Impact Of Computer Aided Instruction in Metal Work Technology.

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CERTIFICATION

I OkupaOgagawih Matric No. 2006/25343BT an undergraduate student of 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 degree of this or any other University.

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APPROVAL PAGE

This project has been read and approved as meeting the requirement for the award of B.Tech Degree in Industrial and Technology Education. Department of Industrial and Technology Education, School of Science and Science Education Federal University of Technology Minna,Niger State.

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DEDICATION

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ABSTRACT

This research was carried out to enable teachers/students participate in the world of computer technology. With recent improvement in computer technology, C.A.I was introduced for the teachers and students to learn how to use C.A.I for teaching of metal work technology. After research done I discovered that male students participate more with computer in class than the female students. I also discovered that student taught with computer perform better than those taught with the traditional method. In effect to that, it was recommended that computer aided instruction should be used for the teaching and learning of metal work in technical colleges.

CHAPTER1

INTRODUCTION

Background of the study

The educational community is increasingly identifying programmes,practices and strategies that are researched based.Initiatives such as the what work are providing independent reviews on the effectiveness of educational interventions (programmes, product, practices, and policies). Both educators and researchers agree that potential of both existing and new technologies in supporting students learning is not in the technologies themselves but the ways they are used as tools for learning.(Valdez &McNabb 1999).

However the research on using technology for different instruction is technology for teaching and learning and on implementation methods for instructional technology. Findings reported in the recent research synthesis by Waxman, Connell and Gray (2000) confirmed the need for more funds to conduct this research in the area of technology and learning. Having more in-depth, new research and rigorous reviews will take time and committed resources. Meanwhile I continue to share the need echoed by families, educators and service providers to improve access to education for students and those willing to learn. Therefore the focus of "tech tips" website is on how commonly available technology can be used in a different classroom setting to support research based strategies. In these recent days computer has made life easier for human labour. I can use computer to create programmes for work to be done that is where I came about the (Computer Aided Instruction).

Computer aided instruction (CAI) includes the use of computer to teach academic skills and promote communication and language development, it includes computer modeling and computer tutors. (CAI) is the organized, processing, storage and dissemination of vocal,pictorial,textual and numeric information by microelectronic based on combination of computing and telecommunication. It has become increasingly visible and important in economic axial and political life. (Akinyemi, 1988). 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 (micro electronics) is having a huge impact on modern life of society.

According to learning the first alliance, the use of computer aided instruction in teaching metal work has become a problem. The overall use of computer to teach metal work has improved since the introduction of professional teaches. Who impact the skills and knowledge to the student.

Computer aided instruction (CAI) is among the range of strategies being used to improve student achievement in metal work, 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 manifestations.

Students are expected to benefit from CAI. The benefits include among others, better and more comfortable learning for students, since they learn at their own pace and convenience, opportunities to work with vastly superior materials and more sophisticated problems, personalized tutoring, automatic measurement of progress and among others.

Teachers are expected to gain from CAI as the experience less drudgery and repetition, greater ease in updating instructional material, more accurate appraisal and documentation of student progress, and more time to work directly with students. (kulic, Bangert, and Williams 1983).With increasing advances in computer technology, computer aided instruction (CAI) is now seen by many as a method of providing relevant instruction for large numbers of students. A number of different approaches to the use of computers in education are reflected in educational practices. A useful classification of these approaches is that of Goldberg and Sherwood (1983). Of these categories – learning from computers, learning about computer, and learning about thinking with computer - the most relevant to this study is learning from computers.

Learning from computers encompasses approaches to CAI in which the computer is used as a means for transmitting specific subject matter, such as reading. The flow of information is basically from the computer to the student, with the computer presenting learning material or activities for student responses. The computer retains records of the student's progress through the course of study. Based on the degree of interaction between student and computer, researchers have identified three levels of CAI:

Dialogue: With this type of computer use, the student takes an active role in interacting with the computer, giving instructions in the form of a computer language so as to structure the student's own curriculum. The computer provides information, exercises, and feedback. Dialogue CAI is believed to come closest to actually substituting for regular instruction (Gourgey, Azumi, Madhere, & Walker, 1984).

Drill and practice: The computer provides the student with exercises that reinforce the learning of specific skills taught in the classroom, and supplies immediate feedback on the correctness of

the response. Used in this manner, CAI functions as a supplement to regular classroom instruction, and may be especially useful when a teacher does not have the time to work individually with each student. Drill and practice on the computer may also motivate student's more than traditional workbook exercises.

Tutorial: Tutorial CAI provides some information or clarifies certain concepts in addition to providing the student with practice exercises. In this sense, the computer begins to take over actual instructional functions, tailored to the student's individual level of achievement.

The verdict for the use of computers in education seems to be in. As stated by the National Center for Education Statistics (NCES):

According to encyclopedia – Technologycan be most broadly defined as the making, usage and knowledge of tools, techniques, craft, systems or methods of organization in order to solve a problem or serve some purpose. The word technology comes from Greek meaning art, skill, craft and meaning study.

Metalwork technology-is the process of working with metals to create individual parts, assemblies, or large scale structures. The term covers a wide range of work from large ships and bridges to precise engine parts and delicate jewelry. It therefore includes a correspondingly wide range of skills, processes, and tools.

Metalwork is a science, art, hobby, industry and trade. Its historical roots span cultures, civilizations, and millennia. Metalworking has evolved from the discovery of smelting various

ores, producing malleable and ductile metal useful for tools and adornment. Modern metalworking processes, though diverse and specialized, can be categorized as forming, cutting or joining processes. Today's machine shop includes a number of machine tools capable of creating a precise, useful work piece. Not all metal required fire to obtain it or work it. Isaac Asimov speculated that gold was the "first metal. His reasoning is that gold by its chemistry is found in nature as nuggets of pure gold. In other words, gold, as rare as it is, is always found in nature as the metal that it is. There are a few other metals that sometimes occur natively, and as a result of meteors. Almost all other metals are found in ores, mineral bearing rocks that require heat or some other process to liberate the metal. Another feature of gold is that it is workable as it is found, meaning that no technology beyond eyes to find a nugget and a hammer and an anvil to work the metal is needed. Stone hammer and stone anvil will suffice for technology. This is the result of gold's properties of malleability and ductility. The earliest tools were stone, bone, wood, and sinew. They sufficed to work gold.

According to Encyclopedia 2011 –Strategy is a word of military origin, refers to a plan of action designed to achieve a particular goals. in military usage strategy is distinct from tactics, which are concerned with the conduct of an engagement, while strategy is concerned with how different engagements are linked. How a battle is fought is a matter of tactics. The terms and conditions that it is fought on and whether it should be fought all is a matter of strategy, which is part of four levels warfare; political goals or grand strategy, operations, and tactics. Building of the work of many thinkers on the subject, one can define strategy as a carefully devised plan of action to achieve a goal, or the art of developing or carrying out such a plan.

Statement of the problem

The use of conventional teaching method by teachers of technical colleges in Metalwork has been a major setback in student's achievement in Metalwork.Teachers in metal work have to spend more time trying to explain a concept while students on the other hand some time are forced to engage on abstract learning (imagining the supposed interactive illustration on a concept that is being taught).

But then this problem seems to be peculiar to our present day colleges of education in Nigeria, and as a developing country the need to curb this problem then arises . in addition , the time required by the learners to use CAI was higher overall than conventional classroom instruction , students taught using tradition instruction combined with the use of computer performed significantly better than students taught using traditional instruction in a college setting (Akour, 2006). Similar , college students taught statistics using lecture-plus-CAI obtained higher avareges on midterm and final exams than students taught using lecture method only (Basturk, 2005). Based on a review of several studies and shortcomings on studies comparing CAI with conventional instruction, CAI can be considered as effective as traditional instruction.

Furthermore, how CAI is delivered can affect its effectiveness, and that new studies are needed to clarify the effect of CAI in contemporary student's environment (Jenk& Springer, 2002). Thus, empirical findings on the use of CAI have been mixed.

Hence, the focus of thisstudy investigated for impact of computer aided instruction in metal work technology in colleges of education.

Purpose of study

The purpose of this study was to investigate the impact of (CAI) in metal work technology in Colleges of EducationZaria,Kadunastate. Specifically, the study is found out:

1. To find out if the student in Zaria,Kaduna state COE are computer literate or know how to use computer.

2.Determine what type of teaching method is being used in teaching metalwork.

3.Identify the strategies to be adopted for improving the use of CAI in teaching metalwork.

Significance of the study

The study if conducted will reveal how CAI will be used to teach student in metalwork in zaria,Kaduna State College of Education. Perhaps this knowledge will give an inciteon how similar system (computer) used and could also be managed properly. it is also hoped that the findings of this study will help the Government in Kaduna state to provide computers in colleges of Education Kaduna.

The study will help to enhance the existing knowledge used in CAI in teaching metalwork.

The findings of this study will be of important to, computer owners, users of computers, colleges of education and the nation at large. The result of this study which will show the benefits of computer aided instruction, will help student of College Of Education to appreciate the benefits of the use of computer to study metal work technology.

The findings of this study which will show how to effectively utilize Computer Aided Instruction in Colleges of Education will help the students in metal work to establish a clear guide line of

responsibilities and will also enhance performance and efficiency in the metalworking industries.

Scope of the study

The study is strictly limited to find the impact of metal work Technology via Computer Aided Instruction in College of Education Zaria,Kaduna state.

Assumption of the study

The following assumptions were held for guiding the study

1. The student of zaria College of Education Kaduna will corporate with the researcher and give their candid opinion on the issues addressed in the study.

2.That responses from the respondent will be reliable enough to draw valid conclusion about the study

Research question?

1. What type of teaching method is being used in teaching metalwork?
2. What strategies where adopted for enhancing the use of CAI in teaching metalwork?
3. Factors that hinder effective use of CAI in metalwork courses?

Hypotheses

The followings research hypotheses were tested in the study.

HO_1: There is no significant difference in the mean response of the students and teachers on the strategies adopted for enhancing the use of CAI in teaching metalwork.

HO_2: There is no significant difference in the mean response of the students and teachers on what type of teaching method is being used in teaching metalwork.

HO_3: There is no significant difference in the mean response of the students and teachers on the factors that hinder effective use of CAI in metalwork courses.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviewed related literature under the following headings:

1. Computer literacy level of students.

2. Impact of the use of CAI in metal work

3.Teaching method utilize for teaching metalwork

4. Summary of review of related literature.

Computer literacy level of students.

Throughout the years the government has continually made emphasis in the importance of mass computer literacy among schools and student at large, at present there is very little to show for the efforts, this is because the level of computer literacy attained is far below average and this is owed to a couple of factor and they include

1. Lack of sufficient hardware: in most of our schools generated a lot of problems, this evident in most of our colleges of education, talk less of elementary schools. This has rendered lame effective take-off of computer literacy in Nigeria.

2. Technical and management problems: associated with the likely replacement cost of established hardware, the equipment which is acquired over a very short lifetime over brief time span.

3. Problem of interaction: Even though the student has one to one interaction with the computer, it is possible for a student to have a feeling of isolation and not being part of a large group. If one objective of an educational program is to enhance the student interpersonal relation on face to face basis.

4. Supply of software: is a major bottle neck obstructing wide application of the computer. This has to commensurate with indigenous resource provision and national educational philosophy.

5. A significant problems of many students, is the typing ability required for the used of the system

6. Furthermore, most if not all of the problems listed above can be curbed or aborted, below are a few steps amid guidelines if carried out properly will help increase the level of computer literacy among students and society at larger.

1. It is suggested that, in evaluating malfunctions of computers, the lights failure and malfunctions of hardware, instructors and computer engineer should be employed.

2. In order for a student and teacher to effectively use a computer based education system, a period of training and acclimatizing is necessary. At times a superficial understanding of system capability and operation can be relatively obtained quickly but to use a system to its fullest extent and capitalized in the advantage of a system require consideration sophistication.

3. The interactions of both staff and student should be encourage so that the student can express them self incase of any difficulty during the time of learning.

4. Emphasis should be placed on the need for software so as to reflect the cultural diversity of the country. The local production of educational software should be encouraged.

5. The need for typing can be utilized by the used of programming techniques that limit the complexity of responses.

Impact of the use of Computer Aided Instruction

Computer aided instruction (CAI) refers to the application specifically design to teach a variety of subject areas to children and adult. In CAI, students receive feedback from the computer, which controls the sequencing of the subject matter (freedman, (1991).

Advocates of CAI have high expectations for the computer as an instruction for identifying and meeting individual needs. Many studies conclude that using CAI to supplement traditional is better than the instruction program itself. Goode (1988) found that fifth and sixth grade pupils scored significantly higher in mathematical concepts and computation than a control group of students who used the traditional approach. Harrison (1993) found that student who received computer instruction showed greater increases in their achievement score in multiplication and subtraction than students who received traditional mathematical instruction.

Burns and Bozeman's study (1981) showed evidence that curriculum supplemented with CAI led to gains in achievement in some areas of curriculum. Tsai and Pohl (1977) studied the effectiveness of the lecture approach and CAI on college students learning how to program.

They found a significant difference when achievement was measured by quizzes or final exam scores. When professors used the lecture approach supplemented by CAI, it was more effective. The lecture approach alone was the least effective method of instruction. Most gender studies try to get at the reasons for males using the computer more than females. Collis and Ollila (1986) examined the gender differences in secondary school student's attitudes toward writing on the computer. Females were significant less positive than their male counterparts on every item that related to computers. Swadener and Hannafin (1987) studied the gender similarities and differences in sixth grader's attitude toward the computer. They found that boys with higher achievement levels in mathematics also had high interest in computers. This is the complete opposite of the females, with the low achieving female students having the most interest in the computers.

Sacks et al. (1994) examined the relationship between alternatives high school student's attitudes toward computer and computer use over a four-month time period. The result of the study showed that girls' attitudes toward computer improved over the course of the study, while boys' attitudes remained the same. Result also found that girls' attitudes toward computer with pre-post correlation were not stable, while boys' attitudes were. However, there were no overall gender differences in actual use of the computer nor did computer use increase across the course of the study.

Generally, students learn very well with science simulation software. Linn (1986) conducted an experiment in which eight eighth grade science classes used computers and Pohl (1977) studied the effectiveness of the lecture approach and CAI on college students learning how to program.

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semester. These students learned to use the computer to collect and display data and save and print out their reports. They used tools such as temperature and light probes, which were attached to the computer, and the results were displayed on their computer screens. Linn found that the students instructed in the micro-based lab outperformed seventeen years old who took a standardized test on scientific knowledge. In addition, these computer-taught students demonstrated a very positive attitude toward experimentation.

Moore et al. (1980) found higher student achievement with the computer simulation when students had to interpret the results of the experiments make decisions. If the students only had to follow direction and calculate the result, there was no difference between the experimental and control groups. Summerville (1984) and Fortner et al (1986) noted similar findings. According to Thomas and Hooper (1991), the result of the science simulation studies are very promising. Even when a study shows no significant difference between students who use the traditional method and students who use the computer, this is encouraging. This means that simulation can substitute for laboratory experiments, which is advantageous because science simulations are less dangerous, less time consuming, and less expensive than actual lab work. CAI research has generally been positive regarding the time it takes to learn concepts. Dence (1980) described several studies in which students learn more quickly with CAI than with traditional instruction. Gleason (1981) reviewed CAI research and interviewed researchers. His conclusion regarding CAI was that it results in a 20 to 40 percent saving in time as compared with traditional instruction. Fisher (1983) reported that students using the computer completed their work 40 percent faster than when they did not have access to it. Krein and Maholm (1990) found that computer- aided instruction lessened by 25 percent the time it look students to

learn the instructional material. A finding common in almost all studies is that the use of CAI reduces learning time, as compared with the regular classroom (Hirschbuhl, 1980).

Teachers face the challenge of motivating students and foster in them positive attitudes to improve their chances for success in school. For example, an essential element for improving students spelling is keeping interest high. There are many studies that report student's positive attitudes toward the computer and how computers motivates students and help them maintain high interest (Hatfiel, 1991). Some researchers have tried to find out if students prefer computer-based method simply because a computer is involved. Other research has focused on the computer's influence on student attitudes toward school and curriculum. Bracey (1982) found that students reacted favorably to computer use for instructional tasks. He reported that students who worked on the computer had a more positive attitude toward the machine than those who had used the computer. Kuliketol. (1983) reviewed studies on student's attitudes toward the curriculum after using CAI classroom. In their met analysis, Roblyer et al. (1988) found that students do not seem to prefer the computer over other media; thus, the results are unclear. Another common finding of studies in this area is that students usually develop a more positive attitude toward computers in general as a result of their exposure to CAI (Russell, 1982).

Although improvement in learning is probably the most sought after result of CAI application, the most positive statement that can be made about it at this time is that most studies show that the use of CAI either improves learning or show no difference when compared to the traditional classroom approach (Alderman, 1978; Gershman and Sakamoto,

1981). In addition to this finding, however, kulak el al (1983), surveying 11 CAI studies involving college students, found differences favoring the development of positive attitudes toward the subject matter as well as toward computer as a result of exposure to CAI. This same finding was also expressed in the study conducted by Gershman and Sakamoto (1981). Although this finding can be considered only as a tentative indication at this time, it certainly points toward a goal that faculty in general shares – to motivate the students to want to learn more about their field on their own. Another experiment, designed to measure the effects of student-teacher contacts on use of CAI, was reported by Tsai and Pohl (1980). Using students in an introductory statistics class at the university level as subjects, they divided the class into several groups. The groups then received instruction for two-week segment of the course in one of the following methods: (1) lecture/ discussion (regular classroom); (2) programmed instruction (i.e., students were told to read materials in a programmed textbook); (3) CAI tutorials; (4) programmed instruction with periodic discussion sessions with faculty; and (5) CAI tutorials with periodic discussions with faculty. Tests were given at the end of the period and again after six weeks in order to measure retention. The results of the achievement tests at the close of the initial two-week period clearly favored the CAI tutorials supplemented by the faculty discussion sessions. However, the results of the retention tests showed no significant differences among the groups.

In another study, students found to be extraverted on personality measures tended to drop out of CAI training at significant levels. However, when human interactions were increased, dropout rates decreased (Hoffman and Waters, 1982)

Teaching method utilized for teaching metalwork

There are two models for designing interactive educational programs. The first, instructional system design (ISD), the traditional model, determines a goal, sets objectives, delivers instruction, formulates test questions, evaluates learning. The second, hypermedia design (HMD) focus on the student's goal and how the student chooses to access information's. While ISD is considered with design goals, HMD focuses on the user's goals. Selection of CAI or web-based design should be based on whether the program is well designed and meets the needs of the intended user's (dewald, 1999).

There are many design models for CAI available today. One model, developed by Ina Fourie in 1994 consisted of seven phases:

Determination of the need and situation analysis

Formulation of aims and performance objectives and development of items for evaluation.

Design of study material, including development of a teaching strategy and media selection and integration (e.g. the inclusion of sound and video).

Development and preparation including story boarding and programming.

Implementation and use

Assessment of student progress

Formative and summative evaluation on a continuous basis.

After each phase is completed, it must be evaluated before moving to the next phase. CAI design projects should consist of several members including o project manager, subject experts,

advisors, evaluators, programmers, and graphic artists. The CAI must meet the needs of its users to be effective. Also computer literacy is a major problem. Students without technology skills will have to master basic computer knowledge before using the CAI successfully.

Good web-based instruction asks students to interact in some way and not just to memorize information. It must be flexible and allow for differences in learning abilities. It should encourage deep learning and not merely surface learning. Students must understand concepts and how they fit into the whole, be able to integrate parts, apply the information particularly, and receive feedback. Web-based instruction provides opportunities for interactivity to make it meaningful for the student (Dewald, 1999). Computer aided instruction (CAI) is defined as the use of computer to provide course content instruction in the form of drill and practice, tutorials, and simulation. Drill and practice is a common CAI form in which a type of repetitive, or "flash card," approach `emphasizes rote memory. It is used extensively at all educational levels (Chambers and Sprecher, 1983). Tutorial use the computer in a higher-level mode in which question-and-answer, dialogue-type learning in the traditional tutor mode is emphasized. Like drill and practice, it is used extensively at all educational levels. Provide a model in which the student plays a role and interacts with the computer. Simulations have been used most often in higher education to model scientific process. They are applicable to any field, however, and can be of significant help in illustrating concepts, in helping students to develop problem-solving techniques, or in allowing students to explore complex interactions.

These three categories-drill and practices, tutorials and simulations-make up what has become known in the United States as computed Aided instruction (CAI), computed-based instruction

(CBI), or computed-based education (CBE). In Europe and elsewhere, these activities are usually referred to ad Computer Aided Learning (CAL).

Characteristics of Computer Aided Instruction

Acts like a super teaching machine catering to the needs of a number of students at the same time. The characteristics aspect of the CAI is its capacity to initiates flexible interactions with the students that is not possible in the teaching machine. There are a number of ways in which this can be brought about. The computer is able to record and store all the responses of all the students. It can use the information in deciding what information to give the student next. It can branch not just in terms of one answer but also in terms of a whole series of previous answers. It can also record the time taken to answer a question and the degree of correctness of the student's response. It uses the information in planning to determine which branch to take (Sampath et al 1990).

A typical CAI installation consists of individual learning booths, each with a console. The student is seated. Facing him on the console is the television screen for displaying information. Before you start a programme, the student must check the computer for it to display his identity number. This connects him with his part of the learning programme. A complete package of information stored in the system is presented sequentially. This information could take the form of video-tape recordings, slides, motion picture films, filmstrips, etc. The student may question the computer and feed answer into it by means of a typewriter keyboard. The computer responds by printing out comments, answers and questions. Sometimes, the student may write directly on the cathode ray tube display screen with a "light pen'. His answer will be

picked by the computer and evaluated. When he has finished, the computer assigns him the next program, records his (Sampath et al 1990).

The CAI starts by identifying the way a student seems to learn best. It reviews his past history of learning and then presents programme built on his strength. Sometimes the computer stores all the information gained from all students who have taken the computer course previously. This information may be re-analyzed and much of the teaching strategies, which were not effective, may be rejected and strategies which have succeeded may be continued (Sampath et al, 1990). Computer Aide Instruction is, therefore, not merely a sophisticated type of programmed instruction but it also uses electronic data processing, data communication, concepts of audio-media theory, communication theory, system theory and learning theory. In contrast of CAI, computer-managed instruction (CMI) analyses the relationship between various factors pertaining to a pupil and suggest activities appropriates to individual students. This includes PLAN (Programme for learning in accordance with needs) and IPI (Individual Presented Instruction). In general, students learn well with CAI in considerably less time (Sampath et al 1990).

Computer Aided Instruction makes use of multimedia software in the learning process including text, video technology, graphics, and sound and internet technology. Computer Aided Instruction, like programmed instruction, has been linear in nature. Web-based instruction on the other hand is nonlinear (Lawson, 1999).

There are numerous unique features of CAI which make it an exciting field. One of the most useful is its adaptability for distance learning. Before the dominance of microcomputers,

distance learning was mostly accomplished through programmed instruction or mail system supplemented by telephone contact. CAI provides regular and timely interaction with the instructor and current feedback. Students can repeal tutorials as often as needed and work at their own pace. CAI also can be used with greater numbers of students than a traditional class room would hold. CAI and web-based instruction have opened avenues of access to individuals with disabilities that were not previously possible. Intelligent Computer Aided Instruction (ICAI) is programmed so that the CAI adapt to the student's individual needs. It acquires information than creates a user profile based on this knowledge. It can then adjust itself to the individual student. Web-based instruction is unique in that student and/or instructor can communicate with each other anywhere in the world within seconds via internet. Feedback from the instructor can be obtained immediately (Moursund, 1998).

Drill and Practice

Computer Aided Instruction facilitates student learning through various methods. Different types of CAI tutorials, simulation, drill and practice, problems solving and games are discussed in the following pages. Although a computer can be used in many ways in the educational programmes, the following are some of the areas where it proves to be effectives in the instructional process.

The student sits at a specially designed electric typewriter, which is connected to a computer by telephonic lines. May identifies himself by a code number and his name. The machine types out the first question and the student responds. Soon the lesson is underway. The computer keeps track of each student's performance and can 'read back' to the teacher a summation of each

student's work whenever the teacher wants it. Depending upon the programme, the student might be referred to a branching type of remedial exercise. As in programmed instruction, the student move at his own pace, gets immediate feedback and receives individual tutoring. Drill and practice software differs from tutorial software in a key way: It helps students remember and utilize skills they have previously been taught, whereas a tutorial teaches new material. Students must be familiar with certain concept prior to working drill practice programs in order to understand the content. The typical drill and practice program design include four steps: (1) the computer screen presents the student with question to respond to or problems to solve; (2) the students responds; (3) the computer informs the student whether the answer is correct; and (4) if the student is right, he or she is given another problem to solve, but if the student responds with a wrong answer, he or she is corrected by the computer (sharp, 1996).

Simulations and Games

These have come into effective use in education during the past decade. Simulations are condensed learning exercise specifically designed to represent vital real life activities by providing learners with the essence or essential elements of the real situation without its hazards, cost or time constraints. Simulations are realistic imitations. According to Thorson (1979), simulation is a mode of education which demands that knowledge be integrated with reality and with behavior. It helps students to perceive values and ideas not as the material for armchair rhetoric, but rather as the base of practical decisions and the touchstones of responsible actions.

Simulations are frequently planned in the form of competitive games to increase motivation and interest. Organized social simulation is called gaming, as for example, historical games. Simulated learning came into prominence during the Second World War when extensive use of this was made to train recruits in psychomotor skills such as aircraft flying, weapon system operation, etc. now simulation may involve simulator trainers or mock-ups. Which are really three-dimensional teaching aids e.g., an aircraft flight stimulator. Role-playing is also a type of simulation, ranging from simple make- believe to play acting drama. Educational simulation and games like all other well- organized learning experiences must be carefully designed with clearly specified objectives. The most obvious use of simulation is in extending the experience of pupils and in simulating their interests. Simulation and gaming increase motivation and self-confidence and an accommodate students of different age and levels of maturity. They approximate reality far more closely than conventional class methods. But some of these take considerable time and demand too much from the teacher. In simulation programs, students take risk as if they were confronted with real life situations without having to suffer the consequences of failure. Students can experiment with dangerous chemical on the computer screen, for example, and not be in danger from the actual chemicals. With laboratory simulations, there is no expensive lab equipment to buy and students do not have to wait a long period of time for the effects of experimental conditions before they can observe the results. Moreover, students can repeat experiments easily as often as they wish. Simulations save time and money, reduces risk, and work well in decision-making situations. Many educators feel that well-designed simulation software affords students the opportunity to apply

classroom knowledge in more realistic situation than can otherwise be set up in a classroom, which enhances students learning (Sharp, 1996).

The strength of a simulation is to force students to retrieve or discover relevant knowledge, experiences and problem-solving skills under authentic situation. Exploratory simulations require students to take more responsibility in learning processes. Active learners are most likely to benefit from this kind of use of computer-based simulation. For non-engaged learner, it suggested that this kind of simulation be used in small groups. Through cooperative learning and social interaction, some students will overcome difficulties which occur when they use simulation by themselves.

In education, simulations have become increasingly popular, especially in science, mathematics, and the social sciences. Many situations in the biological sciences cannot be done in a lab or in short time periods in the field. Simulations give students the chance to experience situations not normally available in classroom settings. Microcomputers, distance learning was mostly accomplished through programmed instruction or email system supplemented by telephone contact. On the contrary, CAI provides regular and timely interaction with the instructor and current feedback. Students can repeal tutorials as often as needed and work at their own pace. CAI also can be used with greater numbers of students than a traditional classroom would hold. CAI and web-based instruction have opened avenues of access to individuals with disabilities that were not previously possible.

Intelligent Computer Aided Instruction (ICAI) is programmed so that the CAI adapts to the students individual needs. It acquires information about the student's currents knowledge of a

subject and his/her goals in learning the subject and then creates a user profile based on this knowledge. It can then adjust itself to the individual students. Web-based instruction is unique in that student and/ or instructor can communicate with each other anywhere in the world within seconds via the internet. Feedback from the instructor can be obtained immediately (Mourund, 1998).

Animation:

Animation means, literally, to breathe life into something. A transformation is involved to move things. It plays significant role in stimulation learning. In the English language animation is mostly associated with the work of film makers. Action is created from a series of images and we have the illusion of something living. Animation is that stimulation to the mental, physical and emotional life of people in a given area which moves them to undertake a wide range of experience through which they find a higher degree of self-realization. (Boal, 1992).

Modeling:

This is similar to the simulation mode in that both help the student to learn by working with an analogue to a real life system or phenomena, expressed as set of rules within the computer. However, whereas in stimulation, the analogue is specific by the tutor, in modeling it is the student who must construct the analogue in effect, the student must “teach” the computer the rules, so that it can emulate the real-life system in given circumstances and correctly predict

the behaviour of the real-life system in new circumstances. The student learns through this process and demonstrates his or her mastery of the learning through the final model.

It is another form of stimulation except that modeling involves conceptual learning opposed to the concrete learning involved in the simulation activities. In a modeling activity via the CAI the learner provides the model rather than the computer. The learner controls the rules and structure of the model. A model may not be realistic or complete. This is because the learners attention' is constantly focused on the understanding of the modeled situation itself (akinyemi, 1988)

according to Shea and self (1983) an example of the modeling activity may be where students are allowed to discovered concepts and nature laws by manipulating ecological or environmental problem. Specifically, sample modeling may be for students to study the effects proliferation of breweries, on sanitation and juvenile delinquency problem in Nigeria. In this exercise student will generate various concepts. The learning involved here is covert and not overt behaviors which can directly be transferred to some real world situations. Students, through this exercise, will be able to discover several concept, rules and law by manipulation a model established by them at the exercise Shea and self, (1983).

Dialogue method: The dialogue mode represents the latest in computer programming (computer revolution). In this mode, the learner can actually talk to the computer and engage in real dialogue. For now, this is still an utopia in the classroom. One problem is the difficulty in devising a computer that c an understand' oral communication especially that of young

children (Suppes, 1975). Though, this problem has been over-come now due to the presence of the multimedia.

Information seeking: The power of the computer to store, retrieve and process information is used to help the student as he or she browses through the material, responding to question about related information; retrieving items which are needed summarized statistical data and suggestion possible lines of investigation that may be of interest.

Problem analysis: This mode represents a very sophisticated use of the CAI as distinct from the problem solving capability of say a simple calculator. Rather, the problem analysis mode is used to establish logical steps that may lead to general rather than specific solutions or correct answers. In this mode, the learner tries to find the logic behind a solution rather than the particular facts or calculation to a rigid answer.

The focus of the problem analysis mode is on logic or order of seeking solution to problem situation (tanner, 1991).

Information handling :A general mode of CAI is for the storage and retrieval of information. Information may be store on subject or course, with necessary information on all the students who have interacted with the programme and who are planned to interact with programme in future. One area in which the information handling capacity of computers is being used to advantage is in guidance and counseling (Burchardt, Frassera and Wells, 1982).

The computer stores cumulative records of students' IQs, grade test scores, extracurricular activities, inventories, and so on, and match them with a wide range of occupational or educational requirement (wittich and schuller, 1979). The computerized management of library management) are United State of America (ayeni, 1992)

Problem-solving method: The problem solving software teach directly through explain and practice, the steps involved in solving problems or help learners acquire problem solving skills. This software provides the student with opportunities to solve problems. The problem-solving may be specific to teaching content area skills or focus on general, content-free skills.

Problem solving skills: In the problem solving method the learner is given the opportunity to be directly in: Defining his own learning tasks, Set his own goals, Collect the data, Rearrange the data, Evaluate the necessary data to help him solve problem, The solution of a problem involves, Understanding the problem, Gathering the data or information relating to the problem, Making of hypothesis, Testing of hypothesis, Evaluation of the solution. Most CAI program employs the problem solving method. Most of these programs help student practice some problem solving skills by presenting problem solving situation to them. For example the instructional use of computer games help learners acquires problem-solving skills that are applicable to life situations. A teacher using the problem solving method assigns problem situations to the students and monitors each student's progress. Student, however, who has mastered the technique can discuss it with the teacher and purpose the solution. The computer presents the problem situation, maintain database, evaluate students' performances and gives the student a feed back. The student on the other hand analyses the problem situation

presented by the computer and defines the problem. He continues using trial and error strategy to manipulate variables in the computer.

Tutorial method: The tutorial method of CAI is based on the principles of programmed instruction developed by Douglas Elison in 1960. In programmed instruction the learner is presented with the information or learning content after which he answers questions based on the learning content. Such contents are usually presented in small unit and each units is followed by questioning. The computer acts as the usually presented in small units each unit is followed by questioning. The computer acts as the teacher or the test book. The learner interacts with the computer in the learning process. Three strategies come into place in this instructional method. These are instruction, practice and feedback. First the computer presents the learning content or the instruction, keeps monitoring the learners' responses assesses performances, provides remedial feedback and keeps record. A teacher using CAI selects the learning package based on the learning objectives. Materials for the tutorial must be judiciously selected to allow students manifest the behavioral objectives at the close of the lesson. The teacher plays the role of director and supervisor by going round the class with the bid to match available resources to suit individual student's needs.

Summary of review of related literature

The characteristics aspect of the CAI is its capacity to initiates flexible interactions with the students that is not possible in the teaching machine. There are a number of ways in which this can be brought about. The computer is able to record and store all the responses of all the students. It can use the information in deciding what information to give the student next. It

can branch not just in terms of one answer but also in terms of a whole series of previous answers. It can also record the time taken to answer a question and the degree of correctness of the student's response. It uses the information in planning to determine which branch to take (Sampath et al 1990).

However, Computer Aided Instruction makes use of multimedia software in the learning process including text, video technology, graphics, and sound and internet technology. Computer Aided Instruction, like programmed instruction, has been linear in nature. Web-based instruction on the other hand is nonlinear (Lawson, 1999).

There are numerous unique features of CAI which make it an exciting field. One of the most useful is its adaptability for distance learning. Before the dominance of microcomputers, distance learning was mostly accomplished through programmed instruction or mail system supplemented by telephone contact. CAI provides regular and timely interaction with the instructor and current feedback. Students can repeal tutorials as often as needed and work at their own pace. CAI also can be used with greater numbers of students than a traditional class room would hold. CAI and web-based instruction have opened avenues of access to individuals with disabilities that were not previously possible. Intelligent Computer Aided Instruction (ICAI) is programmed so that the CAI adapt to the student's individual needs. It acquires information then creates a user profile based on this knowledge. It can then adjust itself to the individual student. Web-based instruction is unique in that student and instructor can communicate with each other anywhere in the world within seconds via internet. Feedback from the instructor can be obtained immediately (Moursund, 1998).

The study carried out by Burns and Bozeman, (1981) showed evidence that curriculum supplemented with CAI led to gains in achievement in some areas of curriculum. Tsai and Pohl, (1977) studied the effectiveness of the lecture approach and CAI on college students learning how to program. They found a significant difference when achievement was measured by quizzes or final exam scores.

A general mode of CAI is for the storage and retrieval of information. Information may be store on subject or course, with necessary information on all the students who have interacted with the programme and who are planned to interact with programme in future. One area in which the information handling capacity of computers is being used to advantage is in guidance and counseling (Burchardt, Frassera and Wells, 1982).

CHAPTER THREE

METHODOLOGY

This Chapter Deals With The Research Design, Area Of The Study, Population Of The Study, Instrument Of The Data Collection, Validation Of The Instrument, Administration Of The Instrument, Method Of Data Analysis, and Decision Rule

Research Design

The study is to determine the impact of Metal Work Technology via Computer Aided Instruction in Colleges of Education in Zaria,Kaduna State.

Area of the study

The study was conducted in tertiary institution in Kaduna State.

Population of the study

The target populations for the study of 60 subjects which consist of 50 students and 10 teachers in Zaria College of Education Kaduna State.

Sample of the study

Since the metal work student constitutes the population, hence, there was no need for sampling.

Instrument for the data collection

The instrument used for collection of data in this study was a structured questionnaire the questionnaire were issued to the respondent which constitute the teachers and student. The questionnaire contained 30-item questions which sought responses to such factors like the factors that hinder effective use of CAI in metal work courses, strategies that where adopted for improving the use of CAI, What type of teaching method is being used in teaching metal work. The questionnaire contain four sections, A,B,C and D. section A comprise of 6 item under the following sub-learning or learning or sections. Question and respond made is on a four-points rating scale of strongly agree (S.A), Agree (A) Disagree (D) and strongly Disagree (S.D). In the questionnaire, respondents were requested to indicate by ticking (√) against the most appropriate options in the space provided in the response column.

Validation of the instrument

A draft of the questionnaire was designed and constructed by the researchers and was validated by the researcher supervisors and some professionals in the department of Industrial and TechnologyEducationFederalUniversity of Technology Minna. Correction, and addition were made by validates before production and administration of instrument.

Administration of the instrument

The researcher administered the questionnaire to the respondent and collected back the completed questionnaire. It was administered to tertiary institution student s and the respondents reported no difficulty in understanding the items of the instrument.

Method of Data Analysis

The data collected by the researcher was analyzed using frequency count, mean, standard deviation, and t-test. The mean response was used to ascertain the central tendency of the respondents' opinion to decide on the items and answers to the three research question used to determine the measures of validity of the responses, t-test statistic were used to test the hypotheses.

Modified scale was developed using strongly agreed, disagreed, and strongly disagreed.

Alternative	**Abbreviation**	**Rating value**
Strongly agreed	S.A	4
Agreed	A	3
Strongly disagreed	S.D	2
Disagreed	D	1

$$\frac{4 + 3 + 2 + 1}{4} = \frac{10}{4} = 2.5$$

Decision Rule

The following guide lines were used to interpret and make decisions on finding of the study.

The mean scores of 2.5 on the four scale was used as a cut-off point to accept items of the research question as being agreed or not by the respondents. Any response with a mean of 2.5 and above was considered acceptable while response below 2.5 was considered rejected.

CHAPTER FOUR

PRESENTATION AND DATA ANALYSIS

This chapter deals with presentation and analysis of data with respect to the research question asked and hypotheses formulated for the study.

Research question 1

What are the current techniques employed in teaching metalwork?

Table 2: Mean Score Of ResponseOf StudentsAndTeacherOn The CurrentTechniquesEmployedIn**TeachingMetalwork.**

S/No	Item	X_1	X_2	X_t	Remarks
1.	Practical works are performed by metalwork Teachers.	3.18	3.20	3.19	Agreed
2.	Demonstration method is used for teaching metalwork	3.36	3.20	3.28	Agreed
3.	Organization of tutorials by the teacher	2.76	2.90	2.83	Agreed
4.	Use of instructional aides are used to teach metalwork	2.96	2.30	2.63	Agreed
5.	Projects are performed by metalwork students	3.28	2.60	2.94	Agreed
6.	Availability of adequate equipments in the workshop to teach metalwork	3.06	2.70	2.88	Agreed

$N_1 = 50, N_2 = 10$

KEY

n_1 = number of students

N_2 = Number of teachers

$\bar{X}_1$= Mean of students

$\bar{X}_2$= Mean of teachers

d.f represents degree of freedom

that is $(N_1 – N_2) – 2$

(50 + 10) – 2

60– 2 = 58

The data represented in table 4.1 revealed that the respondents agreed with all the items with an average mean score ranging between 2.40 – 3.28 respectively .

Research Question 2

Factors that hinder the affective use of CAI in metalwork courses.

Table 3: Mean Score Of ResponseOf StudentAndTeachersOn The Factors That HinderffectiveUse Of CAI In MetalworkCourses.

S/No	Item	X_1	X_2	X_t	Remarks
7.	Lack of interest in computer	1.94	2.90	2.42	Disagreed
8.	Insufficient period in the practical usage of the computer	2.76	2.50	2.63	Agreed
9.	Lack of conducive area for practical work	3.06	2.70	2.88	Agreed
10.	Insufficient material for practical work	3.16	2.80	2.98	Agreed
11.	Metal work technicians are not trained to Understand the underlying principles of various Components of CAI programmes	3.06	3.00	3.03	Agreed
12.	They have very limited educational Background	2.10	2.60	2.35	Disagreed
13.	machine are available for practical work	2.00	2.70	2.35	Disagreed
14.	No adequate electricity supply to power the computers	2.84	2.60	2.72	Agreed
15.	Limited available time to teach the	3.10	2.90	3.00	Agreed

	course				
16	Poor staff and student relationship	2.88	2.70	2.79	Agreed
17	Metal work technicians are not financially buoyant to procure material and gadgets to undertake workplace learning.	3.02	3.10	3.06	Agreed
18	There is no coordination of activities in the workplace	3.12	3.00	3.06	Agreed
19	Evaluation of data by student to Solve problem.	2.72	2.70	2.71	Agreed
20	Lack of financial support by Government in providing adequate equipment.	2.78	2.80	2.79	Agreed

$N_1 = 50$, $N_2 = 10$

Table 3: shows the means responses of students and teachers on the literacy level of the student in colleges of education Zaria Kaduna State. It revealed that item 8, 9, 10, 11, 14, 15, 16, 17, 18, 19 and 20 agreed, while 7, 12 and 13 disagreed.

Research question 3

What are the impacts for the use of CAI in teaching metalwork?

Table 5: Mean ResponseOf StudentAndTeachersOn The ImpactFor TheUse CAI In TeachingMetalwork.

S/No	Item	X_1	X_2	X_t	Remarks

21	Qualified teachers are available in teaching Metalwork using CAI programme.	2.92	3.00	2.96	Agreed
22	Teaching staffs are sponsored for seminars and workshop practice to upgrade there knowledge and skills	2.66	2.90	2.78	Agreed
23	Metal work teachers are encourage to attend Further training	2.90	2.60	2.75	Agreed
24	New staffs are given orientation on workshop, School rules, policies and procedures	2.60	2.60	2.60	Agreed
25	All metal work teachers are equip With Computers	2.40	2.20	2.30	Disagreed
26	Computer as a teaching machine promises increasing design sophistication	2.82	2.50	2.66	Agreed
27	Computer technology assist the Teacher in the learning process in CAI application	3.00	2.80	2.90	Agreed
28	More qualified and competent personnel are Employed in metal work department	2.92	2.80	2.86	Agreed

29	Metalwork teachers have most of the subject Matter	1.88	2.20	2.04	Disagreed
30	Adequate power supply.	2.20	2.00	2.10	Disagreed

$N_1 = 50, N2 = 5$

Table 5 shows the means responses of students and teachers on the impact for the use of CAI in teaching metal work, It revealed that item 21, 22, 23, 24, 26, 27 and 28 were agreed, while 25, 29 and 30 disagreed.

HYPOTHESES 1

HO_1 : There is no significant difference in the mean responses of student and teachers on the current techniques employed in teaching metalwork.

Table 6: T-test AnalysisOf StudentsAndTeachersOn The CurrentTechniquesEmployedInTeachingMetalwork.

S/No	Item	SD_1	SD_2	t-cal	Remarks
1.	Practical works are performed by metalWork Teachers.	0.45	1.02	-0.06	NS
2.	Demonstration method is used for teaching metalwork	0.48	1.02	0.49	NS
3.	Organization of tutorials by the teacher	0.46	1.00	-0.43	NS
4.	Use of instructional aids are used to teach metalwork	0.45	1.22	1.69	NS
5.	Projects are performed by metalwork students	0.46	1.08	1.96	NS
6.	Availability of adequate equipments in the workshop to teach metalwork	0.45	1.04	1.07	NS

$N_1 = 50$, $N_2 = 10$

Key:

N_1 = Number of students

N_2 = Number of teachers

T = t-test

SD_1 = standard deviation of students

SD_2 = standard deviation of teachers

NS = Not significant

S = Significant

Table 6 revealed that the t-test analysis fail to accept the null hypothesis of all the items at 0.05 level of significance. Meaning that there is no significant different for all the items accepted in the mean rating of students and teachers on the current techniques employed in teaching metalwork.

HYPOTHESES 2

HO_2 : There is no significant difference in the mean responses of student and teachers on the factors that hinder the effective use of CAI in metalwork courses.

Table 7: T-test AnalysisOf StudentsAndTeachersOn The Factors That HinderEffectiveUse Of CAI InMetalworkCourses.

S/No	Item	SD_1	SD_2	t-cal	Remarks
7.	Lack of interest in computer	0.65	1.00	-2.90	NS
8.	Insufficient period in the practical usage of the computer	0.46	1.12	0.72	NS
9.	Lack of conducive area for practical work	0.45	1.04	1.07	NS
10.	Insufficient material for practical work	0.45	1.02	1.09	NS
11.	Metal work technicians are not trained to Understand the underlying principles of various Components of CAI programmes	0.45	1.00	0.19	NS
12.	They have very limited educational Background	0.60	1.08	-1.42	NS
13.	machine are available for practical work	0.63	1.04	-2.05	NS
14.	No adequate electricity supply to power the computers	0.45	1.08	0.69	NS
15.	Limited available time to teach the course	0.45	1.00	0.62	NS
16	Poor staff and student relationship	0.45	1.04	0.54	NS

17	Metal work technicians are not financially buoyant to procure material and gadgets to undertake workplace learning.	0.45	1.00	-0.25	NS
18	There is no coordination of activities in the workplace	0.45	1.00	0.37	NS
19	Evaluation of data by student to Solve problem.	0.46	1.04	0.06	NS
20	Lack of financial support by Government in providing adequate equipment.	0.46	1.02	-0.06	NS

$N_1 = 50, N_2 = 10$

Table 7 revealed that t-test analysis fail to accept the null hypotheses of all the items at 0.05 level of significance. Meaning that there is no significant different for all items accepted in the mean rating of students and teachers on the average computer literacy level of the student.

HYPOTHESES 3

HO_3 : There is no significant difference in the mean responses of student and teachers on the impact for the use of CAI in teaching metalwork?

Table 8: T-test AnalysisOf StudentsAndTeachersOn ImpactFor The Use Of CAI InTeachingMetalwork.

S/No	Item	SD_1	SD_2	t-cal	Remarks
21	Qualified teachers are available in teaching Metal work using CAI programme.	0.41	1.00	-0.26	NS
22.	Teaching staffs are sponsored for seminars and workshop practice to upgrade there knowledge and skills	0.47	1.00	-0.74	NS
23.	Metal work teachers are encourage to attend Further training	0.45	1.08	0.87	NS
24.	New staffs are given orientation on workshop, School rules, policies and procedures	0.48	1.08	0.00	NS
25.	All metalwork teachers are equip With Computers	0.52	1.28	0.49	NS
26.	Computer as a teaching machine promises increasing design sophistication	0.45	1.12	0.89	NS
27.	Computer technology assist the Teacher in the learning process in CAI application	0.45	1.02	0.61	NS

28.	More qualified and competent personnel are Employed in metal work department	0.45	1.02	0.37	NS
29	Metalwork teachers have mostly of the Subject Matter	0.67	1.28	-0.77	NS
30.	Adequate power supply.	0.57	1.41	0.44	NS

$N_1 = 50$, $N_2 = 10$

Table 8 revealed that t-test analysis fail to accept the null hypotheses of all the items at 0.05 level of significance. Meaning that there is no significant difference for all items accepted in the mean rating of students and teachers on the factors that hinder effective use of CAI in metalwork courses.

Findings.

Findings related on the current techniques employed in teaching metal work. Both respondents agreed with the followings:

1. Practical works are performed by metalwork Teachers.
2. Demonstration method is used for teaching metalwork

3. Organization of tutorials by the teacher
4. Use of instructional aids are used to teach metalwork
5. Projects are performed by metalwork students
6. Availability of adequate equipments in the workshop to teach metalwork

Findings related to the factors that hinder the effective use of CAI. Both respondents agreed with the followings:

1. Insufficient period in the practical usage of the computer
2. Lack of conducive area for practical work
3. Insufficient period in the practical usage of the computer
4. Metalwork technicians are not trained to Understand the underlying principles of various components of CAI programmes
5. No adequate electricity supply to power the computers.
6. Limited available time to teach the course
7. Poor staff and student relationship.
8. Metalwork technicians are not financially buoyant to procure material and gadgets to undertake workplace learning.
9. There is no coordination of activities in the workplace

10. Evaluation of data by student to solve problem.

11. Lack of financial support by government in providing adequate equipment.

Findings related to the factors that hinder the effective use of CAI in metalwork courses. Both respondents agreed with the followings:

1. Metalwork technicians are not trained to Understand the underlying principles of various Components of CAI programmes
2. The inability to use and operate modern equipment and tools used on the job
3. There is no provision for a competent and skilled workplace instructor
4. They show no commitment to the learning process
5. Metalwork technicians are not exposed to undertaking projects that would stimulates the learning of new skills
6. Metalwork technicians are not financially buoyant to procure material and gadgets to undertake workplace learning.
7. There is no coordination of activities in the workplace
8. Lack of financial support by government in providing adequate equipment.

Findings related to the impact for the use CAI in teaching metalwork in college of education Kaduna State. Both respondents agreed with the followings:

1. Qualified teachers are available in teaching Metal work using CAI programme.
2. Teaching staffs are sponsored for seminars and workshop practice to upgrade there knowledge and skills
3. Metal work teachers are encourage to attend Further training
4. New staffs are given orientation on workshop, School rules, policies and procedures
5. Computer as a teaching machine promises increasing design sophistication
6. More qualified and competent personnel are employed in metalwork department adequate power supply.

Discussion of findings

inability to use and operate modern equipment, lack of competent The findings on the current techniques employed in teaching metalwork revealed that insufficient period in the practical usage of the computer, lack of conducive area for practical work, poor staff and student relationship, no coordination of activities in the workplace and the lack of financial support by Government in providing adequate equipment are the some of the factors that militate against the computer literacy level of the students.

Findings related to the factors that hinder the effective use of CAI in metalwork courses revealed that metal work technicians are not trained to understand the underlying principles of various components of CAI programmes, the and skilled workplace instructor, lack of commitment to the learning process, no coordination of activities in the workplace and lack of financial support by government in providing adequate equipment.

However, findings related to the strategy for improving the use CAI in teaching metalwork in college of education in Kaduna State revealed that qualified teachers should be made available for teaching metalwork using CAI programme, the teaching staffs should be sponsored for seminars and workshop practice to upgrade there knowledge and skills, metal work teachers are to be encourage to attend further training, new staffs are to be given orientation on workshop, school rules, policies and procedures and there should be adequate power supply.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary of the study

Based on the findings, analysis of data revealed that the students taught through computer aided instruction as supplementary strategy performed significantly better. The computer aided instruction was found equally effective as a teaching machine as it promises increasing design sophistication.

Conclusions

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

1. The application of computer resource sharing system in a programmed environment would improve the student learning.

2. Though computer technology assists the teacher in the learning process in CAI application, metal work technicians are not financially buoyant to procure material and gadgets to undertake workplace learning.

3. Adequate teachers of metal work are available in teaching the subjects

4. New staffs are given orientation on workshop, School rules, policies and procedures

5. Metal work technicians are not exposed to undertaking projects that would stimulates the learning of new skills

6. Lack of financial support by government in providing adequate equipment.

Recommendations

In the light of the finding revealed and conclusions drawn from the study, the following recommendations are made;

- An experiment with the student from different colleges needed to examine the effectiveness of computer aided instruction as a supplementary strategy.

- An experiment with greater number of students from different colleges representing a wider range of intelligence, be planned to examine the result of the study.

- The teachers of different subject area should be trained in the use of computer in the classroom.

- Government should make fund available to support the provision of adequate equipment.

- The government and its relevant agencies should establish standard computerized workshops available for metal work technicians.

Suggestions for further study

1. Effects of computer aided instructions on students achievement in metal work

2. Level of implementation of computer literacy program in teaching metal work.
3. Replica of this study should be carried out in all technical colleges' states in Nigeria.

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APPENDIX I

APPENDIX II

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

QUESTIONAIRE ON STATEGIES FOR IMPROVING THE STUDY OF METAL WORK TECHNOLOGY VIA COMPUTER AIDED INSTRUCTION IN COLLEGE OF EDUCATION IN ZARIAKADUNA STATE.

SECTION A

Please complete the following by ticking (✓) or filling the spaces provided

Personal Data:

1. Position held:

Student ( ) Staff ( )

2. Sex:

Male ( ) Female ( )

Please complete the questionnaire by ticking (✓) in response to the following items using the key provided below;

KEY:

Strongly Agree(SA)

Agree (A)

Disagree (D)

Strongly Disagree (SD)

SECTION B

What are the current techniques employed in teaching metal work?

S/N	ITEMS	SA	A	D	SD
1.	Practical works are performed by metal Work Teachers.				
2.	Demonstration method is used for teaching metal work				

3.	Organization of tutorials by the teacher				
4.	Use of instructional aids are used to teach metal work				
5.	Projects are performed by metal work students				
6.	Availability of adequate equipments in the workshop to teach metal work				

SECTION C

What is the average computer literacy level of the student?

S/N	ITEMS	SA	A	D	SD
7.	Lack of interest in computer				
8.	Insufficient period in the practical usage of the computer				
9.	Lack of conducive area for practical work				
10.	Insufficient material for practical work				
11.	Metal work technicians are not trained to Understand the underlying principles of various				

	Components of CAI programmes				
12.	They have very limited educational Background				
13.	machine are available for practical work				
14.	No adequate electricity supply to power the computers				
15.	Limited available time to teach the course				
16.	Poor staff and student relationship				
17.	Metal work technicians are not financially buoyant to procure material and gadgets to undertake workplace learning.				
18.	There is no coordination of activities in the workplace				
19	Evaluation of data by student to Solve problem.				
20	Lack of financial support by Government in providing adequate equipment.				

SECTION D

What are the strategies for improving the use of CAI in teaching metal work?

SN	ITEMS	SA	A	D	SD

21.	Qualified teachers are available in teaching Metal work using CAI programme.				
22.	Teaching staffs are sponsored for seminars and workshop practice to upgrade there knowledge and skills				
23.	Metal work teachers are encourage to attend Further training				
24.	New staffs are given orientation on workshop, School rules, policies and procedures				
25.	All metal work teachers are equip With Computers				
26.	Computer as a teaching machine promises increasing design sophistication				
27.	Computer technology assist the Teacher in the learning process in CAI application				
28.	More qualified and competent personnel are Employed in metal work department				
29.	Metal work teachers have most of the subject Matter				
30.	Adequate power supply.				

The mean response of each item was obtained using the formula.

$$\bar{X} = \frac{\Sigma FX}{N}$$

Where

Σ = Summation of

X = Normal value of Option

$\bar{X}$ = Grand Mean of each item

N = number of response of an item

F = frequency of response to each option

T-test was used to compare the mean of the groups (students and teachers) to determine the relationship between the responses.

Formula for calculating t-test is given as:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{SD_1^2}{N_1} + \frac{SD_2^2}{N_2}}}$$

Where;

t – Test of significant

$\bar{X}_1$= Grand means of group 1 (students)

$\bar{X}_2$= Grand Means of group 2 (teachers)

N_1 = Number of respondents in group 1

N_2 = Number of respondents in group 2

S_1^2 = Variance of group 1

S_2^2 = variance of group 2