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TRACER STUDY ON SKILLS POSSESSED BY GRADUATES OF MECHANICAL ENGINEERING CRAFT PRACTICE TRADE OF GOVERNMENT TECHNICAL COLLEGES IN ADAMAWA AND BORNO STATES OF NIGERIA

Mele E. F. [1], Abana J. [2], Haruna A. I. [3]

[1, 2, 3] Technology Education Department, School of Technology and Science Education, Modibbo Adama University of Technology, Yola Adamawa State, Nigeria

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ABSTRACT

This is a study on 'Tracer Study on Skills Possessed by Graduate of Mechanical Engineering Craft Practice Trade (MECPT) of Government Technical Colleges in Adamawa and Borno States of Nigeria. It was carried out to identify the levels of skills possessed by technical college graduates. Relevant literature related to the study was reviewed. A descriptive survey design was used to guide the study. The population was 223, and the sample size was 171 which comprised of 120 MECPT graduates from five government technical colleges, 15 industrial managers, 30 supervisors and 6 ministries of works officials. The sample size was purposively drawn. Structured questionnaire that had 77 items divided in to 4 sections A, B, C, and D was used to collect data. The data was analyzed using mean and standard deviation to answer the research questions. Analysis of variance (ANOVA) was used to test the null hypotheses at 0.05 level of significance. The findings indicated, among others that, the graduates possessed 90% of the skills required of them. While 10% were completely not possessed by the MECPT graduates. It was recommended, among others that, graduates of MECPT trade should possess the other machine safety and machine operational skills that were not for employment and self-reliance.

1. INTRODUCTION

Tracer studies are often seen as important tools of institutional development, especially now that the world of work is changing rapidly (Schomburg, 2001; European Training Funde (ETF) ,2016; and Quaha ,2017) defined tracer study as a survey in written or oral form about graduates from education institutions, which takes place, normally, between 6 months and 3 years after graduation. And that those educational institutions require systematic feedback, regularly, to assess and renew their curriculum. Tracer study gets to know the whereabouts of graduates, their working conditions and assessment of their courses of study that might stimulate curricular debate and thus become beneficial to the current or later students. Traditionally, tracer studies are used for determining the progress of a particular set of people over a particular time frame for the purpose of acquiring interesting and useful information. In a related development about tracer studies, Luguador and Dotong (2007); Markirvin(2013) and Quaha (2017) informed that, the general objective of a tracer study is to evaluate medium to long-term impact of any education

programme. More concrete objectives include improving the education and training content, study conditions, improving the transition of graduates from classroom to the labour market, and better matching of the supply of skills with the demand and thus inform ministries, other bodies and the labour market about success of the graduates (ETF, 2016).

Hornby (2001) defined Skills as particular ability, experience and knowledge that could enable anyone to do something well.Also, Chells (2o13) defined skill as a quality of performance which does not depend upon a person's fundamental capacities but must be developed through training, practice and experience. And that skills acquired do prepare individuals to be responsible and enterprising. Although skill depends essentially on learning, it also includes the concepts of efficiency and economy in performance in any engineering trade.

Mechanical engineering craft practice trade is one of the trades offered in technical colleges, aimed at training and imparting necessary skills leading to the production of craftsmen who will be self-reliant and enterprising on job areas, such as metal fitting, machining, welding and fabrication, Auto vehicle mechanics, air-conditioning and refrigeration etc. [National Board for Technical Education, (NBTE 2014)]. Federal Republic of Nigeria (FRN,2013) believe that the training will qualify them to secure employment (in both public and private sectors of the economy) at the end of the whole course, set up their own business or become self-employed and be able to employ others; pursue further education in advanced craft programme and in post-secondary (tertiary) technical and vocational institutions such as polytechnic, colleges of education (technical) and universities.

Technical and Vocational Education is defined as that aspect of education that exposes the learner to the acquisition of demonstrable skills that could be transformed into economic benefits and sustainable livelihood [(Ndomi (2005); Okoro (2006); Akerele (2007) and Oni (2007)]. In other words Technical and Vocational Education is that type of education which fits the individual for gainful employment in recognized career as semi-skilled workers or technicians. Technical and vocational education is form of education that is geared towards teaching technical skills and attitudes suitable for success in particular occupation.

Technical Colleges are categories of secondary schools in Nigeria where students acquire training in various skilled trades (Okoro, 2006 and Bakare, 2009). Graduates of Technical Colleges, according to Federal Republic of Nigeria FRN (2014) are expected to possess skills in agricultural implements and equipment, auto electrical work, auto-body repair and spray painting, mechanical engineering craft practice trades, electrical installation and maintenance work, radio television and electrical work, block laying, bricklaying and concrete work, painting and decorating, carpentry and joinery, furniture making and upholstery. Furthermore, graduates of technical colleges are expected to be efficient craftsmen craftwomen who will promote industrial development and produce goods and services. However, personal observation by the current researchers revealed that, the graduates of MECPT from technical colleges in Adamawa and Borno States are unable to set up their own businesses nor are they self-employed immediately after graduation, rather they work as apprentices for some years before they can fully establish their own businesses. Based on this observation, the researchers attempted to find out whether the graduates possessed the machine safety and machine operational skills required for the employment, and to ascertain the levels of skills acquired with a view of suggesting remedial measures towards achieving the goals of mechanical engineering craft practice trade in technical colleges.

2. STATEMENT OF THE PROBLEM

Mechanical engineering craft practice as an engineering trade is offered as an area of specialization in technical colleges. Students who offer this trade area are expected to graduate with skills that will enable them further their education, gain employment in the industry or be self- employed**.** However, outcome of researches conducted by Akplu & Amankrah (2010) and Ayonmike (2016) revealed that most of these technical college graduates in those study areas do not have adequate practical skills for work. Further, the observation by this researchers showed that skills acquired by graduates of MECPT of government technical colleges was inadequate for them to seek employment or to be self-reliant. Acquisition of the adequate skills by the graduates of MECPT of government technical colleges will solve the problems of unemployment, under employment and retraining need by prospective employers. Since tracer study results are used for determining successes and failures of a particular set of people over a particular time for the purpose of acquiring interesting and useful information and in view of outcome of previous and the current researchers' observation, there is need to identify the machines safety and machines operational skills possessed by graduates of MECPT of government technical colleges in Adamawa and Borno states

of Nigeria, with a view of coming up with reliable strength and weakness of the graduates and thus make inform recommendations on this problem.

3. PURPOSE OF THE STUDY

The purpose of this study was to identify the skills possessed by graduates of mechanical engineering craft practice trade of government technical colleges in Adamawa and Borno states of Nigeria. Specifically, the study intended to:

1) Identify the levels of machines safety regulation skills possessed by graduates of mechanical engineering craft practice trade of government technical colleges in Adamawa and Borno states.
2) Identify the levels of machines operational skills possessed by graduates of mechanical engineering craft practice trade of government technical colleges in Adamawa and Borno states.

4. RESEARCH QUESTIONS

The following research questions were raised to guide the study

What is the level of common machines safety regulation skills possessed and the ones not possessed by graduates of mechanical engineering craft practice trade of technical colleges?

What is the level of common machines operational skills possessed and ones not possessed by graduates of mechanical engineering craft practice trade of technical colleges?

5. RESEARCH HYPOTHESES

The following null hypotheses were formulated to guide the study and were tested at 0.05 level of significance.

HO_1 There is no significant difference between the mean responses of four groups of respondents regarding level of machine safety regulation skills possessed and safety regulation skills needed

HO_2 There is no significant difference between the mean responses of four groups of respondents regarding level of machines operational skills possessed and machines operational skills needed

6. SIGNIFICANCE OF THE STUDY

The findings of this study would provide information on the present state of machine safety and machine operational skills possessed by graduates of mechanical engineering craft practice trades of government technical colleges in Adamawa and Borno states that will benefit teachers, students, federal and state ministry of education, National Board for Technical Education (NBTE) and Nigeria as a nation. Now,since tracer study is used to evaluate impact of any education programme, teachers of technical colleges will benefit from the findings of this study because it will provide them with information on levels of skills acquired in technical colleges by graduates and thus enable the teachers to impart the skills that were lacking to the in-school students. The in-school students of government technical colleges will acquire the necessary skills required for gainfull employment and self-reliance. The federal and state ministry of education will be informed on state of education acquired in technical colleges. The findings will also enable the curriculum planner to review and make improvement on the existing curriculum with a view of meeting the demands of industries and higher educational institutions.

7. SCOPE OF THE STUDY

This study was delimited to find out the machine safety and machine operational skills acquired by graduates of mechanical engineering craft practice trade of government technical colleges in Adamawa and Borno States of Nigeria. Specifically, the study find out the level of technical skills possessed by graduates of MECPT in technical colleges, in accordance with the curriculum of National Business and Technical Examination Board, towards meeting the real life work places requirements.

8. METHODOLOGY

This chapter contains description of procedure that was adopted in carrying out the study under the following sub-headings: - Research Design, Area of the Study, Population of the Study, Instrument for Data Collection, Validation of the Instrument, Reliability of the Instrument, Method of Data Collection and Method of Data Analysis.

The study used descriptive survey research design. It involved the collection of data in the attempt to answer the research questions and test the hypotheses. The decision to use survey research design is supported by Laguador (2007) who emphasized that descriptive research is a process of gathering, analyzing, classifying and tabulating data about the prevailing conditions, practices, beliefs, process, and trends, thereby making adequate and accurate interpretations and generalization. For this, descriptive survey design is appropriate for this study in the sense that, it collected data from employers, supervisors and graduates of mechanical engineering craft practice trade of government technical colleges working in the industries in Adamawa and Borno States.

The study was carried out in Adamawa and Borno States of Nigeria. Adamawa State is located between latitude 8° N, 11°N and Longitude 11.5°E, 13.5°E. It is bounded by the Cameroun Republic to the East, Gombe state to the West and Borno state to the North and Taraba State to the South respectively (Anthony 2014). While, Borno State is located between latitude 10 N and 14 N and longitude 11. 3 E and 14. 4 E. It shares a borders with Republic of Niger to the north, Republic of Chad to the northeast and Cameroon Republic to the east, Adamawa State to the south, Gombe State to the southwest and Yobe State to the west (Ctnigeria 2011).

The population for this study was 172 mechanical engineering craft practice trade graduates of five government technical colleges in Adamawa and Borno States, 15 industrial managers, 30 supervisors, working in manufacturing industries in Adamawa and Borno States of Nigeria and also 6 six officials from the state ministries of works in Adamawa and Borno States of Nigeria. The sample for this research was one hundred and twenty 120 graduates from five technical colleges in Adamawa and Borno states that graduated from 2014 to 2017. Purposive sampling technique was employed to draw the sample size of the graduates. The whole population of 15 industrial managers, 30 supervisors and 6 officials from ministries of works in Adamawa and Borno State was used in the study.

The instrument for data collection was a structured questionnaire titled "Tracer Study Instrument for Data Collection (TSIDC). The structured TSIDC questionnaire had (77) items divided into 2 sections A and B. Section A elicited responses on level of machines safety regulation skills possessed. And section B, are items that elicited responses on level of machines operational skills Possessed. Section C, consisted of items that generated information on level of maintenance skills Possessed. The instrument was developed by the researchers using five point rating scale; the response options and their assigned numerical value are as follows:

Highly Possessed	(HP)	5points
Possessed	(P)	4Points
Moderately Possessed	(MP)	3Points
Least Possessed	(LP)	2Points
Poorly Possessed	(PP)	1Points

To ensure validity of the instrument, TSIDC questionnaire was given to three experts from the Department of Technology Education, Modibbo Adama University of Technology Yola, for face validation. All their suggestions and recommendations were used to produce the final copy of the instrument.

To determine the reliability of the instrument, the instrument was trial tested on some employers and supervisors in some manufacturing industries in Gombe and Bauchi states presently employing graduates of mechanical engineering craft practice trade of technical colleges. Cronbach Alfa formula was used to compute the reliability index of the instrument. The reliability results obtained was 0.81.

The feedbacks from the graduate's, supervisors and their employers were obtained using the TSIDC. A covering letter was attached to the TSIDC questionnaire to give clarification on the purpose and significance of the study. In all, one hundred and seventy one (171) copies of the TSIDC questionnaire were distributed to the respondents directly by the researcher with the help of research assistants. The researcher directly collected back the completed questionnaire within three weeks with the help of research assistants. The questionnaire percentage returned was ninety one 91% and nine percent 9% was not returned.

The data collected was analyzed using mean and standard deviation to answers the research questions and analysis of variance (ANOVA) was used to test the null hypotheses at 0.05 level of significance. The grand mean of

the items in each of the research questions was computed by adding the scores in each category. Real limits of the assigned numerical values to the response options, were used to determine the cut off points for interpreting and taking decision when answering the research questions. The limits of numerical values of each of the response options are as follows: 5, 4, 3, 2 and 1. The mean of assigned numerical values to the response options is 5+4+3+2+1 = 15/5 = 3. The real limit of 3 is 2.50 – 3.49. Therefore, for this study these limits were used in taking decision. The decision rule is that, any item with a mean response above 2.50 was considered as possessed skills, while those with a mean below 2.50 were considered as not possessed skills. Analysis of variance (ANOVA) was used to test the hypotheses. The choice of analysis of variance (ANOVA) is appropriate for this study because according to Uzoagulu (2011), analysis of variance is appropriate for analyzing data whose respondents' groups are more than two and the respondents groups for this study are four which is more than two. The decision rule for testing the hypotheses was that, if the calculated F value exceeded the critical F value, the null hypothesis was rejected and if calculated F value was less than critical F value, the null hypothesis was accepted.

9. RESULTS

The following were the findings from this study.

1) The study revealed that all eleven machine safety regulation skills items, like: ability to wear safety protective device correctly, ability to use safety guard, ability to maintained good housekeeping were all rated as possessed skills by graduates of mechanical engineering craft practice trade.
2) The study revealed that all the milling machine and grinding machine operation skills items were rated as possessed while six lathe machine operational skills items, four drilling machine operation items and seven shaping machine operation were also rated as possessed by graduates. While four lathe machine operation, two drilling machine operation and two shaping machine operation items were rated as not possessed by the graduates.
3) There is no significant difference between the mean responses of four groups of respondents on machine safety regulation skills possessed and ones not possessed.
4) There is no significant difference between the mean responses of four groups of respondents on machine operational skills possessed and ones not possessed.

10. DISCUSSION OF THE FINDINGS

The findings of the study were arranged and discussed according to the way the research questions and hypotheses were presented in this study. The findings of this study with regard to research question one revealed that all the eleven items on machine safety regulations, which helps in protecting the workers and equipment in the industries like; ability to wear safety protective devices correctly and rests of the ten items were considered possessed by the graduates. This finding is in line with the findings of Blecha & Bradac (2006) and Varshney(2o16) who found out that, the purposes of safety were well known to the subjects of their studies, and that all people active in industry are also aware of their functional safety interpretations. The term functional safety covers the overall safety of machines, which can be achieved through various means, including fixed or movable guards, electronic, electromechanical or other machine controlling hardware or applications, and information-related measures that generally helps in decreasing the level of risk during machines operations and other processes.

The findings from research question two showed that all the seven items on lathe machine operation skills such as ability to connect lathe machine to appropriate power supply, ability to set up an operating index of the machine, ability to cut thread using lathe machine, ability to maintain accurate records of operations, ability to respond correctly to hazards situations during operation were possessed by the graduates of MECPT. This finding agreed with that of Abifarin (1998) who, while affirming the increasing demand in the training of mechanical engineering craftsmen stated that, products of MECPT have to be exposed to basic practical areas such as principles of operation of both automatic and non-automatic lathe machines. Other areas in which products of MECPT should be exposed to include, metallurgy and production of steels, principles of digital and computerized equipment, foundry technology, tolerance and interchangeability in production.

All the eight items on milling machine operation like, ability to set correct clearance angle, ability to prepare machine properly for the job, ability to supply coolant properly, ability to regrind cutters to the correct angle, ability

to clean the arbor cutter, ability to cut gears and ability to feed, correctly, the milling cutters against the work piece were all rated as possessed skills by the respondents. This finding support the findings of Kibbe, Neely, Meyer and White (1991) who reported that the work of a mechanical engineering craftsman is multi facet, they include all milling operations and equipment maintenance.

The four drilling machine operation skills items, such as, ability to drill holes at points, ability to ream an existing hole, ability to counter bore and ability to counter sink on drilling machine were rated as possessed skills. This is in tandem with the findings of Abifarin (1998) who noted that the increasing demand in the training of mechanical engineering craftsmen demand that they be exposed to basic practical foundations principles of all the types of drilling machines. Grinding machine operational skills needed by the graduates of mechanical engineering craft practice trade to assist in the industrial production process were all possessed by the graduates of mechanical engineering craft practice trade. Some of the possessed skills sampled include, ability to select appropriate grinding wheel to be used, ability to set the work piece at correct angle, ability to feed correctly, the work piece correctly against the wheel and ability to apply coolant properly. This finding corroborates that of Oanu & Ogwu (2006) and Lewis (2011) who discovered that technician's operational knowledge and practical expertise such as the use of grinding machine are necessary for success and that acquiring those skills sufficiently, will make graduates of mechanical engineering craft practice trade operate efficiently in the world of work.

The two null hypotheses were accepted. This means, there is no significant difference between the mean responses of groups of respondents on machine safety regulation skills possessed and machine operational skills possessed. This means that the opinions of four groups of respondents were unanimous. This supports the findings of Teresita & Rey (2016), who discovered that the graduates in their study proved to be proficient and competent and are therefore employable in government cycles as well as non-governmental industries.

11. CONCLUSION

Based on the findings of this study the researchers concluded that the graduates of mechanical engineering craft practice trade of government technical colleges possessed the skills for machine safety, lathe machine operation, milling machine, grinding machine and shaping machine operation for employment and self-reliance. However, the graduates also lack some skills in lathe machine operation, drilling machine and shaping machine.

12. RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made.

Some Lathe machine, Drilling machine and shaping machine operations and skills that were not possessed by the graduates of MECPT should be incorporated in curriculum for MECPT.

Teachers of MECPT should be exposed to all the content of all the necessary skills and be encouraged to effectively teach same to the students before graduation

13. IMPLICATIONS OF THE STUDY

The implication of this study is that, since some of the necessary skills such as those of machine safety and machine operational skills were not possessed by graduates of MECPT of government technical colleges, this is calling for programme improvement and curriculum review by National Board for Technical Education. If this is done, it will help government technical colleges to produce graduates of MECPT that will be employable, be self-reliant to the effect that they will be able to operate machineries safely.

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CONFLICT OF INTEREST

The author have declared that no competing interests exist.

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