# The Need for the Installation of Computer Numerically Controlled (CNC) Machines, in Technical Education Workshop in Rivers State University of Science and Technology

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***ABSTRACT***

*The study was based on the need for the installation of computer numerically controlled (CNC) machines in Technical Education workshop in Rivers State University of Science and Technology. Two research questions and one hypothesis was drawn from the study. Survey research design was used for the study. Random sampling technique was used to select 25 students from year two and three in the department of Technical Education, in RSUST. All the technological instructors in Technical workshop was used as sample for the study as well. Four point likert scales was used to analyse the questionnaire items in the study. Mean response of 3.5 and above was accepted, while 3.49 or below was rejected. The hypothesis was tested at 0.05 level of significance with 30 degree of freedom. The instrument was face validated by two department of Technical Education from University of Education, Iwofe, Rivers State. The reliability of the instrument was calculated to be 0.79 using cronbach alpha methods. Mean and standard deviation was used to analyse the research questions. Student t-test was used to analyse the hypothesis. From the result of the data analysis, items responses from 1-11 of the research question one and two were all accepted. The null hypothesis was accepted as t-calculated value of 0.326 was less then t tabulated value (1.697). It was recommended that Technical Education department should inform the school management on the need to install CNC machines in the workshops. Technological instructions should be sent on training on the use of CNC machines. Finally CNC machinery courses should be inculcated in Technical Education curriculum to update students on current machine shop operations.*

***Keywords:*** *Computer numerical control, Technical Education, machining, installation*

## INTRODUCTION

Technical Education is designed to train technicians and technologist for the world of work in engineering. Basically, Technical Education programmes are divided into building, mechanical and electrical options in most technical institution in Nigeria. Due to the practical nature of Technical Education courses, workshop demonstration and fabrication is mostly carried out during teaching process.

No meaningful instruction and skill acquisition can take place on a workshop environment that is haphazard and inadequate. (Odu, and Nwabudike, 2007). Students should be enlighten with the practice of the use of tools and equipments in the workshop. Workshop practice involves the process of utilizing equipment, tools and consumable in the teaching and learning of skills. It includes demonstration of physical actions and practical application of knowledge by the workshop teacher and students. Most equipment used in Technical Education workshops in Nigeria are old and absolute. With the introduction of computerized system and controls, there is a need for technical institutions to migrate to the use of modern equipments. Some of such modern equipment used in the workshop are computer numerical control (CNC) machines.

CNC machinery is a process used in the manufacturing sector that involves the use of computers to control machine tools. Tools that can be controlled in this manner include lathes, mills, router and griders. CNC machine refers to the ideal of controlling machine tools program via computer (CNC cookbook (2015)). The first NC machines were built in the 1950's and ran from punched tape. By 1970, the economics of most western countries had slowed and employment costs were rising. With the 60's, having provided the firm technology foundation that was needed, CNC took off and began steadily displacing older technologies such as hydraulic tracers and manual machining. CNC machines exist in CNC machine lathes, CNC routes, etc.

In CNC machine, the program is stored in the memory of the computer. The programmer can easily write the codes, edit the programs as per the requirements. The CNC machine offers greater flexibility and computational ability. New systems can be incorporated, into the CNC controller simply by reprogramming the unit.

**How the CNC Machine Works**

The CNC machine comprises of the computer in which the program is fed for cutting of metal of the job as per the requirements. All cutting processes, that are to be carried out and all the final dimensions are fed into the computer via the program. The computer thus knows what exactly is to be done and carries, out all the cutting process. CNC machine works like the Robot, which was to be fed, with the program and it follows all your instructions (B,H, engineering, (2012) some of the common machine tools that can run on the CNC are; lathe, milling machines, Drilling machines, etc. in the CNC machines the row of the operators is minimized.

One of the greatest problems facing vocational Technical Education is that most of the instructor are non-vocationally trained persons (Ibeneme, 2007). There is therefore the need to introduce new and advance technologies in machine shop operation like CNC machinery to see if the knowledge gained will update the standard of teaching and learning in Technical Education.

**PURPOSE OF THE STUDY**

The purpose of the study is to find out;

i. The interest of technology instructors on the installation of CNC machines in technical education workshop in Rivers State University of Science and Technology.
ii. Challenges faced by students when learning with conventional machines tools in technical education workshop in Rivers State University of Science and Technology.

**Research Questions**

The following research questions were used for the study:

i. To what extent are technology instructions interacted on the installation of CNC machines in Technical Education workshop in Rivers State University of Science and Technology?
ii. What are the challenges faced by students when learning with the conventional machine tools in Technical Education workshop in Rivers State University of Science and Technology?

**Hypothesis**

The following hypothesis was tested at 0.05 level of significance;

1. There is no significant difference between the mean responses of technical instructors interest on the installation of CNC machines and student responses on the use of conventional machine tools in Technical Education workshop in Rivers State University of Science and Technology.

**Method**

The survey research design was used to conduct the study in Technical Education workshop in Rivers State University of Science and Technology. The University is situated in Port Harcourt. Department of Technical Education was selected because technical areas such as building, mechanical, and electrical options students work with machine tools.

The population consist of all the student from year two and three in technical education and all the Technical instructors in the technical education workshop in RSUST. Random sampling technique was used to select 35 students from year two and three in technical education, RSUST. All the instructors in the workshop were used as sample for the study. Four point Likert scale of strongly Agree (SA), Agree (A), Disagree (D) and strongly Disagree (SD) were used for the study. The points for SA, A, D and SD are 4,3,2, and 1 respectively. A total of 11 questionnaire items were used for the study. The test instrument, research questions, purpose of the study, hypothesis were face validated by two experts from the department of Technical Education University of education, Iwofe. Their recommendations, suggestions were effected before distribution.

Using cronbach Alpha, the reliability of the instrument was calculated to be 0.79 after a pilot test was conducted with ten students and four instructors in the department of Technical Education in Niger Delta University, Bayelsa State.

Mean and standard deviation was used to analyse the research questions, while students t-test was used to analyse the hypothesis at 0.05 level of significance.

For decision making, a mean score of 3.5 or above was considered as accepted, while a mean score of 3.49 or below was rejected. For the hypothesis, reject the null hypothesis if the t-calculated value exceeds the critical or the t-tabulated value. But if the reverse is the case do not reject the null hypothesis.

**Results**

**Table 1:**

**Research Question 1:**

To what extent are technology instructors interested on installation of CNC machines in Technical Education workshop in Rivers State University of Science and Technology?.

| S/N | Factors | SA | A | D | SD | $\bar{X}$ | SD | REMARK |
|---|---|---|---|---|---|---|---|---|
| 1 | I would love to e trained on how | 4 | 3 | 0 | 0 | 3.00 | 0.64 | Accept |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | to use CNC machines | | | | | | | |
| 2 | I would love the workshop to be equipped with CNC machines. | 5 | 2 | 0 | 0 | 3.71 | 0.67 | Accept |
| 3 | I would love to teach with CNC machines. | 6 | 1 | 0 | 0 | 3.90 | 0.73 | Accept |
| 4 | CNC machines operation will increase my level of experience on machine tool operation. | 4 | 3 | 0 | 0 | 3.60 | 0.64 | Accept |
| 5 | CNC machines will improve my knowledge of machinery in the workshop. | 5 | 1 | 1 | 0 | 3.60 | 0.64 | Accepted |
| 6 | CNC machines will improve my level of accuracy on jobs. | 6 | 0 | | 1 | 3.60 | 0.64 | Accept |

**Table 2:**

**Research Question 2:**

What are the challenges faced by students when learning with the conventional machine tools in Technical Education workshop in Rivers State University of Science and Technology?

| S/N | Factors | SA | A | D | SD | $\bar{X}$ | SD | REMARK |
|---|---|---|---|---|---|---|---|---|
| 7 | The program of operating conventional machine tool is stressful | 20 | 5 | 0 | 0 | 3.80 | 0.70 | Accept |
| 8 | Find it difficult to aspest when learning conventional machine tool in the workshop | 15 | 5 | 5 | 0 | 3.60 | 0.64 | Accept |
| 9 | I find of difficult to understand machining process on workpiece using conventional machine tool | 13 | 11 | 1 | 0 | 3.50 | 0.61 | Accept |
| 10 | Conventional machine tool operation is complex | 14 | 10 | 0 | 1 | 3.50 | 0.61 | Accept |
| 11 | Conventional machine tools are absolute and should be replaced with modern tools | 17 | 5 | 2 | 1 | 3.52 | 0.62 | Accepted |

**Table 3:**

**Hypothesis**

There is no significant difference between the mean responses of technical instructors interest on the installation of CNC machines and student responses on the use of conventional machine tool in Technical Education Workshop in Rivers State University of Science and Technology.

| Respondents | $\bar{X}$ | Student deviation | N | Df | t-cal | t-table | Decision |
|---|---|---|---|---|---|---|---|
| Students | 3.58 | 0.64 | 25 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Technical | 3.67 | 0.66 | 7 | 30 | 0.326 | 1.697 | Accept |

Result table 1:

**Discussion of Results**

Based on the findings of the study, from research questions 1 and 2, it has revealed that all the responses from the various items were accepted, this goes a long way to show that instructors in Technical Education Department need to be exposed to the use of CNC machines. They also need to be trained on how to operate these machines. Ibeneme (2007) stated that for vocational education to take its rightful place in Nigeria development, concert effort should be made towards equipping vocational institution. From the results presented in research question 2, it was revealed that students find it difficult and boning when learning with conventional machine tools. This may be that they have been exposed for a long time on the use of these machines. Therefore there is the need to migrate into modern computerize machinery.

The result from the null hypothesis, revealed that there is no significant difference between the mean responses of technical instructors interest on the installation of CNC machines and students responses on the use of conventional machine tool in Technical Education workshop in RSUST. The null hypothesis was accepted as t-calculated value of 0.326 was less than t-tabulated value of 1.697. This was tested at 0.05 level of significance.

**Recommendations**

Based on the findings of the studies, the following recommendations were made:

i. Vocational/ Technical Education department should inform the school management on the need to install CNC machines in the workshops.
ii. Technological instructors in the workshop should be sent on training on the use of CNC machine.
iii. CNC machines courses should be introduced in Technical Education curriculum to update students on current machine shop operations.

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