quite patient (unlike the teacher) and it allows learner to make

mistakes without imparting their self concept. It has been used at all levels of educating primary, secondary and tertiary.

Another, use of computer aided devices for instructional delivery is the use of computer aided design (CAD). Program instructions are instructions written or coded according to the subject area discipline which can be used in disseminating information to students or learners with little assistance from the teacher, which allow individual to use an instructional material such as computer aided design (CAD).

This is a dramatic use of computer in the classroom of design purposes. Mc mullan (1988) stated that a single drawing stored by the computer can generate “hard copy” on a variety of printers or plotters. In recent years, CAD system has evolved rapidly and now offers a variety of 3-dimensional modeling and visualization features. Using the computer, images can be rendered completely from a 2-dimensional description to 3-dimensional. Industrial designers, architects etc. all use CAD to design engines, new vehicles, buildings etc. Hayes and Robinsm (1999) found that students have favourable attitude towards multimedia instruction, therefore a classroom environment utilizing the instruction delivery method may be desirable to educators. More so, students enjoy working with computer aided devices as it provides them with immediate and effective positive feedback, grade all students fairly and provide them with control over speed when instruction is delivered. In Nigeria, technical education colleges produce craftsmen for various sectors of the economy and are regarded as the principal vocational institution.

It offers various mechanical trades among which is motor vehicle mechanics (MVM) trade. The program of motor vehicle mechanics trade in Nigeria technical college is designed to produce

competent auto mechanics craft men for Nigeria technological and industrial development. According to National Board for Technical Education (NBTE 2001), auto mechanics craft man is expected to test, diagnose, service and completely repair any fault on the motor vehicle to the manufacturers specification. Zoro (1992), states that motor vehicle mechanic trade program is one of the technical courses taught in technical colleges which is designed to prepare individuals in this field to acquire practical skills basic and scientific knowledge, and attitude as sound craft men and technicians at sub professional level for them to either continue their education in polytechnics or university. This will help the students to prevail in carrying out motor vehicle mechanic trade like body spraying, panel beating; engine de-assembling etc. Olorunfemi (2003), state that trades in vocational and technical education has been designed to prepare persons for gainful employment.

However, a motor vehicle mechanic trade deals with a mechanic with a variety of car makes either in a specific area or in a specific makes of car. In repairing of cars their main role is to diagnose the problem correctly. They often have to quote prices for their customers before commencing work or partially dismantling for inspection. The mechanics uses both electronic means of gathering data as well as their “senses”. Their job may involve the repair of a specific part or the replacement of one or more parts as assembled. Elobuiké, (1999) viewed that the production of craft man on motor vehicle mechanic (MVM) trade by technical colleges should be based on the needs of automobile industries in the world. With the rapid advancement in technology, the mechanic job has evolved since from purely mechanical, to include electronic technology, since the vehicle today possess complex computer and electric system. Motor mechanics need to have broader base of knowledge than in the past.



Lately, the term “auto mechanic” is being used less and less frequently and is being replaced by the euphemistic title “automotive technician”. Gone are the days of the backyard mechanic that needs little knowledge of today’s computerized car system. There is several offer trade qualification for working on motor vehicle. This includes panel beaters, spray painter, body builder, motorcycle mechanic etc. In addition, motor vehicle mechanic trade is a program in its modern year, designed to develop an understanding of the basic purpose, construction, operation and service of components part and assembly of an automobile (Enchanter 2009).

The student will develop the knowledge and skills required to dismantle, inspect, coupling or assembling and perform basic repairs and maintenance in the motor vehicle units and component. This programme of trade in technical colleges are designed for those who wish to enter a trade but also wishes to broaden their educational knowledge are open the possibility of future study. All the trade requires the use of computer gadgets in order to facilitate teaching and learning in technical college.

The future of Nigeria as a nation depends also on the scientific and technological strength for advancement areas especially technology education, and as a result the implementation can only be by improving on the standard of technology education in our technical colleges. It is from this background that the need of undertaking the study becomes necessary.

### **Statement of the Problem**

What is the challenges facing auto technicians’ skill on computer diagnostics devices in technical colleges in Nigeria specifically in kogi state?

## **Purpose of the study**

The purpose of the study is to determine the challenges of the computer diagnostic device in motor vehicle mechanic (MVM) trades instructional delivery in technical colleges in Kogi state.

Specifically, the study is designed to;

- (1) Determine the relative challenges of computer diagnostic devices on motor vehicle mechanic (MVM) trade student's academics achievements in technical colleges of Kogi state.
- (2) Access the difference between treatment effects on students with high and low intelligence.

## **Significance of the study**

This study is aimed at the challenges of computer diagnostic devices in student's achievement towards learning of motor vehicle mechanic trade. It is expected that this research work, would be beneficial to the students and instructor/teacher of motor vehicle mechanic trade in the following ways. Computer diagnostic devices allow students to practice procedures as long as required to achieve defined competence. This helps to level the ground where students bring a wide range of native skills and educational backgrounds to the class room. The study will be help to the students as they get acquainted to use of computer application in motor vehicle mechanic trade and this knowledge would be attained through the provision of this computer facilities/devices in the technical colleges of Kogi state. In addition, the study will be of great benefit to the instructor/teacher of automobile technology in different ways to help improve methods of teaching automobile technology and different technical subjects.

## **Scope of the Study**

This study focuses mainly on the challenges of computer diagnostic devices in motor vehicle mechanic trade instructional delivery in technical colleges of Kogi state.

It is specifically delimited to the challenges of computer diagnostic devices on students' achievement in motor vehicle mechanic trade. In addition, this study is limited to motor vehicle mechanic (MVM) trades in technical colleges and does not also extend to the other trades which are offered in Kogi state technical colleges like building, metal work, wood work, electrical trades etc.

## **Assumption of the Study**

That the different locations and areas of technical colleges will not affect the findings of the study, but will help in generalizing the result of the findings of the study.

## **Research Question**

The following research were raised to guide the study

1. Would there be any difference in the performances of motor vehicle mechanic students taught with computer aided (experimental group) devices and those taught using traditional method (control group)?
2. Would there be any difference between the mean score of the high achievers and low achievers of experimental and control group?

## **Hypotheses**

The following will hypothesis were formulated and tested.

1. There would no significant difference between the mean scores of students of motor vehicle mechanic trade taught with CAD and those taught using traditional method.
2. There is no significant difference between the mean scores of higher achievers and low achievers of experimental and control groups.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

This chapter seeks to review related literature in conjunction with the purpose of the study. The review is schedule under the following subheadings:

- I. Development of technical education in Nigeria
- II. CAD in instructional delivery in Technical Education.
- III. Methods of teaching and learning technical subjects.
- IV. Summary of related literatures.

#### **Development of technical education in Nigeria.**

The development of any nation is critical to the economic survival and vibrancy of that nation. This holds particularly true for developing nations like Nigeria, who is still grappling with chronic factors like unemployment and under development which has kept them in perpetual bondage of economic frustration. Vocational and technical education, a multi-faceted, multi-disciplinary and pragmatic field of study, is aimed at equipping the individuals with requisite vocational and technical education literacy skills which will enhance their relevance and functionality in the society, as a result it plays a vital and indisputable role in the development of the society. Vocational and technical education can be deduced as any form of education whose purpose is to prepare person(s) for employment in an occupation or group of occupations. Throughout the country there is a growing awareness about the need for vocational and technical education. This improvement in societal perception and interest has culminated in demands for changes in content, organization and delivery of vocational and technical curricula to reflect a new emphasis on technology. Before the British intervention in Nigeria, that is the coming of the

colonial master (white man) there was mainly vocational, that means somebody's work, job, or profession, especially a type of work demanding special commitment which is not relating to or specializing in industrial techniques. An important function of education in those days was to teach the people how to earn a living by being expert produces of goods and services. The young men acquired the rudiment of an occupation from their parent or from expert craftsmen to whom they are apprenticed. The education system of Nigeria has been influenced the British system of education. This type of education neglects the cultural and vocational interest of the nation. The apprenticeship system was the earliest type of vocational education practices in Nigeria and it provided employment for the youth as they learnt how to use their hands in specific trade (Vocation). Extensive development of vocational education started in Russia in 1988 with the introduction of shop classes in addition to the existing apprenticeship system. The change in educational system in Nigeria came after the enactment of the land grant foundation Morill's act of 1890. This foundation in the united state of America (U S A) influenced the education reform after the abolition of the state trade. Simple job training skills through companies and schools were introduced. Learning of skills in carpentry, tailoring, mechanizing, crafts making e.t.c. stated in some schools in Nigeria like the comprehensive high school Aiyetoro and the technical colleges in Yaba, Lagos. Vocational and technical education remained dormant for a long time with the introduction of western education. The first education institutions in Nigeria were established by Christian missionaries. In 1895, Hope Waddell training institute in Calabar was established by the church missionary society (CMS).

Further more in 1945 the commission on higher education in West Africa converted Yaba high colleges into a technical institution in the ten years development plan (1946) as part of the recommendation of the commission of higher education, honest effort were made to improve

vocational and technical education in Nigeria. This further brought about the proposed man for immediate establishment of

- Hand craft centers for training in manual arts
- Trade center for training of skills craft men
- Technical institutions for training technicians.

The plan was started in the three regional governments i.e. North, West, and East, in the North fourteen (14) craft schools, in the West two (2) craft schools and with the East one (1) technical school. The organized vocation education started in Nigeria between 1908 and 1935. In 1909 Nassarawa School was opened and a technical section which delivered course in leather work, carpentry, weaving and blacksmithing. The policy statement on education in 1925 uplifted vocational and technical education in Nigeria. The policy stressed the need for vocational and technical education and this automatically led to the establishment of the trade centers and technical institutes, though most of them were offered through government department such as public work departments as well as post and telegraph (P & T). In 1952, college of arts, science, and technology was established.

The first branch was open in Zaria (north) offering courses in civil engineering, architecture, local government and secretarial skills. The second branch was opened in Ibadan (West) in 1954 offering course in agriculture, forestry, book keeping, accountancy, education, arts, sciences, and engineering. The third branch was in Enugu (East) in 1955 offering courses in mining, surveying, sciences, and arts. At the end of 1955. There were a total of thirty-five (35) domestic centres in the country and the government also established trade centre at Yaba, Kaduna, Enugu, Obo River, Bukuru, Aliara Ibadan and Sapele. The centers were generally beset with common

problem such as poor facilities lack of instructor and lack patronage by the industrial world as the products of the centre were not accepted for employment by industries. In 1962 the established colleges were closed down and their assets taken by three new universities, these are Ife over the Ibadan College, Ahmadu Bello University Zaria over Zaria College and university of Nigeria Nsukka over Enugu College. (Audu, 2005). The third National development plan (1975-1980) seemed to be the era when the greatest attention was given to the vocational technical education. This era led to the establishment of various technical teacher training colleges, polytechnics and universities of technology. In order to improve the man power needed in the country a training programme for Nigerians in overseas, the technical teacher training programme (TTTP) was then embarked on by the federal Government. The industrial training fund (ITF) was also launched within this period. The (ITF) was designed to help provide students technical education with work experience in industries. The training is also organized during long vacations in some institution (Audu 2005). The industrial trust fund (ITF) was established by the federal government of Nigeria in October 1971 by the decree No 47. The decree ensures the greater participation of industries in technical education. The industrial training fund incorporates funds provided by the federal government and by industries as well. Every employer having twenty five (25) or more persons in his/her establishment was required by the provision of the decree to contribute in respect of each year the percent (3%) of the amount of his annual payroll or one and half percent (1.5%) of his amount turnover whichever ever was the greater penalty imposed for nonpayment or delay in the payment of the contribution (ITF 1973). Before the Nigeria independence, the United Kingdom (UK) was a primary source of financial assistance to the Nigeria educational development, but after independence, a number of other external agencies such as United Nations, United Kingdom and the Ford foundation rendered



substantial financial aids for the country's educational expansion and operations. It could be recalled that the Ford Foundation fund was used for the establishment of the Department of Vocational Teacher Education of the University of Nigeria Nsukka in 1961. In other words in 1968 the Federal Government of Nigeria established the National Teachers College Lagos; the college offered two kinds of programmes a one year programme for those who already passed an approved technical certificate, while the three (3) years programme led to the award of Nigeria Certificate in Education (technical). The Nigerian universities have been slow in establishing department of vocational teacher education, probably due to a belief by some Nigerian's educated in traditional British universities that vocational education should not be the concern of Universities. (Zerby, Hewis and Margret, 1972). Furthermore the states of vocational and technical education in the country generally started change appreciably within the plan period of 1975 to 1980 and upon which time the country had been divided into 19 states of the federation. In 1975, the government established eighty four post primary institutions of vocational and technical education status within the nineteen (19) states of the federation.

Besides, there were six (6) technical colleges, the Yaba colleges of technology, the technical teacher college Lagos, the institute of management and technology Enugu, Ibadan polytechnic, Kaduna polytechnic and Auchi polytechnic. Equally worthy of note was the development of vocational education at the secondary school level so much that at the end of 1974 eight- four (84) secondary technical and vocational institutions were established all over the country with more than (248) percent enrollment. These institutions operated a five (5) years training period with much emphasis placed on technical subjects and their curricula designed to allow direct transition into post-secondary technical education e.g. polytechnic and colleges of technology, (Umoh 2003).

For the first time ever in the history of Nigeria vocational and technical education system, major transformation took place within the country's educational system vis-à-vis the implementation of new national policy in education for Nigeria in 1977. The new national policy in education (NPE) revised 1998 conveyed on Nigeria a 6-3-3-4 system of education that is full six (6) years primary education followed by a three (3) years junior secondary school (JSS), followed by a three (3) senior secondary education concluding at a four (4) years university education. The junior secondary school which commenced in 1982 throughout the country was both pre-vocational and academic.

The pre-vocational subjects as prescribed by the NPE included introductory technology (that consist of basis woodwork, metalwork electrical/electronics, auto-mechanic), local crafts home economics business studies and practical Agriculture. The underlay philosophy behind the introduction of pre-vocational core subject at the junior secondary school level was to develop in the studies manipulative skills inventiveness, respect for dignity of labor and healthy attitude towards things (technical). (FRN 1981).

Never the less the pre-vocational education at the junior secondary school (JSS) level was not intended to produce workers such as formers, carpenters, masons and engineers etc rather it's an educational program needed to provide children with occupational orientation, exploration and exposure. In additional, the National Business and Technical Examination Board (NABTEB) care into existence in the year 1992. The decree establishing the board (Decree No.7 of 1993) was promulgated and signed into law on the 23<sup>rd</sup> August 1993. Among its functions and withstanding the provisions of any other enhancement the board NABTEB has been charged with the responsibility of:-

1. Take over the examination of technical and business exams up to this time conducted (in Nigeria) by the Royal Society of Arts London (RSA), city and guilds London Institute (S and G) and West African Examination council (WACE).
2. Conduct examinations leading to award of National Technical Certificate (NTC), Advance National technical certificate (ANBC).
3. Conduct entrance examination into technical colleges and allied institutions the National Technical Certificate (NTC) and National Business certificate (NBC) examination which replaced the WECT technical and WAEC Business examination conducted by the national business and technical examination Board (NABTEB) with effect from 1995. The board offers examination in the following areas; engineering trade's construction trades miscellaneous trades and business trade (FRN 2004).

In conclusion the history and development of technical and vocational education enables us to have full grasp of the past event and actions so as to use them to compare with the present happenings and ultimately proper planning can be evolves for the future using the present data. Every past government in Nigeria planned and developed vocational and technical education probably based upon the prevailing need and aspiration of the Nigeria society. The only instrument Nigeria needs to join the global changing is the implementation of effective vocational and technical education. The developed nations of today consciously evolved functional vocational and technical education as a strategy for their technological development.

Thus the only option left now for Nigerian Government is to develop vocational and technical education to achieve economic, social, political and military emancipation from the developed countries of the world.

### **Computer diagnostic devices in technical education**

Onasanya, (2000), stated that computers at this time when used for elementary task of calculation and where looked upon as device to help mankind move some date and do some calculation. It is further adapted to education and individual functions. The use of computer however covers various activities in education, such as e-teaching, e-learning, e-book, e-journal, e-registration, e-exam etc. Hooper (1975) provided a classification of five (5) uses of the computer in education, which are in research, the teaching of computing, administration, management of learning and as learning resource. Akanbi, (2000) defined computer as an electronic machine that accepts data as input, process it and give out result (output) as information. Computer education is a programme designed to enable students and individuals understand the function, uses and limitations of computer to provide opportunity for the study and method of information processing. It can be looked upon as process of educating the people on how to use the computer to run programmes of diverse applications including business industry and commerce. Since the country is developing technologically and regarding the advancement in modern world of work, there is need for inclusion of computer education in technical college curriculum. The absence of computer education has further hindered the effectiveness of technical colleges in many trades to produce graduates who can cope with the modern demand of accuracy in the world of work as regards the use of computers in performing different tasks. Wenrich, (1974), states that technology education prepares youth and adults for employments in a specific occupation by providing experiences which enable them to develop

competences. This type of education prepares the youths for works in industries, commerce, and other enterprises by exposing them to experiences that provide the manipulative, cognitive and attitudinal skills that makes them competence for the works. In recent times, most of the activities in companies and factories are carried out through the use of computerized plants and machines in order to maintain very high quality of goods and services. Mandell,(1986) commented that to be better prepared to cope with what the technology will pose or bring computer literacy must be emphasized in schools and colleges. He believed strongly that computer will play a vital role in our lives come the future and has proven to be the fact as there is hardly any area of the society that has not been affected by computer technology. Such areas like manufacturing communication, health, transportation, banking, and education e.t.c. computer has become a permanent feature in vocational training institutions and workshops in Asia, Europe and America. Technical drawing equipment such as drawing board T-square, set-square etc. have been relegated to the background in schools of developed countries due to the accuracy gotten in the use of computer graphics and computer aided design (CAD) Tukura and Audu (2003). Today we have moved into another age that is different from any other. It is the computer age, a time when computer is necessary today almost every society are using computer to gain competitive advantages. It simply the reality of today world, communities that have realized the true value of computer are catalyzing and communities that have not are experiencing difficulties trying to survive. Computer aided instruction (CAI) which has been revolutionizing societies and transforming relationship, increases fundamental change in the production and the use of computer in the society (CAI) is the organized, processing, storage and dissemination of vocal, pictorial, textual and numeric information by microelectronic based combination of computing and telecommunication. It has become increasingly invisible and

importance in economic axial and political life. Integrated circuits are currently used by computer, pocket calculator, automatic bane till, industrial robots and the host of the application. The ability to harness electrical power in miniature form i.e. (microelectronics) is having a huge impact on modern life of society. According to learning the first alliance, the use of computer aided instruction for teaching in technical colleges becomes very important. Computer aided instruction (CAI) is among the range of strategies being adopted to improve student achievements at technical college level for CAI it has come a long way since they were first developed over two decades ago. These program tutor and drill student, diagnose problem keep records of student progress, and present material in print and other manifestation. Student are expected to benefit from CAI and among the benefits that have been expected are the better and more comfortable learning for student, since they learn at their own pace and convenience, opportunities to work with lastly superior materials and more sophisticated problems, personalized tutoring automatic measurement of progress and others. Teachers as well are expected to gain from CAI as the experience less drudgery and institution greater ease in updating instructional material more already appraised and documentation of students. ( Kulic bangert, and Williams 1983).in conclusion the need for computer education in technical education will be of great importance regarding the youth, as it will enable them to operate and run programmes with the same confidence which they show towards other technologies (Okoro, 2001) it will also make students to appreciate the ways in which computers can be used in dealing with different tasks. Computer education in technical education will help to train students in technical institution very much skilled in the use of computers to do secretarial jobs, maintaining of computer programming etc, computer education will help industries to solve their

problem of programming and training cost of computer operators to becomes computer operators and experts, (Audu, 2005).

### **Methods of teaching and learning technical subject.**

The ultimate aim of teaching as a social one, it's to help those whom we teach to live fully at their present state and in the future to help them learn the art of living with others. Teaching giving information; as such the teacher must have communicative knowledge. The teacher's main task is to cause students to learn, develop and to establish his/her subject and the environment. Teaching method according to Gage in Gage and Berliner (1979) is a recurrent pattern of teacher behavior applicable to various subject matters characteristics of more than one teacher and relevant to teaching. The training gives in technical colleges are to teach the fundamental use of land and simple mechanics tools and equipment to such a standard that students acquire some basic skills. This requires knowledge, teaching skills and of high order by the teacher. The general aim of technical education in technical colleges is full occupation preparation (Okoro 1993), the real tools equipment and process of how to design instruction which will best meet the needs of the learner. Te selection process requires not only that the teacher be aware of how to use various techniques but that he/she knows which type of student learn best with various technique which techniques should be used under various conditions and what level of information can best be learned using various techniques. (Agnew and Shinn 1990). Olivas and Newstorom cited in Agnew and Shinn (1990) that the effectiveness of the method depends upon the particular objective begin

served. The best way to make learning more concrete is to make use of real objects (Akinwale 2004). The different levels and objective of technical education requires different teaching method. All technical courses irrespective of their levels and objective are made to stress practical and activities. Okoro, (1993) pointed out that any technical course in which a large reservation of the allocated time is not developed to practical work projects and experiment is not likely to be successful.

Furthermore Olaiten (1982) who explained that instructional method relevant to the teaching of subjects are project, discussion, excursion or field trips and homework. He further stated that lecture method might be used when necessary. In technical training colleges these method be used effectively to fulfill the required objective of technical education is specifically to train personnel who will eventually be useful in the production line of the industries or setup item owned workshops it was observed by Adenle (1997) that most training institution employed more of lecture and project method of teaching. Other teaching methods includes discussion, excursion or field trips method of teaching and home work method of teaching are most effective. In the development of skills and should be adopted in technical education Okoro (1993) stated that lecture, questioning, demonstration, project, experiment, guest lecturer and field trip are basic instructional methods that should be employed in technical education programs. The student's success in the class room is largely based on the effectiveness of the teaching methods. In general sense no teaching method is more efficacious than the other. But in strict sense some method are more suitable for teaching certain contents i.e. skill knowledge, values e.t.c, still other yield better results for large group small group and individualized instruction



**Project method:** This method of teaching is suitable for large group, small group and individual instruction originated in the early twentieth century the underlying principle of the method is that concepts are comprehended through observation and that learning takes place through direct contact with materials. The project method is a problem solving approach to learning. The teacher assigns individuals or small group to a special task that involves creating doing or experimentation. The project method of teaching is a co-operation study of real life situation by either a class or the whole school usually under the expert guidance of the teacher (Bello, 1981). A project is learning activity selected, planned, designed and executed by learning collectively or individually to clarify facts acquire new knowledge, skills appreciations and to solve identified problem under the teacher's guidance and supervision. The project is often derived from the course to reinforce abstract learning and develop skills in the use of equipment, tools and materials. Vocational and technical education for instance, the end product of a project must be an article of worth to justify the effect. Emphatically all school projects must be perceived by the learner as a useful venture that is worth undertaking. The criterion is a driving force towards the completion of any project. The project is learner centered approach in group project student's work towards the same goal. They learn to plan and co-operate with one another as they work as a team. Project should be selected on their value and relevance to the learning objectives of the course; student need to understand the activities and reason for doing the project and the skill develop in completion of the project.

Furthermore project varies in purpose and duration; it could be a short term type lasting for few days to few weeks. It could last for months, terms, semesters or even a session. From the states purpose their development is designed to accomplish, four types of projects could

distinguish. It could be practical project experiment projects problem solving and skill projects

**Discussion method :** The discussion method make itself amenable to the teaching of variety of content in diverse subject's areas arrangement could be concluded for the entire class to participate in a discussion were necessary. The discussion provides for the students' involvement which in help to stimulate and reinforce learning. It is organized system of learning for the purpose of achieving specific instrumental objectives. Discussion involves sharing of ideas, information, attitude and experiences. This encourages everyone to get involved and participate in the learning process and amongst students, themselves. Akinseinde (1998). Discussion method of teaching involves communication of ideas, facts and opinions by group of learners on an identified and clearly stated instructional objective using skills as speaking, listening and non-verbal processes. For better student's participation, a group size of 3 to 5 members is considered manageable. It can be used when a group has some knowledge or experience on the subject matter, both the participants and the moderator (usually the teacher) put their knowledge together to understand and appreciate a problem by learning from one another. Each member of the group is assigned a specific time limit to address the group while other member listen and observe. The use of discussion method in technical education enables participation to acquire and synthesize information. It helps to develop knowledge about new methods practices and processes of machinery and equipment. It helps to foster co-operative attitude among students and increase their innovation for learning. Discussion method can also facilitate the understanding of materials maintenance procedure and production techniques. The success and effectiveness of the method depend upon how well the learner are prepared and motivated to participate and the

sensitive of the teacher to the spontaneity of the participants. Thus the method demands adequate preparation on the part of the teacher and participants. Two key points should be noted for discussion to be effective and successful to fulfill the stated objections, it requires a clearly stated objection to serve as a focus and guiding post. Secondly, to ensure effective participation of the member prior knowledge of the discussion topic is essential.

**Lecture method:** Lecture involves a formal discussion or exposition on a subject matter to attain a stated instruction objective. The teacher does the talking while the learner listen and occasionally takes notes the method was a further extension of traditional view point that the teacher is an embodiment of knowledge. It is the responsibility of the teacher to disseminate the knowledge to the learners who are supposedly ignorant and blank. There is very little or no student participation. The students are merely required to listen, think about what they hear and possibly understand the information given. It is a teacher centered method and the teacher should resist giving a length lecture since such lectures are usually dull and are incapable of stimulating and sustaining the interest of the students. This method is a typical method of teaching skills involving sole performance and one way communication when giving examples, explaining concepts, pointing out relationships etc in using the method, teacher's lunch into monologues and as such, the method has been severally criticized by educators. The method vitiates the teacher learner interaction essential for learning to take place. The intellectual passivity and weariness of listeners and lack of discussion are said to be a contradiction of the process of the free flow of information and exchange of ideas which learning demands in addition the method is characterized by lack of feedback however the method has persisted and perhaps is the most commonly used method of instruction, especially in teaching institution. The method has been found suitable in teaching when the

purpose of the lesson is to disseminate information, the materials is scarce and cannot be readily sourced by the learners, the materials must be organized and presented in a particular way for a specific group of learner's the content of the lesson needs to be remembered for a very short period of time, and when there is need to introduce contents to be executed using other methods. Conversely, lecture method is unsuitable or adjudged inappropriate when objectives other than dissemination and accusation of information is desired long term retention is to be encouraged in the lesson active rather than passive learner participation in attaining the instructional objectives is essential, an when higher order cognitive objectives such as analysis synthesis and integration are begin fostered the teaching method will be effective when combined with other method and techniques which can be supplemented with the use of aided device. It will be more effective if the lecture does the following.

- Speak loud and clear enough to be heard. Amplifier or audio devices can be used in large class that is more than 40 students.
- Start the presentation from the known to abstract from already known and proceed to new information in sequential order.
- Using short sentences and simple language.
- Giving some time to demonstrate using sample charts tables and methods that are appropriate and likely to facilitate the comprehension of the lecture.
- Ask question or allow students to ask question or make comment.
- Keep explanation brief and to the point especially when deciding with pupils in lower classes.
- Summarize by stating the main point of the lecture.

- Provide student with syllabus or outline of the topics to be covered  
Audu (2005)

Lecture method will also be effective if it follows the basis of preparation, introduction, presentation evaluation and conclusion.

**Demonstration method:** Demonstration is the effective method in teaching skill or performance oriented subjects in the sciences, arts, vocational and technical education. Using the method the teacher can explain steps in operation techniques of handling a piece of apparatus, machine or hand tools, and procedure in carrying out an experiment while performing them. The method executed by examples and activities by the teachers while the learners observes and listen. Thus this method takes the learner sense of sight and hearing. Demonstration can be given to the entire class, small group of students or to an individual in each case. It requires careful planning and skillful execution. It is an instructional method which enables students to illustrate specific skills principles or concepts. Workshops and lecture are equipped with machines, tools and materials for developing competences needed for particular occupation. This requires the method of demonstration which is very suitable for psycho-motor objectives Akinseinde (1998) stated that demonstration appeals to many skills performance in the use of tools and equipment which always attract attention. He continued that in demonstration student see immediate progress as a result of their efforts, also their desire to arouse to emulate the works of teacher and others. Demonstration is the teacher's greatest aid in training students in fundamentals skill and practice in the shortest possible time. Formal instruction using other method often time reside demonstrational such as situation demonstration supplements are first explained to the learners before the actual demonstration. The preceding information lesson is considered essential for the

understanding of the processes or skill to be demonstrated. When the method is used as an adjunct to another method or solely used the teacher needs plan will organize the materials and skillfully present the demonstration exhibiting high degree of crafts men ship. Demonstration is showing and explaining how a particular concept works or how it is been used or produced. For example a student in automobile or metal work option can best learn welding by watching experts performing the task. The teaching will be effective when the teacher emphasizes correct performance, explaining the process steps and showing the students what to do or lookout for while performing the task. On the students side they should commit the step to memory and recall the specific step in sequential order before practicing with welding equipment. The demonstration in this case should go along with an explanation of what is being performed Laird (1985) declared that demonstration method will be efficient if it does the following

- Has all the equipment and materials in place.
- Explaining the goal of the demonstration at the beginning.
- Presents the operation one step at time not to confuse the learners.
- Introductory lesson should proceed demonstration.
- Check the condition or arrangement of all equipments just before demonstration starts.
- The teacher should plan and practice the skill that will be presented to avoid being confused during presentation
- Talk to the learners and not the equipments on chalkboard

**Discovery method:** Discovery method of instruction delivery provides the students the opportunity to find out information and ascertain the reason why things happen the way they do.

Basically there are two types of discovery methods which are unguided discovery and guided discovery. When the teacher does not control the instruction and the student seeks for information without assistance, this method is called unguided discovery. At the other hand, when the teacher provides some guidance but allows the students to find the information by themselves, the method employed is appropriate for teaching science and technological subjects as it exposes the learner to discover knowledge. The guided discovery approach can be used to teach skills, facts, concept and principles embedded in the course content (Akinseinde 1998) this is a teaching technique that encourages students to take a more active role in their learning process by answering a series of question or solving problems designed to introduce a general concept (Mayer, 2003). The discovery method is based on the notion that learning takes place through classification and scheme formation (Gellenstein, 2004). The instructor in this approach guides the students through process by posing a series of questions whose responses would lead to the understanding of a concept before it is explicitly stated. Children act as detectives as they solve concept attainment activities in stimulating learning environments. In doing so, they place a newly introduced object in a category that they have previously discovered or identified (Gallenstien, 2004). This teaching method is believed to increase retention of material because the student organized information that has already been stored. There are three (3) levels of guidance in teaching using discovery:-

1. Pure discovery:- the students receive representation problem to solve with minimal teacher guidance (Mayer, 2003).
2. Guided discovery: - the students receive problems to solve, but the teacher provides hints and direction about how to solve the problem to keep the student on track (Mayer, 2003).

3. Expository: - the final answer or rule is presented to the student (Mayer, 2003).

**Experimental method:** The experimental method of instructional delivery is usually taken to be the most scientific of all methods, the “method of choice”. The main problem with all the non experimental methods is lack of control over the situation. The experimental method is means of trying to overcome this problem. The experiment is sometimes described as the cornerstone of psychology. This partly due to the central role it plays in many of the physical sciences and also to psychology’s historical view of itself as a science. An experiment is a study of “cause and effect”. It differ from other method in that it involves the deliberate manipulation of one variable while trying to keep all other variables constant’s. This method is occasionally used in technical courses.

Experiments are useful in electrical and electronics and power machines. In an experiment students are told what to do and required to note and record their observations (Okoro 1993). Experiments assist students to learn because it enables them to verify rules, relationship and laws.

**Assignment method:** The assignment method of instructional delivery is a method where a teacher gives assignment to the students from the syllabus. Sometime the teachers give the assignment out of the syllabus but it should be related to the subject. The teacher uses this method to develop self study habit among the learners even to give individual autonomous. This method is considered as the best method for the self study because teachers have to facilitate materials topic distribution, how to present the views etc. it’s a method mainly useful for



developing self study among the learners. It also gives scope for working in groups and doing practical activities related to unit.

Assignment may be performed in the classroom workshop or home and may involve writing or practical work Okoro, (1993) stated that in the workshop or laboratory assignments students may be required to carry out a process or use an experiment. Home assignment may require students to consult their text books or reference materials to carry out the study or write a report. The assignment may also require student to visit other institution and industries in order to learn more about the topic covered in the classroom. This further enhances self study and further understanding of the syllabus and world application of topics taught in class although some students tends to copy other peoples work and there by hindering the effectiveness of the method.

**Field trips:** This is a method of instructional delivery which ensure better utilization of community resources, it provides the student opportunity to learn our side the school environment with realistic experiences to the learners which is not possible in the school. Learning therefore becomes more realistic, concrete, meaningful and effective. The method also facilitates transfer of learning as the students are motivated to learn as they have opportunities to examine materials process and form new ideas. Field trip enables students to study industrial process first hand and see the relevance of laboratory and workshop practical (Okoro, 1993). Before students are taken on field trips, they should be told what they are supposed to observe and what they are expected to learn. To ensure that the students are sufficiently informed about the trip, a pre-departure lecture is necessary. During the lecture the learners should then be observed, their conduct during transit and the place of interest, possible hazards and risks say safety precaution to be observed whether a post-visit discussion is necessary and whether their

observation shall be evaluated in the form of a written report or essay. Besides student's preparation, necessary administrative arrangement for the field trip needs to also be made. After a field trip the lecture should review with the students the experience of the trip and various things learnt, this makes the trip a learning experience rather than a mere sight seeing. Field trip may be made to industrial centre such as power generating stations, steel rolling mill, flour mill, car assembling companies, factories, oil refinery, computer rooms, radio and television stations etc. field trip may cease to be an educational experience, if it is not well planed and properly organized. The method in addition is time consuming and expensive.

**Guest lecture:** The guest lecture is another method used in teaching subjects. A lecture is an occasion when you number one end to benefit the other. Guest lecture emphasis is given on not only making the students academically brilliant but true leaders and team players, this preparing them for the real life of the corporate world. This is done by inviting people from industries and top institutions to people valuable information to the student. Eminent personality from various industries and institutions are invited to lend valuable information from their experience to the students. Guest lecture is a way of enriching our students with the latest update of the industries and technicalities. The students are bestowed with knowledge about industrial needs, latest technical updates; avenues for higher studies etc in their method experts in various technical areas are to give talks to student. Okoro (1993). Guest lecturers provide variety of knowledge to the teaching situation and stimulate the interest of the students. Student has the opportunity to interact with people who are actually engaged in various occupations. Students may obtain valuable information's in which they could not obtain from books or their teachers. If helps in career exploitation and enhancement of adequate knowledge in the world of work.

**Question techniques:** This is a method by which questions are well structured in series of sentences for the purpose of successfully getting information from the students through their answers. It may be in written or oral form of questioning. The question method is also a successful teaching method that is adopted in technical college to meet instructional objectives.

This method can be used to:-

- Increase the student's involvement in teaching and learning process of lesson.
- Provide direction for executing instructional process which focuses on a topic. It provides the teacher with enough fact at a time regarding the student knowledge of the topic.
- It helps the teacher to note important point and present items in logical sequence.
- It make the learning process interactive and effective when carefully planned and makes teaching so easy for beginners teachers.
- It is also useful to a teacher who relieves a fellow subject teacher when he/she is absent from school (New Man 2009).

**Simulation Technique:** This is a teaching method which is developed for the testing of students knowledge in a controlled setting, this technique is a means of preparing students to function effectively in their chosen occupation (Okoro, 1993). It allows students to experiment in a confine, safe, simplified and realistic environment with minimal fear of failure. This technique comprises of cognitive, effective and psychomotor performance objective, before a simulation is used. At the end of the simulation exercise, a follow up discussion should be held to reinforce key-concepts and determine whether or not the objective has been attained. There are simulations

for air planes submarines and automobiles. A driving simulation offers a user the opportunity to react to conditions which user might encounter in actual traffic. A student can learn how to drive a motor vehicle by using simulator that produces all aspects of driving including application of clutches, brakes and accelerators. The simulator techniques can be used to train a pilot on how to fly an air craft using computerized flight simulator (Akinseinde, 1998) this type of techniques in technical college can be applied in different trends to enhance the student's knowledge.

**Individual Instruction:** This method of teaching on technical college punches a student to work towards achievement part of technical education. The instruction is directed to the individual rather than the group in order to adopt the instruction to the workshop experiences and varied abilities of students. This teaching method helps the individual to acquire skills for occupational proficiency and economic security. The technical education teachers accept students as they come into the school and assist them to possess the best of their abilities. In a situation where a student cannot learn what is required of him/her the student will be allowed to try other occupation trades that fit his/her ability and interest. The technical education system as it is believed in the principle of conservation of human resources. It surely believes that every student is important and the school provides learning experience which will make the student become a productive member of the workforce upon learning and becoming a person that can make positive influence in the society. A good technical education teacher should be an expert in his occupational area or discipline, he should be an expert at imparting his/her knowledge and combined skills with adequate pedagogical knowledge and careful lesson preparation makes the technical education teacher effective and efficient in teaching (Okoro, 1993).

### **Summary of Related Literatures.**

This chapter has analyzed and discoursed the historical development of technical education in Nigeria stressing that for the first time even in the history of Nigeria vocational and technical education system, major transformation took place within the country's education system vis-à-vis the implementation of new national policy in education for Nigeria in 1977 and that the only instrument Nigeria needs to join the global changing the implementation of effective vocational and technical education. It further discussed the need and importance of instructional materials in teaching and learning as they enhance the effectiveness of teaching and learning at technical colleges. It affirmed that any technical institution that is lacking instructional materials is not expected to attain reasonable achievement of its educational objectives which is aimed at meeting the nations man power needs. In addition the different methods adopted in the teaching of students at technical colleges were also discussed, method such as lecture, demonstration, projects, discussion, field trip, questioning methods etc were all explained. The different levels at technical colleges require different method as technical courses in which a large proportion of the allocated time is not developed to practical work projects and experiment is not likely to be successful. It further explained computer aided devices in technical education as the need for computer education in technical education will be of great importance regarding the youth, as it will enable them to operate and run programmes with the same confidence which they show towards other technologies, it will also make students to appreciate the ways in which computers can be use of in dealing with different tasks. Also the use of computer will enhance need for accuracy in the modern world of work.

## **CHAPTER III**

### **METHODOLOGY**

This chapter describes the method that was adopted in carrying out the study under the following sub-headings, research design, and area of study, population of the study, instrument for data collection, validation of instrument, administration of instrument and method of data collection.

#### **Research Design**

The design found most suitable for the purpose of this study was experimental research design with intact class of TC 1 MVMT students and TC 2 MVMT. In this design, subjects are

randomly assigned to experimental and control groups. The following are the symbolic representation of the design: R, E, C, O<sub>1</sub>, O<sub>2</sub>, and T

where

R=Random

E=Experimental group

C=Control group

O=Observation or measurements

T=the experimental treatment to which a group is exposed i.e. independent variable.

This design is one of the most effective in minimizing the threats to experimental validity. At the conclusion of the experimental period the difference between the mean test scores of the experimental and control groups are subjected to a test of statistical significance, a t-test or analysis of variance. (Farooq2001).

### **Area of study**

The study was conducted at the technical colleges of kogi state.

1. Government technical colleges Ankpa
2. Government technical colleges Idah
3. Government technical colleges Mopa
4. Government technical colleges Oboroke.

## **Population**

The population of this research is eighty (80) students.

## **Sample**

Forty (40) students were selected randomly from the school. Only students of motor vehicle mechanic trade were included in the sample. The sample students were divided into two groups, i. e. the experimental group are the students in TC 1 MVMT and control group are those in TC 2 MVMT. Both groups were equated on the basis of their scores in previous term in the subject of motor vehicles mechanic trade. Each group comprised of 20 students.

## **Instrument for Data Collection**

Documents on previous achievement scores and post test administered to the experimental as well as the control group were used to collect data for the study. A teacher made test was given to the sample as post test immediately after the treatment (teaching) was over. The purpose of this test was to measure the achievement of the students constituting the sample. A test comprising multiple choice items, matching items and item of short answers were used. These items were based on the selected automobile units. These units were taught to both experimental and control groups, and were intended to measure the outcomes of learning. The test was administered to both groups. The data obtained from permanent school record were the scores of the sample in automobile technology (AUT21) on the test given to the sample students at the end of previous term. The scores were treated as previous achievement and were obtained to equate both groups on the variable of previous achievement.

## **Validation of instrument**



The instrument used for the collecting of data for this study was validated by the project supervisor and two (2) other lecturers from industrial and technology education department of Federal University of Technology Minna. All the test items were based on the text of the units taught to the sample students.ther validation help in choosen the topic to be teached.

### **Administration of the Instrument**

There were two different patterns applied during the experiment. The both groups were taught through routine method by the same teacher. The computer aided devices were used as supplementary strategy for the experimental group. During the experiment period, the experimental group received the treatment of independent variable, i. e. computer assisted instruction. The experimental group also received treatment on web sites consisting of drill and practice, tutorials, stimulations and animations.

Furthermore, the control group was kept busy in other activities such as guided practice and independent practice. This was adopted to control the variable of time and to realize the primary objective of the study. The experiment continued for three weeks, and the post test was to measure the achievement of the students constituting those samples of the study. Final data were collected from the forty (40) students i.e. twenty (20) from each group.

### **Method of Data Analysis**

The achievement scores of the sample were obtained as a result of the post test. After obtaining the scores, the lists were prepared for each group. The means, standard deviation, differences of the mean were computed. Significance of difference between the mean scores of both groups on the variable of previous achievement and scores of post- test were tested at .05 level of significance by applying t= test.

In addition, to see the treatment effect for male and female students the factorial design (2x2 analysis of variance) was applied. For this purpose the students of both groups were divided into two halves, i.e. high achievers (above the mean score) and low achievers (below the mean). This division was made on basis of scores on previous achievement test.

The factorial design is symbolized as in appendixII.

## **CHAPTER IV**

### **PRESENTATION AND ANALYSIS OF DATA**

This chapter is confined to the analysis and interpretation of data obtained from the school record and through post test. Previous achievement scores in the subject of motor vehicle mechanic trade were obtained from the school record to equate the groups. Significance difference between the mean scores of experimental and control groups on previous achievement scores and post test were found out by applying t-test, analysis of variance and factorial design (2x2 analysis of variance). Both the experimental and control groups were compared on variable of pervious achievement.

#### **Research Question 1**

Will there be any difference in the performance of motor vehicle mechanic trade students taught with computer diagnostic devices as supplementing strategy, and those taught using traditional method?

Table 1: Significance of difference between the mean scores on previous achievement test of experimental group and control groups

Group	N	Df	Mean	T- value
Experimental	20	19	78.40	2.14*
Control	20	19	72.00	

\*Not Significant

t at 0.05 = 2.02

Where

N is number of the student

df stand for degree of freedom

It appears from table 1 that difference between the mean score on the post test of the experimental group was 78.40 and the same of the control group was 72.00. the difference between the two means was found significant at 0.05 level in favour of the experimental group. Goode (1988) and Harrison (1993) also found that student who received computer instruction showed greater increases in their achievement scores.

### **Research Question 2**

Will there be any difference between the mean score of high achiever and low achievers of experimental and control groups?

Table 2: ANOVA (2 x 2) Showing difference between the mean scores post – test of high achievers and low achievers of experimental and control group

Source of variance	Degree of Freedom	Sum of square	Mean square variation	F
Treatment	1	384.80	384.80	2.30*
Achievement level	1	2524.80	2525.80	15.12***
Interaction	1	6898.00	6898.00	41.32****
Within cells	36	6009.20	166.92	

Not Significant F at 0.05 = 4.12

Table 2 reflects that the value F – value obtained with “treatment” as the source of variation, was not statistically significant. But the interaction effect between treatment and achievement level of the student was significant at 0,05 level.

H<sub>0</sub> 1 : The performance of the experimental group was significantly better than that of control group on post test. The difference between the two means was statistically at 0.05 level (table6). Thus, the null hypothesis that, there is no significant difference between the mean scores of the students taught motor vehicle mechanic trade with CAD as supplementing strategy and without CAD was rejected at 0.05 level of significance in favor of the experimental group. These findings support the findings of the studies conducted by Goode (1988) and Harrison (1993).

Table 3: Significance of difference between the mean scores on previous achievement test of experimental group and control groups

Group	N	Df	Mean	T- value
Experimental	20	19	78.40	2.14*
Control	20	19	72.00	

\*Not Significant t at 0.05 = 2.02

Where

N is number of the student

df stand for degree of freedom

It appears from table 3 that difference between the mean score on the post test of the experimental group was 78.40 and the same of the control group was 72.00. the difference between the two means was found significant at 0.05 level in favour of the experimental group. Goode (1988) and Harrison (1993) also found that student who received computer instruction showed greater increases in their achievement scores.

H<sub>02</sub> : The F-value obtained in case of “treatment” as the source of variation and “gender” as source of variation was found to be significant at 0.05 level. The interaction between treatment and gender was also significant at 0.05 (table 8). Thus, the null hypothesis that, “there is no significant difference between the mean scores of male and female students of experimental and control group”, is rejected at 0.05 level. These findings support the finding of the study conducted by sacks etal, (1994).

Table 4: ANOVA (2X2) Showing difference between the mean scores post test of males and females of experimental and control groups

Source of variance	Degree of Freedom	Sum of squares	Mean square variation	F
Treatment	1	409.6	409.6	20.89*
Gender	1	360	360	18.37***
Interaction	1	2323.2	2323.2	118.53****
Within cells	36	705.6	19.6	

\*Not Significant

F at 0.05 = 4.12

The summary of result is presented in Table 5.

Table 5: Significant of difference between the mean scores on previous achievement test of experimental group and control groups.

Group	N	Df	Mean	T-value
Experimental	20	19	71.80	0.24
Control	20	19	71.25	

Not Significant

t at 0.05 = 2.02

Where

N is number of the student

df stand for degree of freedom

Table 5: indicates that the means score of the pervious achievement in automobile of experimental group was 71.80 and that of the control group was 71.25. The difference between the two was not statistically significant at 0.05 level. Hence, both the groups could be treated as equal on the variable of previous achievement in motor vehicle mechanic trade.

Table 6: Significance of difference between the mean scores on previous achievement test of males and females of experimental group

Group	N	Df	Mean	T- value
Males	10	9	69.20	1.13*
Females	10	9	74.40	

\*Not Significant

t at 0.05 = 2.10

Where

N is number of the student

Df stand for degree of freedom

Tables 6 reflect that there was no significant difference between the mean scores on previous achievement of the males and females of experimental group. Hence, both male and female students included in experimental group could be treated as equal on previous achievement.

Table 7: Significance of difference between the mean scores of high achievers of experimental control groups on previous achievement test

Group	N	Df	Mean	T- value
Experimental	12	11	78.50	0.37*
Control	12	11	77.75	

\*Not Significant

t at 0.05 = 2.07

Where

N is number of the student

df stand for degree of freedom

Table 7 shows that there was no significant difference between the means scores of high achievers of experimental control group on previous achievement. Hence, the high achievers of both groups could be treated as equal.

Table 8: Significance of difference between the mean scores on previous achievement test of experimental group and control groups

Group	N	Df	Mean	T- value
Experimental	8	7	61.75	0.06*
Control	8	7	61.50	

\*Not Significant t at 0.05 = 2.14

Where

N is number of the student

df stand for degree of freedom

Table 8 reflect that there was no significant difference between the mean scores of low achievers of experimental and control group on previous achievement. Hence, the low achievers of both groups could be treated as equal.

Table 9: ANOVA showing difference between the mean scores of males and females of experimental group and control group on previous achievement test

Source of variance	N	Df	Mean	T- value
Among the means of conditions	3	419.48	139.83	1.38*
Within conditions	36	3647.50	101.320	



Total	39	4066.98	104.28	
-------	----	---------	--------	--

\*Not Significant

t at 0.05 = 2.14

Where

N is number of the student

df stand for degree of freedom

It appears from table 9 that the difference between the mean scores of males and females of both experimental and control groups on the variable of previous achievement was not significant.

Hence, both the comparison groups on the variable of gender could be treated equal.

Table 10: Significance of difference between the mean scores on post- test of males and females of experimental group

Group	N	Df	Mean	T- value
Males	10	9	75.70	1.36*
Females	10	9	81.10	

\*Not Significant

t at 0.05 = 2.10

Where

N is number of the student

df stand for degree of freedom

From table 10 that the difference between the mean scores on post of males and females of experimental group was not significant at 0.05 level. Hence, both males and females of the experimental group performed equally on the post- test.

Table 11: Significance of difference between the mean scores on post – test of high achievers of high achievers of experimental group and control group

Group	N	Df	Mean	T- value
Experimental	12	11	83.83	3.15*
Control	12	11	77.75	

Significant  $t$  at 0.05 = 2.14

Where

N is number of the student

df stand for degree of freedom

Table 11 Indicate that the difference between the mean score of high achievers of experimental group and control group on post – test was statistically significant at 0.05 level in favor of experimental group.

The above results are in line with Swadener and Hannafin (1987) who found that boys with higher achievement levels in mathematics also had high interest in computers.

Table 12: Significance of difference between the mean scores on post- test of low achievers of experimental group and control group

Group	N	Df	Mean	T – value
Experimental	8	7	70.25	1.61*
Control	8	7	63.38	

Significant  $t$  at 0.05 = 2.14

Where

N is number of the student

df stand for degree of freedom

It is an evident from table 12 that the difference between the mean scores of low achievers of experimental group and control group on post – test was not significant at 0.05 hence, low achievers of both groups performed equally on the post test.

### Discussion of Findings

The above result revealed that the entire three null hypotheses were rejected. It means that performance of experimental group was significantly better than that of control group on post test on the variables of overall achievement, gender and achievement level of the students. To make it clear whether the experimental treatment was more effective for the males or females, table 7 is referred to where mean score of female group post- test was found to be 81.10 as compared to 75.70, that of male group and it was found below the level of significance. It was found significant when interaction between treatment and gender was calculated (table 8).

Therefore, it can be concluded that the performances of females on post- test was significant better than that of males.

To clarify the interaction between treatment and achievement level of the students, Table 9 is referred here where performance of high achievers of experimental group on post test was significantly better than that of control group. In case of low achievers, the difference between the means on post test was not significant (table 10). Hence, it can be concluded that the performance of high achievers on the post-test significantly better than that of low achievers. Since there was no significant difference the mean scores of low achievers of experimental and control groups, it affected the significant of treatment variable when 2x2 analysis of variance was applied.

The overall results of the study indicate that CAD, as a backup strategy to support traditional teaching methods, improved student's achievement in the subject of motor vehicle mechanic trade at college level with higher achievement gains for the group of high achievers and male student. The results of the study were mostly in line with those of previous researches carried out in other cultures. However individual variation were found regarding the impact of CAD on males and females; and on high achievers and low achievers as evidenced by the significance of interaction effects.

The results, especially about high achievers, collaborate the observation of Percival and Ellington (1988) regarding the research into students' use of back up approach as individualized learning. The better students makes more use of and benefit more from, individualize learning material than weaker student whom the supplementary strategy was mainly intended. The result of study show better performance of high achievers than that of the low achievers. The difference

might be attributed to previous exposure of the former group to use of computers. A slight difference between the performances of male and females might also be due to difference in their computer awareness. Since software in subject of motor vehicle mechanic trade at colleges level (CDs and websites) were available only in English Language, the experiment was carried out in English medium schools, the result of the study were therefore generalized only to English technical colleges. These findings support sacks et al (1994) who found that there were no overall gender differences in actual use of computer nor did computer use increase across the course of the study.

The significance of difference between the mean scores of experimentally group and control group on previous achievement in motor vehicle mechanic trade was found applying the t-test

## **CHAPTER V**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This chapter presents the summary of the study, conclusion, recommendation and suggestion for further study.

#### **Summary of the study**

From the beginning of this study, the study as be able to bring out some challenges of computer diagnostic device in the skill of auto technicians in technical colleges of kogi state, which also we look into some related literture of the study the methodology of the study which is experimetal process, Based on the findings, analysis of data revealed that the students taught through computer aided devices as supplementary strategy performed significantly better.

The students with high achievement level showed better result than those with low achievement level when taught through computer assisted instruction.

## **Conclusion**

On the basis of statistical analysis and the findings of the study, the following conclusions were drawn:

The application of computer aided devices as supplementary strategy in teaching of motor vehicle mechanic trade was found to be more effective.

Though computer aided devices as supplementary strategy was found to be equally effective for male and female students, yet the female student benefited more from computer assisted instruction as compared to male students.

Computer assisted instruction proved that there is no difference in the performance of motor vehicle mechanic trade student exposed to individualized computer assisted instruction, cooperative computer assisted instruction, and those taught using conventional method.

## **Recommendations**

In the light of the findings revealed and conclusion drawn from the study, the following recommendations were made:

1. An experiment with the students from different college needed to examine the effectiveness of computer aided devices as a supplementary strategy.
2. An experiment with greater number of student from different colleges, representing a wider range of intelligence, be planned to examine the result of this study.

3. The teacher of different subject areas should be trained in use of computers in the classroom.
4. The present study was conducted to see the effect of computer aided devices as supplementary strategy in teaching of motor vehicle mechanic trade.
5. The control and experimental groups were not organized on the basis of sameness of chronological age of the students. The present study, therefore, points to an area which needs further research.
6. More computer aided devices need to be made available to enhance the effectiveness of instructional delivery on motor vehicle mechanic trade.

### **Implication of the study**

This study has provided information to be both students and teachers, that the application of computer aided devices as supplementary strategy in teaching of motor vehicle mechanic trade enhances the instructional delivery and makes it more effective.

### **Suggestion for further study**

The following suggestion are therefore made for further research

1. The impact of computer aided devices (CAD) in other technical college trade courses instructional delivery at technical colleges of kogi state.
2. Problem and prospects of using computer aided device (CAD) in teaching and learning of technology trade courses.

## REFERENCES

- Adigun, A. O. (2003): Vocational and technical method (with principles of teaching skills), Lagos: publication and consultancy services.
- Akinwale, O. (2001): science and Technology Development in Nigeria: Journal of Curriculum Studies and Development, pp48 – 50
- Akinsiende, A. O. (1988): Vocational and Technical Method (with principle and methods of teaching skills). Lagos: publication and consultancy services.
- Philip, B. C. (2002): Developing Computer Use in Education Guidelines. Trends and Issues UNESCO. Regional Office for Education in Asia and Pacific, Bangkok: Thailand pp57-59
- Audu, R. (2005): History of vocational and technical education in Nigeria: unpublished manuscripts: Department of Industrial and Technology Education, Federal University of Technology, Minna.
- Mandell, G. (1986): The First Course in Computer Education: A Survey Journal of Computing in Teacher Education 7, pp 115 – 119
- Federal Republic of Nigeria, (1981): National policy on Education (revised), Lagos: Federal



Government Press.

Federal Republic of Nigeria, (2004): National Policy on Education 4<sup>th</sup> Edition, Abuja: NERDC Press.

Olaitan, S. O. (2001): Vocational Education and manpower development, constraints and strategies in Nigeria, problem and policies, Lagos: University press Lagos.

Okoro, O.M. (2006): Principle and methods in vocational and technical education. Nsukka: University Trust Publisher

Olorunfemi, A. I. (2005): Information and Communication Technology and Education: Analysis the Nigeria National Policy for Information Technology. International Education Journal: 6(3), 316 – 321 (Electronic Version).

Mc mullan, A. (1988): Computer in Education: What the Research Shows Electronic Learning, pp 3, pp 51 – 54

Industrial Training Funds, (1973): A Strategy for reducing the financing constraints on implementation of vocational and technical education, Nigeria: Journal of curriculum studies, 67, 76.

Merill, A. S. (2002): Word Processing Packages Computer in Africa. London: The design Council

Okoro, O. M. (1999): Principles and Methods in Vocational and Technical Education, Nsukka: University Trust Publisher.

Onasanya, S. A. (2000): Selecting the right words in words processing package. African Journal of Information Technology, 4(1), 121 – 124.

Spinilli, M. A. (2001): The use of Technology in Teaching business statistic: Journal of education for business studies.

Morall, J.(1999):3D Computer Animation. Addison Newsy: Working ram

Durosaro, I. A. (2002): Counseling needs of Female Prisoners in Nigeria: The Nigeria Journal of Guidance and Counseling: 8(1), 154 – 161 (Journal of the Department of Guidance and Counseling, University of Ilorin).

Hopper, J. (1975): Artificial Intelligence and Computer Assisted learning. Ten years on. N. J.

Rush by (Ed), Selected Reading in Computer Based Learning 9pp33- 46) London: Kogan Press

Federal Republic of Nigeria, (2004): National policy on education. Lagos: NERDC Press.

Techencyclopedia, (2003): <http://www.techweb.com/encyclopedia>

Encyclopedia Britannica, (2003): <http://www.britannica.com>.

Ozoro, (1992): implementing technology education in Nigeria schools: a journal of Nigeria Association of teachers of technology @, 5 – 11.

Elobuiké. U. (1999):Relevance of Techniscal College in Electrical/Electronic and Mechanical/Automobile programs to the needs of industries in Anambra, Ebonyi and Enugu States: Unpublished PhD Thesis, Department of Vocational Teacher Education, University of Nigeria Nsukka.

Okoro, O. M. (1999): Principles and Methods in Vocational and Technical Education. Nsukka: University Trust Publishers.

Olaitan, S. O. (1996): Vocational and Technical Education in Nigeria: Issues and Analysis. Onitsha: Noble Graphic Press.

Percival and Ellington (1988)

Swademer and hanafin (1987)

Sa ksetal (1988)

Goode (1988) and Harrison (1993)

## APPENDIX I

### STATISTICAL DATA

Experimental Group				Control Group			
Students	Male or Female	Previous Scores	Scores on post – test	Students	Males or Females	Previous Scores	Scores on post – test
1.	F	86	90	1.	F	86	85
2.	M	84	87	2.	F	83	84
3.	F	82	86	3.	F	83	84
4.	M	82	86	4.	M	83	84
5.	M	81	85	5.	M	79	80
6.	M	80	86	6.	F	79	78
7.	F	77	83	7.	M	76	77
8.	M	78	83	8.	M	76	77
9.	F	75	82	9.	F	72	73
10.	F	73	80	10.	F	72	71
11.	F	72	79	11.	F	72	70
12.	F	72	79	12.	M	72	70

13.	F	71	79	13.	F	70	75
14.	F	68	78	14.	F	68	66
15.	F	68	75	15.	M	68	69
16.	M	66	77	16.	F	65	67
17.	M	62	71	17.	M	61	62
18.	M	58	68	18.	M	61	64
19.	M	51	57	19.	M	50	54
20.	M	50	57	20.	M	49	50

## APPENDIX II

### FORMULARS

The following formulae were used in doing statistically analysis:

I. Standard error of the difference between two means

$$SE_D = \sqrt{SD_1^2 + SD_2^2}$$

$$N_1 + N_2$$

II. Computation of t – value

$$t = M_1 + M_2 / SE_0$$

III. Step 1 = correction term(C) =  $(X_1 + X_2) / N_1N_2$

Step 2 =  $SS_{total} = X_1^2 + X_2^2 - C$

Step 3 SS between means =  $X_1^2 + X_2^2 - C$

Step 4 = SS within group\* - SS (Mal - SS Mean\*)

Step 5 = ANOVA table

Source of variance	Degree of freedom	Sum of square	Mean square variation	F
Between group means				
Within groups				

M.S within group =  $\frac{SS_{within\ group}}{df}$

Degrees of freedom within group

F - value =  $\frac{SS_{between\ group\ mean}}{df}$

M.S within group means

T- Value =  $\sqrt{F}$

IV. Factorial design (2 x 2 analysis variance)

Step 1 = correction term (C) =  $(X_1 + \dots)^2 / N$

Step 2 =  $SS_{total} = X_1^2 + \dots - C$

Step 3 =  $SS_{Cds} = N(d_{11}^2 + d_{12}^2 + d_{21}^2 + d_{22}^2) / S$

Step 4 =  $SS_{within\ cell} = SS_{total} - SS_{cells}$

Step 5 =  $SS_{treatment} = N_1(d_1^2 + d_2^2)$

$$\text{Step 6} = SS_{\text{intelligence}} = N_1 (d_1^2 + d_2^2)$$

$$\text{Step 7} = SS_{\text{interaction}} SS_{\text{cells}} = SS_{\text{treatment}} SS_{\text{intelligence}}$$

Step 8 = ANOVA (2 X2) table

Source of variation	Degree of freedom	Sum of squares	Mean square variation	F	P
Treatment					
Intelligence					
Interaction					
Within cells					

## STATISTICAL DATA

(Male Students)

Experimental Group			Control Group		
Students	Previous scores	Scores on post – test	Students	Previous scores	Scores on post – test
1	84	87	1	83	84
2	82	86	2	79	80
3	81	85	3	76	80
4	80	86	4	76	77
5	78	83	5	72	70
6	66	77	6	68	69
7	62	71	7	61	62
8	58	68	8	61	64
9	51	57	9	50	54
10	50	57	10	49	50

## STATISTICAL DATA

(Female Students)

Experimental Group			Control Group		
Students	Previous scores	Scores on post – test	Students	Previous scores	Scores on post – test
1	86	90	1	86	85
2	82	86	2	83	84
3	77	83	3	83	84
4	15	82	4	79	78
5	73	80	5	72	73
6	72	79	6	72	71
7	72	79	7	72	70
8	71	79	8	70	75
9	68	78	9	68	66
10	68	75	10	65	67

**STATISTICAL DATA**

(Low Achievers)

Experiment Group				Control Group			
Students	Male or Female	Previous scores	Scores on post – test	Students	Male or Female	Previous scores	Scores on post – test
1	F	71	79	1	F	70	75
2	F	68	78	2	F	68	66
3	F	68	75	3	M	68	69
4	F	66	77	4	F	65	67
5	M	62	71	5	M	61	62
6	M	58	68	6	M	61	64
7	M	51	57	7	M	50	54
8	M	50	57	8	M	49	50

