SKILLS REQUIRED BY TEACHERS TO CARRY OUT THEIR ACTIVITIES IN WOOD WORKSHOPS IN TERTIARY INSTITUTIONS IN NORTH WESTERN NIGERIA

by

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APPROVAL PAGE

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CERTIFICATION

I, Umar Lawal, a post graduate student in the Department of Vocational Teacher Education with Registration Number PG/M.Ed/10/52441 has satisfactorily completed the requirement for the course and research work for Master Degree in Industrial Technical Education (woodwork technology). The work embodied in this thesis is original and has not been submitted in part or full for any other diploma or degree of this or any other University.

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DEDICATION

This project is dedicated to my Late father Alhaji Lawal Nakantoma Jibia and my Mother Malama Khadija Lawal Jibia.

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Abstract

The study was influenced by the great concern about the future and continuity of woodwork as a skill oriented course which equipped learners with relevant skills for the world of work. The concerned emanated from poor performance in woodwork and low declining skills in performance among tertiary institutions graduate in the North Western Nigeria. The study therefore, focused on the Skills Required by Teachers to carry out their Activities in Wood workshops in Tertiary Institutions in North Western Nigeria. Four research questions were asked and four hypotheses formulated and were tested at 0.05 level of significant. A questionnaire titled óSkills Required by Tertiary level Woodwork Teachers (QSRTWT), consisting of 64 items was structured based on the four research questions: Cutting, Planing and Joint making others are Assembling, Finishing and finishes application as well as Maintenance of woodwork tools and equipment were administered to forty woodwork teachers in seven tertiary institutions in North Western Nigeria (Kano, Kaduna, Katsina, Kebbi, Sokoto and Zamfara states). Data collected were analyzed using the Mean and answered the research questions and t-test statistic was used and tested the hypotheses at 0.05 level of significant. The result of the research questions showed that all the 64 woodwork skills were required by the tertiary institutions teachers. The hypotheses tested revealed that there is no significant difference in the mean responses of the Experienced and Less experienced teachers in the skills required by woodwork teachers in carrying out their activities in wood workshops in tertiary institutions in North Western Nigeria. Therefore, the result of the study showed that there is the need for re-training of teachers in woodwork skills for effective transfer of same to the learners. The study recommended that continuous training and re-training of woodwork teachers in woodwork skills through in service training, workshop and seminars to update their skills is necessary.

CHAPTER ONE

INTRODUCTION

Background of the Study

Technical Education is a course of study that enables an individual to address the complex demands of the environment, through the production of tangible goods and services for the benefit of the society. Technical education is explained by the United Nations Educational Scientific and Cultural Organization (UNESCO, 2002) and the International Labor Organization (ILO, 2002) as a means of preparing for occupational fields for effective participation in the world of work; an aspect of lifelong learning and preparation for responsible citizenship; an instrument for promoting environmentally sound, sustainable development and a method of facilitating poverty alleviation. The goal of Technical Education according to Onwuegbuna (2003) is the transmission of ideas, skills, knowledge and values of work and what an individual can do with his or her life. Therefore, Technical Education enables an individual to acquire ideas and skills for self-reliance.

The term skill could be defined as the level of efficiency achieved or attained through repetitive performance of an operation. Ezeji (2003) referred to skill as a well established habit of doing something in the most economical way involving the acquisition of performance capabilities. According to Abdullahi (2010), skill is the capability of accomplishing a job with precision, cleverness and expertise. It is therefore, necessary for a woodwork teacher to acquire some skills that would enable the woodwork teacher to impart same to the learners. Okorie and Ezeji (1988) remarked that to possess a skill is to demonstrate the habit of acting, thinking or behaving in a specific activity which has become so natural to the individual through repetition or practice that may become automatic. Ogwo and Oranu (2006) stated that, skill requires actual muscular movement of the fingers, hands, arms and other parts of the body, coordinated with the eye and sometimes the ear. Such

movements according to Ogwo and Oranu, involve the use of hand tools, instruments and machines. Careful consideration reveals that when such skills are fully learned, they become fixed muscular habits.

Habits according to Ogwo and Oranu, is a way of doing something which when learned does not require active thinking in order to do it subsequently. Many actions that people perform frequently become habit that is they become automatic by practice. A carpenter in sawing to a line does not exert conscious mental control over each muscular movement as the sawing proceeds. The correct grasp of the saw, the correct angle of the saw to the work, correct pressure and length of strokes have all become habitual through long practice, by watching an experienced woodwork teacher performs the actions in the workshop.

A teacher is a professional person, a leader, an important personality in the classroom situation who is highly knowledgeable in the subject matter. The teacher is not a material that can be created overnight. It takes a long time to train a teacher. The teacher is important because no matter what material is on the ground, a student cannot teach himself/herself effectively without the guidance of a teacher (Adewumi, 2009). The teacher in relation to this study is a wood worker who has acquired professional training in teaching with relevant skills in the use of hand tools and machines. In tertiary institutions, wood workers are generally professional teachers or instructors who have served for many years and are regarded as experienced teachers.

Experience teachers are those teachers who possessed knowledge and skills through involvement in or exposure to something over a period of time. A person with considerable experience can gain a reputation as an expert. Therefore woodwork teachers that served from six years and above with regard to this study are regarded as experienced teachers. Among these teachers there are some that have served for less than six years these are regarded as

less-experienced teachers. These groups make use of wood workshops where some important improvement in skills required becomes necessary.

The skills expected of a woodwork teacher to possess and pass to the students include: cutting, planing and joint making skills. Others are wood project assembling skills, wood finishing and finishes application and maintenance of woodwork tools and equipment skills. Cutting is the separation of a physical object into two or more portions, through the application of an acutely directed force (Bureau, 2012). According to the Bureau, cutting is a compressive and shearing phenomenon and occurs only when the total stress generated by a cutting implement exceeds the ultimate strength of the material of the object being cut. Cutting also describes the action of a saw which removes material in the process of cutting wood John (1994). Beside cutting, planing is the next skill a teacher should acquire for effective workshop operation. Planing is the smoothing of surfaces and edges of sawn timber by taking off shavings by planes (Walton 1976). Planing is removing of imperfections of the piece of wood to make it smooth and attractive. Planing is a vital skill which enable a woodworker to construct a perfect joint for furniture making . Joint is a connection used to put two or more parts together.

Joints in woodwork are devices for holding parts of wooden artifacts or structures together (Sackey, 1999). According to the Sackey, there are varieties of joints and those used for cabinet construction may be categorized into three: widening joints, angle joints, and framing joints. When joints are constructed for the purpose of making an article, they are assembled with either adhesives or mechanical fasteners (nails and screws). Assembling means to collect together or fit different parts together. Assembling in woodwork is the collection of different part of furniture or wooden article together to form a whole using adhesives or mechanical fasteners (screws, butts and nails). After assembling furniture article, the articles are in their natural outlook in order to make them more attractive, they need to be

finish by applying finishes with either brush, spray or roller. Wood finishing refers to the process of embellishing (decorating) and protecting the surface of a wooden material (Flexner, 1994).

Finishing according to Micheal (1992) is the process of applying finishing materials (finishes) to wood surfaces either by polishing, spraying or brushing for the purpose of protection and preservation, decoration or beautification and for hygienic reasons. While Finishes are chemical liquids used in coating wood and metal articles to enhance their aesthetic appearance and for protection against weather effect. Walton (1976) defines finishes as materials such as polish, stain, paints etc. used to coat wood surfaces. The application of particular finish is influenced by the function of the article to be finished. The continuous use of woodwork tools by the woodwork teachers and students render the tools in efficient to perform optimally that is, the tools need to be maintain from time to time. Therefore it is pertinent for a wood worker to possess maintenance skills to enable the woodwork teacher pass these skills to the learners for effective maintenance of tools and equipment in wood workshop.

Maintenance is the art of carrying out a systematic supporting service on any device or being (Parrish, 1993). Maintenance refers to reactivating activity mainly to preserve existing goods, equipment and services for the betterment of people or the entire society (Fadkini, 1998). Maintenance involves the systematic supply of necessary materials for the continuous operation of given equipment. These include: Lubricants, grease, fluid and water. Therefore, woodwork teachers in tertiary institutions should have these skills for effective teaching and learning in the wood workshop.

However, these skills are lacking in the woodwork teachers of tertiary institutions in North-Western Nigeria and are not properly taught to the learners. This is evident in the way and manner the products of these institutions are not able to deliver when it comes to

practical activities in their school workshops and when they are employed as teachers (Onyemachi, 2004).

A workshop may be a room or building which provides the space, tools and equipment that may be required for the manufacture or repair of goods. According to Jibril (2011), a workshop is an area, room or building where machines, equipment, hand tools, workbenches and materials are used in the manufacturing or repairing of things. Ezeji (1999) stated that a workshop provides unique learning environment where learners may experiment, test, construct, dismantle, repair, design and create something. A wood workshop is buildings were tools; machines and wood materials are used in the production of wooden articles under the guidance and supervision of a woodwork teacher. Tertiary institutions workshops are expected to be well equipped to enable woodwork teachers to teach woodwork skills effectively.

Tertiary institutions in relation to this study are Colleges of Education (Technical) and Polytechnics that offer Woodwork Technology as a course and award National Certificate in Education (NCE Technical). These institutions are expected to have qualified woodwork teachers who will impart the required skills to the learners. A qualified teacher, according to the Federal Government of Nigeria (FGN, 2009) is anybody that has educational training with a minimum of National Certificate in Education (NCE) or its equivalent.

Colleges of Education (Technical) and Polytechnics in the study area have training workshops under the control and supervision of woodwork teachers and instructors to carry out their activities. Teacherôs activities according to Ogwo and Oranu (2006) include: Determining supplies, tools and equipment needed for effective instruction; coordinating resources and arranging for the storage of materials and work in progress. Others are: identifying and following policies as regards to safety; students daily shop routines on tools and equipments; supervising studentôs activities like repair of tools, use of tools, equipment

and materials for effective learning. Nwokolo (2006) opined that, teachers activities in wood workshops include: The effective use of hand tools; operation of machines; supervision of studentôs activities; demonstration and maintenance of tools and equipment.

In order to effectively carry out these activities in the workshop, woodwork teachers who are charged with the responsibility of preparing the skilled personnel should possess the necessary skills in cutting, planing and joint-making. Others include: assembling wood project skills, wood finishing and finish application skills and maintenance of tools and equipment. These skills are lacking by the woodwork teachers of tertiary institutions in the North-Western Nigeria judging from their poor performance in practicalôs when employed as teachers. To buttressed this point, Ogundeji (2002), rightly observed that the problem facing technical institution in Nigeria is that of production of un skilled technical personnel who cannot function effectively in the society. According to Ogundeji, the above situation is attributed to lack of skills on the part of tertiary institution teachers or they are weak in teaching practical skills in their school wood workshops.

It is on the basis of these inadequacies that the researcher seeks to find out the skills required by teachers to carry out their activities in wood workshops in tertiary institutions in North-Western Nigeria.

Statement of the Problem

Todayôs world of technology depends largely on highly skilled personnel for productivity. Tertiary institutions have a major role to play in the production of competent personnel for woodwork industries and teachers for the Ministry of Education. It is expected that the graduates of tertiary institutions should possess skills that will enable them perform in their discipline. This is attributed to the fact that the NCE technical graduates are expected to teach in technical colleges. However most of the graduates of woodwork technology lack

some of the skills required to enable them practice their trade effectively. This lack of skills is buttressed by Okorie (1993) that technical institution graduates are not competent enough to take up the available jobs. Oranu (2001) also stated that technical college products are weak in the practice of their trades. In addition, the standard of performance of Nigerian technical graduates in general is at the moment very low thereby retarding the overall productivity of Nigerian economy (Okorie, 2001).

Most of the tertiary institutions in the study area have wood workshops that are poorly equipped. The teachers also lack the required skills in sawing, planing and joint making, assembling wood projects, wood finishing and maintenance of tools and equipment. These weaknesses make woodwork graduate unfit to work in woodwork industries and those that were able to work as teachers always avoid practical classes in the course of their teaching. The consequences of unskilled technical teachers in technical colleges as a result of poor skill training they received from the technical institutions in the North Western Nigeria is that of turning out half baked technical graduates and this will adversely affect the laudable goal of technical education which is geared towards producing skill personnel who will be enterprising and self-reliant which also hinders the technological development of Nigeria (NPE,2004).

Students graduating from tertiary institutions with low level skills find it very difficult to adjust to changing technology in their field. Retraining of these graduates may be very expensive on the part of individuals and government. In order to train students properly in woodwork skills for effective participation in the world of work, the skills of teachers need to be improved to enable woodwork teachers use the wood workshop for effective teaching and learning. It is against this backdrop therefore that the study is undertaken to find out the skills required by teachers to carry out their activities in wood workshops in tertiary institutions in North Western Nigeria.

Purpose of the Study

The major purpose of the study is to identify the skills required by teachers to carry out their activities in wood workshops in tertiary institutions in North Western Nigeria. Specifically the study is aimed at identifying the skills required by woodwork teachers in:

1. Cutting, planing and joint making of wood in workshops in tertiary institutions in North Western Nigeria.
2. Assembling of woodwork projects in wood workshops in tertiary institutions in North Western Nigeria.
3. Wood finishing and finishes application in wood workshops in tertiary institutions in North Western Nigeria.
4. Maintenance of woodwork tools and equipments in wood workshops in tertiary institutions in North Western Nigeria.

Significance of the Study

The finding of the study would be of benefit to woodwork teachers, school administrators, curriculum planners, students and society in general. Woodwork teachers will benefit from the study in the sense that when skills in planing, cutting and joint making as well as wood project assembling, finishing and finishes application and maintenance of tools and equipment skills are fully integrated in woodwork teachers training curriculum, the skills of the teachers would be upgraded this would help the teachers to teach students effectively in woodwork skills in wood workshops. This will invariably motivate the students to learn and also give teachers job satisfaction.

Curriculum planners would also benefit from the finding of the study. The study will highlight skill areas in cutting, planing, joint, assembling of project, finishing and finishes application, as well as maintenance of wood work tools and equipment that required

teachers to be a breast of. This will enable planners to incorporate such skills into woodwork training curriculum for teachers.

School Administrators would benefit from the finding of the study as the finding would help them to see the need for provisions of tools and equipment as well as training of teachers to update their knowledge and skills for the benefit of the students. Students would benefit from the finding of study because when teachers are fully equipped with the required skills, they will instill this knowledge in the students. The students will therefore learn better and be able to work effectively after graduation.

Generally, society would also benefit from the finding of the study because as student graduated with employability skills, it would be easy for such student to get employed or become self employed and even employ others. This would reduce societal problems such as kidnapping, arm robbery and other social vices prevalent in the society.

Research Questions

The following research questions are formulated to guide the study:

1. What are the skills required by woodwork teachers in cutting, planing and joint making in wood workshops in tertiary institutions in North Western Nigeria?
2. What are the skills required by woodwork teachers in the assembling of woodwork projects in wood workshops in tertiary institutions in North Western Nigeria?
3. What are the skills required by woodwork teachers in wood finishing and finishes application in wood workshops in tertiary institutions in North Western Nigeria?
4. What are the skills required by woodwork teachers in maintenance of tools and equipment in wood workshop in tertiary institutions in North Western Nigeria?

Hypotheses

The following hypotheses will be tested at 0.05 level of significance:

Ho_1: There is no significant difference in the mean responses of experienced and Less-experienced teachers on the skills they require for wood cutting, planing and Joint making in the workshop.

Ho_2: There is no significant difference in the mean responses of experienced and Less-experienced teachers on the skills they require in assembling woodwork projects.

Ho_3: There is no significant difference in the mean responses of experienced and Less-experienced teachers in the skills they require in wood finishing and finishes application.

Ho_4: There is no significant difference in the mean responses of experienced and Less-experienced teachers on skills they require in maintenance of woodwork tools and equipment in the workshop.

Scope of the Study

This study is delimited to the skills required by teachers in cutting, planing and wood joint construction. Others are: assembling wood projects, wood finishing and finishes application, maintenance of woodwork tools and equipment. Woodwork skills on upholstery, machine practice, carpentry and joinery are not included. The study will be carried out in the Colleges of Education and Polytechnics in North-Western Nigeria.

CHAPTER TWO
REVIEW OF RELATED LITERATURE

The review of related literature for this study is organized and presented under the following sub-headings:

1. **Conceptual Framework**
   - Woodwork Programme in Tertiary Institutions.
   - Concept of Skill.
   - Wood Cutting, Planing and Joint making Skills.
   - Wood Project Assembling Skills.
   - Wood Finishing and Finish Application Skills.
   - Maintenance of Tools and Equipment Skills.
2. **Review of Related Empirical Studies**
3. **Summary of Review of Related Literature**

Woodwork Programme in Tertiary Institutions

Woodwork is a course of study which enabled an individual to acquire skills in theory as well as practical aspect of the subject (woodwork). But the emphasis is more on the skill acquisition in order to provide students with skill for self reliance. According to Agbo (2000), woodwork technology is that type of training intended to prepare the students to earn a living in an occupation in which success is dependant largely on understanding of technology as applied to modern technology and design. This type of education provides skills, knowledge and attitudes for effective occupation (Okoro, 2000).

Woodwork technology programme is one of the key aspects of technical education that is offered in tertiary institutions (colleges of education technical and polytechnics). Technical education is the type of education that is design to provide in addition to general education, the study of technologies and related sciences and the acquisition of practical skills and knowledge relating to occupations in various sectors of economic and social life.

The success of woodwork programme depends largely on the effectiveness of woodwork teachers to operate, use and maintain the basic woodwork tools and equipment provided in the workshops. Where woodwork teachers could not operate, use and maintain woodwork equipment for continues use in training woodwork students, technical training programmes will suffer, this will lead to the production of highly unskilled personnel who are unemployable and unproductive. According to Sara (2000), more than 60% of the staff teaching woodwork in tertiary institutions could not perform the skills or provide technical services they were expected to teach others despite their high level paper qualification. This is of course due to non-skill acquisition from their respective institutions of higher learning.

Tertiary institutions are institutions that provide an advance education after secondary education in universities, colleges of education, polytechnics, monotechnics, including those institutions offering correspondence courses (FGN, 2004). Tertiary institutions that offer woodwork technology at National Certificate in Education are the Polytechnics and colleges of education technical that offer technical courses at NCE level.

The philosophy and objective of technical education programme in colleges of education which woodwork is included as spelt out in the Nigerian Commission of Colleges of Education minimum standard as follows:

The philosophy of NCE (technical) programme is to provide technical teachers with the intellectual and professional background adequate for teaching technical subjects and to make them adoptable to any changing situation in technological development not only in the country but the world at large. While the objectives of NCE (technical) is to produce NCE Technical Teachers who will be able to inculcate Scientific and Technological attitudes and values in the society, to provide qualified technical teachers motivated to start the more desired revolution of technological development right from the Nigerian schools and to

prepare technical teachers so as to qualify them for POST- NCE degree program in technical education.(FGN, 2009)

Woodwork programme in tertiary institutions is design to provide theoretical and practical skills by exposing students to drill practices for mastery in the use of tools and equipment for Cutting, planing, construction of joints, assembling of woodwork articles, applying different types of finishes on furniture article as well as maintenance of tools and equipment in the workshop.

Concept of Skill

Skill has been defined in many ways by different authors. Skill could be defined as the level of efficiency achieved or attained through the repetitive performance of an operation. Skill according to Osuala (1981), means ability to perform an operation or act well and expertly. Hull (1972) defined skill as manual dexterity through the repetitive performance of an act. Okorie and Ezeji (1988), remarked that to possess a skill is to demonstrate the habit of acting, thinking or behaving in a specific activity which has become so natural to the individual through repetition or practice that may become automatic. Osuala (1998) viewed a skilled operator as a person competent to perform, to operate a machine with high degree of expertness or to work in one or more specialized divisions of a given trade.

Okorie (2000) remarked that, skill is a well established habit of performing a job and that it involves acquisition of performance capability. One common characteristic of all the definitions is that, skill deals with the acquisition of performance ability which enable a skilled individual to perform at the most economic level. Thus a skilled person has the ability to act, think or behave in a particular way, particularly in a way which has become part and parcel of the individual.

Eheizojie (1993) commented that in learning a skill, about 65 percent of time is spent in practice. To obtain a functional technology in our institutions, he recommended that, well equipped workshop and functional machines and tools must be provided.

Wood Cutting, Planing and Joint Making skills

Cutting is the separation of a physical object into two or more portions, through the application of an acutely directed force (Bureau, 2012). According to the Bureau, cutting is a compressive and shearing phenomenon and occurs only when the total stress generated by a cutting implement exceeds the ultimate strength of the material of the object being cut. The simplest applicable equation is, stress is equal to force divided by area. The stress generated by cutting implement is directly proportional to the area of contact. Hence the smaller the area (i.e. the sharper the cutting implement the less force is needed to cut something).

An implement commonly used for cutting is the knife or medical scarpel. However, any sufficiently sharp object is capable of cutting if it is applied with sufficient force. Cutting also describes the action of a saw which removes material in the process of cutting wood.

John (1994) stated that, when cutting wood length wise in order to protect the stock and the worker, the woodworker need to follow the following guide lines:

1. Placed the stock with the annual rings up, to avoid splittering at the end of the cut.
2. To begin the cut, grasp the handle of the saw with the fore-finger straight out on one side of the handle. Clamp the thumb and other fingers tightly around the handle openings.
3. Put your left thumb against the smooth surface of the blade to guide the saw in starting.
4. Start the saw near the handle and draw up on it to begin the kerf (cut).
5. Hold the saw at an angle of about 45^{o} degrees to the stock. Make sure that cut is started outside the measuring line. This will keep the kerf in the waste stock.

John emphasized that, if an individual begin the cutting on the downward stroke, the saw may jump out of place to cut the users finger or nick the wood. Therefore, draw up on the saw once or twice before the cutting begins. When cutting establish a steady even movement. Do not force the saw. If it is sharpened its own weight is enough to make the saw cut correctly.

Floyd (2006) commented that, when starting a cut on a piece of timber, the woodworker is expected to press the blade of the saw against a thumb and ensure that the thumb is above the teeth and steady with the index finger and with the rest of the hand on the stock. Ogwo and Oranu (2006) stated that manual skills are part of what the vocational education teacher wishes the students to learn. These skills require the actual movements of fingers, hands, arms and other parts of the body coordinated with the eye and sometimes the ear. Such movements are involved in the use of tools and equipment. Careful consideration reveals that when such skills are fully learned, they become fixed muscular habits. According to the authors, a carpenter, in sawing to a line, does not exert conscious, mental control over each muscular movement as the sawing proceeds. The correct grasps of the handsaw, the correct angle of the saw to the work, correct pressures and length of stroke have all become habitual through long practice.

William (1990) recommended that when sawing timber with a handsaw, the woodworker is expected to use reciprocal (back and forth) motion. He should move the saw in straight line, holding it at the proper angle. For rip saw, it has to be at 60 degrees angle; cross-cut saw, 45 degrees, other saws are held at 90 degrees or parallel with the work. When cutting with a saw apply full stroke as much as possible. If the saw teeth are sharp only slight pressure is necessary. The author further enumerated the following steps in cutting wood. These include:

1. Select the correct saw according to the grain direction and type of cut.

2. Align the blade beside your thumb at the saw mark.
3. Start the kerf by pulling the blade on the return stroke across corner.
4. Apply slight downward pressure to keep the blade from jumping out of kerf.
5. Relax the pressure on the back stroke.
6. Use a guide if possible to maintain alignment.
7. Shorten stroke and reduce pressure as you near the end of the cut.

Apart from hand sawing, machine tools are also involved in sawing stock accurately to sizes. A machine is a power driven mechanism usually fixed on the floor or carried by hand while performing operation. Feirer (1994) opined that cutting a stock on a circular sawing machine needs some expertise on the part of the operator, and to successfully carry out sawing operation on the machine, he enumerated the following steps:

- Adjust the ripping fence to the correct width.
- Lock the fence tightly.
- Adjust the blade 6mm above the thickness of the stock.
- Place anti-kick back and splitter in order.
- Turn on the machine.
- Place the stock on the table.
- Stand to one side, not directly at the back of the saw blade.
- Apply forward pressure with one hand as you hold the stock against the fence with the other hand.
- Do not apply too much forward pressure on a small piece.
- When cutting a narrow width, hold push stick in your hand.

Apart from cutting skills, a woodworker needs planing skills.

Planing is the smoothing of surfaces and edges of sawn timber by taking off shavings by planes (Walton 1976). Planing is removing of imperfections of the piece of wood to make

it smooth and attractive. Hand planes are generally the combination of a cutting edge such as sharpened metal plate attached to a firm body, that when moved over a wood surface, take up relatively uniform shavings by nature of the body riding on the high spots in the wood, and also by providing a relatively constant angle to the cutting edge, to render the plane surface very smooth. A cutter which extends below the bottom surface or sole of the plane slices off shavings of wood. A large, flat sole on a plane guides the cutter to remove only the highest parts of an imperfect surface, until after several passes, the surface is flat and smooth.

Floyd (2006) recommended that planing should always be done along the grain in order to have a smooth surface. Planing against the grain will roughen the surface of the wood. In order to successfully hand plane a stock, the operator is expected to exhibit the following skills:-

1. Grasp the knob of the plane in his left hand and the handle in his right hand.
2. Stand back of the work with the left foot forward.
3. Swing the body back and forth as he planes.
4. Place the toe or front of the plane on the board.
5. Apply pressure to the knob at the start of the stroke.
6. As the base contacts the work, apply even pressure to the knob and handle.
7. As the plane begins to leave the surface, apply more pressure to the handle.
8. Lift the plane off the wood on the return stroke and do not drag the plane back. This will dull the blade.

Sackey (1999) stated that planing is the second essential operation in preparation of work piece after sawing. When work pieces are well planed, squared and true, they produce better job. The most efficient way of planing wood is by using planing machines. To plane wood with machine, according to the sackey, the following procedures are followed:-

a. Set the depth of cut at 1.6mm.

b. Set the fence to accommodate the work piece width.

c. Turn on the machine.

d. Determine which direction to feed the work piece.

e. Hold the board with your left hand. Guide the work piece forward with your right hand.

f. Feed the work piece at the moderate rate. Rapid movement will tear or splinter the wood. If moved too slowly, black burn marks will appear.

Hoadley (2000) opined that planing wood along the grain results in thin shavings rising above the surface of the wood as the edge of the plane iron is pushed forward, leaving a smooth surface. The grain direction can be determined by looking at the edge or side of the work piece. Wood fibres can be seen running out to the surface that is being plane.

George (1981) stated that clear understanding and mastery of basic tool manipulations pave roads to success in craftwork and in this respect preparation of timber accurately to sizes and with all faces square to one another is probably the most difficult and frustrating task to the beginner. A sound knowledge of the principles and diligent practice will help to overcome these and other difficulties as they are encountered. The author suggested the following steps in planing:

- Select the face ï side and face edge. These are the two adjacent faces most completely free from knots and other blemishes.
- Place the face side as soon as all the saw marks disappeared; test it with straight edge along the length and across the width.
- Plane the face edge, test it with the straight edge along the length.
- Gauge the wood to width by using marking gauge both on the face side and on the back.
- Plane off waste wood taking care not to pass the gauge lines.

- Gauge the wood to thickness along both edges.
- Plane off the waste wood.

According to Hack (1997) success of woodwork programme depends largely on the effectiveness of woodwork teachers to operate, use and maintained the basic woodwork equipment in the school workshops. According to the author, planing is one of the basic skills that a teacher is expected to have and pass same to his students. The woodwork teacher should always try to plane in the grain direction, set up the plane correctly to make the job easier. On the plane body, there are two screws, underneath the blade, which can be loosened to adjust the width of the mouth. The wider the opening, the thicker the cut. The depth of cut is adjusted by turning the brass knob behind the blade and the literal adjustment lever should be used if the blade protrudes at an angle. Make sure the cap iron is set close to the blade edge at 1.5mm to give a fine cut.

Besides cutting and planing, woodworkers also make joints and need to have skills in making them. Joint is a connection used to put two or more parts together. Joints in woodwork are devices for holding parts of wooden artifacts or structures together (Sackey, 1999). According to the author, there are varieties of joints and those used for cabinet construction may be categorized into three: widening joints, angle joints, and framing joints.

Joints that are classified as widening joints are those used for holding together a number of narrow boards edge to edge to provide a wide board. Among these joints are: butt, tongue and groove, rebated, dowelled and slot screw joints. Angle joints or corner joints are used for joining boards when their faces meet at right angle with the flush edges. They are mostly used in box-like constructions, such as drawers, boxes and solid cabinets, they include: simple butt, plain mitre, rebated butt, housed and shoulder, and dovetailed joints.

Framing joints are those that are commonly used in forming frame-like constructions where the pieces meet end to end with their edges at right angle, they include: dowell joint, halving, bridle and mortise and tenon joints.

William (1999) enumerated the following procedures or steps in constructing joints ï

1. Make the work piece perfectly plane and square at all edges.
2. Use try-square, marking gauge, sliding bevel and pencil to mark the joint.
3. Use back saws (Tenon or dovetail saw) to cut out waste. Saw close to the line on the waste side of the line, as possible.
4. Use chisel and mallet with correct force to remove out waste.
5. Assemble the parts to ensure that they are well prepared.

Geoffs (2003) suggested that, one of the most fundamental skills in woodworking is learning to make joints. The type and techniques that can be used to make the joints depend on the requirements of the pieces but precision is required in the measuring, marking, sawing and planing to ensure a perfect fit.

Wood Project Assembling Skills

Assembling means to collect together or fit different parts together (Webster, 2008). Assembling in woodwork is the collection of different part of furniture or wooden article together to form a whole using adhesives or mechanical fasteners (screws, butts and nails) or knockdown fittings.

Fabbro (2000) stated that, instructions for assembly should be provided with each design. However, knowledge of constituents of adhesives and components of fasteners and hardware as well as their applications are essential. Joint should be executed after marking as indicated in the detailed drawing. After the main parts of a project have been assembled, angles are tested with try-square before final clamping. The author identified the following steps as useful guide to project assembly:

1. All completed parts should be verified including sanding. Identification marks should be indicated on all pieces to show exactly how they are to be fixed.
2. Method of assembling to be decided, either the project will be assembled with glue, screws, nails or knock-down fittings.
3. Provide pieces of scrap block for protecting the project from deflection during clamping.
4. For large projects, sub assembles them in parts.
5. Have a trial assembly, use square to check the correctness of levels and angles.
6. If screws are included, select the right type and size.
7. When applying glue, mix only the amount needed at a time.
8. Apply glue to the joints and ensure not to put too much.
9. Assemble the parts quickly and apply clamps with scrap blocks.
10. As the project is clamped together, remove excess glue and store the piece or project where it can dry without being dumped.

William (1999) indicated that assembling usually occurs after all components have been cut to sizes and smoothened. It can be done with mechanical fasteners such as screws, nails, staples or with adhesives. When using adhesives according to the author, one must consider terms like port-life, set-time and drying or curing time. Port life of an adhesive is the time used before setting starts; set time and curing time equal the drying time. Set-time identifies minutes or hours before the water or thinner in the adhesive evaporates. Curing time is the time when the adhesive reaches its full strength. Walton (1976) recommended that assembly of large jobs should be carefully planned and often consists of three stages:

1. Trial assembly of members and joints without glue to see that they fit together properly and that all job is square and out of winding.

2. Sub-assembly required for such items as chairs and tables, framed car cases, etc. where it is necessary to glue up one or two units of the job at a time.
3. Final assembly where various units are brought together to complete the job.

Feirer (1994), emphasized that, before any assembly of a project, the woodworker should get together all parts that are to go into the finished project. Parts should be scraped and sanded. If there are duplicate parts, rails or legs, check each one of them to make sure that they are all exactly the same in size and shape. If the project has joints, try each joint to see that it fits properly. Check to ensure that joints are clearly marked and can be seen after glue is applied and after the joints are assembled. This checking is important where there is a need to make some small corrections before assembling the project. After assembling, finishing and finish application is the next skill a woodworker requires.

Wood Finishing and Finishes Application Skills

Wood finishing refers to the process of embellishing (decorating) and protecting the surface of a wooden material (Flexner, 1994). Finishing according to Micheal (1992) is the process of applying finishing materials (finishes) to wood surfaces either by polishing, spraying or brushing for the purpose protection and preservation, decoration or beautification and for hygienic reasons.

Feirer (1994), revealed that good finish cannot cover up mistakes and beautiful finishing of a product cannot be realized without careful and thorough sanding. The woodworker must remove all imperfections, scrape and sand the surface, in addition, he or she has to sequentially apply stain where it is applicable, use wash coat to keep stain from bleeding, fill pores, glaze and seal the surface before applying the actual finish.

Fabbro (1998), stated that, careful preparation of the raw wood is required before they received finish. Neglect of this important point is costly in terms of material and labour. Wagner and Kicklighter (1986) emphasized that all defects should be repaired before

applying finish. The woodworker is to coat hard to reach surfaces first then edges and ends before coating surfaces, bottoms and tops respectively. The woodworker is required to be competent in the use of finishing tools and equipment. An understanding of finishing tools and equipment by the woodworker is as much necessary as understanding of material (finishes) if he is to perform efficiently.

According to William (1990), finishing affects the quality of any product, no matter how well it is designed and constructed. Finishing products (finishes) will either build-up on or penetrate the wood surface. Built up finishes form a film on the surface of the wood. The film resist scratches, dents and some liquids. Penetrating finishes are absorbed into the surface. Before applying any finishing material, according to the Williams, follow the following steps:

- Remove any dried adhesive with a sharp chisel/hand scraper.
- Raise dents by applying wet rag and warm iron over the dent.
- If the wood has been chipped away, make repair with wood putty.
- Leave tiny defects if you will be using filler on an open grain wood.
- Lightly sand the product where glue was removed.
- Remove dust from the surface with fine brush, vacuum cleaner or clean rag.
- Apply the desire finish.

According to George (1971), it is essential before applying any finishing material to make sure that wood surfaces are kept perfectly smooth and free from oil, wax and blemishes before any form of finishing materials is applied. The author suggested the following steps in preparing a surface for finishing. These include:

- Smooth the surface using well sharpened smooth plane.
- Where possible raise grains by applying hot water on the surface.
- Use scraper to remove imperfections that cannot be removed by planning.

- Use thinner or benzene to sponge off grease and oil.
- Remove traces of glue from the surface using a sharp chisel.
- Fill nail holes, checks and open joints with patching material such as plastic wood and wood putty.
- Use proper grade glass paper and sand down the surface, i.e. rough, medium and smooth grade glass paper.
- Remove dust by brushing or by using air blower before applying finishes.

Finishes are chemical liquids used in coating wood and metal articles to enhance their aesthetic appearance and for protection against weather effect. Walton (1976) defines finishes as materials such as polish, stain, paints etc. used to coat wood surfaces. The application of particular finish is influenced by the function of the article to be finished.

According to Micheal (2008), finishing a product involves applying a protective coating that either penetrates or build up on a wood surface. Application practices which produce a quality finish include: brushing, spraying, rolling. Other automated method of finish application include hangline and towline approaches. According to the author, before applying any finish, the woodworker must plan a step by step procedure in order to create a high quality finish. When using brush to coat an article the author outline the following procedures:

1. Load the brush by dipping inside the finish to cover no more than half the bristle length.
2. Tap the brush on the inside edge of the container to remove excess finish to prevent dripping.
3. Touch loaded brush to the surface.
4. Keep the brush at a 15 degrees angle while moving it along the grain.
5. Work towards the wet edges of a coated area.

6. Apply light pressure.
7. Cover overlap passes about 10 percent or less when staining, overlap 50 percent when spreading filler and 25 percent when applying top coating.
8. Avoid repeated brush strokes over any areas.
9. Remove runs, sags, air bubbles, and dust by holding brush perpendicular to the surface.

When spraying, according to the author, adjust the air flow, fluid trigger and fan shape and width. Test to find the ideal air pressure to give you the best results. Start at 30psi (pound per square inch) and spray on scrap wood. Raise the pressure in 10psi increment up to 80psi to find the sweat spot for spray. Once the gun is set up, hold it about eight inches from the work and keep it moving at right angles to the spray fan at all times. Keep the gun parallel to the work and spray in straight lines. Pull trigger just before the spray enters the work and release it just after it passes the end of the board.

Rollers are also used to apply finishes quickly on wood surfaces but it usually comes out chockfull of air bubbles and application marks, in order to get good finishing by rolling, you need to use brush after rolling to get a good smooth finish. In addition to brushing, spraying and rolling, manufacturers of wood products that mass produce woodwork articles uses automated wood finishing methods.

According to Flexner (1994), there are two common methods of automating wood finishing these are: hangline approach and towline approach. In hangline approach, according to the author, wood items being finished are hung by carriers or hangers that are attached to a conveyor system that moves items overhead or above the floor space. The operator of hangline can easily access all part of the furniture item for processes such as sanding, sealing and painting. While towline approach in wood finishing uses mobile carts that are propelled by conveyors mounted in or on the floor. This approach is useful for

moving large, awkward shaped wood products that are difficult or impossible to lift or hang overhead. The mobile carts, used in towline approach can be designed with top platens that rotate either manually or automatically. The rotating top platens allow the operator to have easy access to all sides of the wood item throughout the various wood finishing processes such as sanding, sealing and painting.

Maintenance of Tools and Equipment Skills

Life cannot go on unless it is systematically sustained. This is one of the reasons why animals eat to nourish their bodies. In the times of sickness, health restoration is sought through medication. What can be said of human beings can also be said to machines and tools. They too require adequate maintenance, and in times of breakdown, complete repairs have to be effected. Maintenance is essential to reduce failure rate and ensure machine operation (Abdullahi, 2002).

Maintenance is the art of carrying out a systematic supporting service on any device or being (Parrish, 1993). Maintenance refers to reactivating activity mainly to preserve existing goods, equipment and services for the betterment of people or the entire society (Fadkini, 1998). Maintenance involves the systematic supply of necessary materials for the continuous operation of a given equipment. These include: Lubricants, grease, fluid and water.

Olaitan Nwachukwu, Oyemachi, Igbo and Ekong (1999), defined maintenance as taking specific approved steps and precautions to care for a piece of equipment, machinery or facility to ensure that it attains its specific maximum functional shelf-life. Makun (2000) remarked that the concern of any programmes of maintenance is to extend the useful life of the assets, ensure efficiency in the functioning of machines at all times, and enhance the readiness of machines. Orikpe (1994) defined maintenance as deliberately planned action

aimed at ensuring that a given piece of equipment functions as specified by the manufacturers. This involves planned supply of necessary materials for the continued operation of the equipment. According to the author, maintenance refers to the appropriate and timely steps and precautions taken to ensure that a given piece of equipment attains maximum life span.

Usman (1995) remarked that, maintenance of equipment and other material resources involves: Lubrication, cleaning, care, repair and safety. Maintenance, therefore, denotes all actions, carried out on structures, machines, equipment and tools to keep, restore or improve every facility to an agreed standard, determined by the balance between needs and resources. The actions include:

i. Keeping and restoring actions, such as repairs, replacement and cleaning.
ii. Improving, which include refurbishment, rehabilitation, alterations, conversion extension and adaptations.

The U.S. Army Corps of Engineers (REMR, 1983) stated that maintenance is the action that prevents or delays damage or deterioration, or correct deficiencies that would otherwise lead to early repair or rehabilitation. According to them, repair means restoration of damaged or deteriorated elements of a structure or equipment to continue service, while rehabilitation is major modification of an existing structure or equipment to bring up to prevailing operational requirements and standards.

When equipment reaches a certain level of deterioration or obsolescence, economic or safety reasons may demand slow down, halt or reversal of deterioration process. Maintenance can reduce deterioration rate while repair can bring the equipment back to an improved state to as-good-as new state.

Olaitan (1996) classified maintenance into three groups namely prevention maintenance, predictive maintenance and corrective maintenance. In preventive

maintenance, attempt is made to prevent the equipment or facilities from breaking down through regular cleaning, lubricating, painting and servicing. Predictive maintenance on the other hand implies watching out for danger signals, such as unusual noise, danger light indicators and inefficiency of performance; and wresting the situation promptly before there is any major breakdown. This may involves minor errors, which could be corrected by replacement of weak parts. Corrective maintenance involves approaches for rectifying an already damaged or breakdown equipment or machinery. The effort of corrective maintenance is to ensure continuity within the operations and production framework.

Obiegbu (1994) classified maintenance into three kinds: preventive (planned/ periodic) maintenance, curative (accidental) maintenance and renovation/refurbishment maintenance. According to the author, preventive maintenance is the type of maintenance carried out at predetermined intervals or other prescribed criteria and is intended to reduce the likelihood of an item not meeting an acceptable condition. This consists of taking corrective or preventive action in order to avoid expected or avoidable failures. Obiegbu on the other hand, used curative maintenance in place of corrective maintenance. This is the maintenance work done to restore, that is carry out repair of the failure that occurred or maintenance action intended to bring back an item to its original appearance or state.

Wild (1995) classified maintenance into four groups. These are: Inspection, service, preventive and repair. According to Wild, maintenance involves inspection of facilities at interval in order to determine whether service and/or preventive maintenance is required soon. Service involves the routine and re-adjustment of equipment, while preventive maintenance is precautionary, and is undertaken to try to prevent or delay breakdowns, and therefore, the need for repair. The author stated that, repair is remedial, taking place after an item has ceased to operate satisfactorily.

Oranu (1996) suggested that, an instructor has to be continually óon his toesô to keep a shop in suitable conditions for instructional purposes. Sharpening, adjusting and repairing broken tools and equipment is continuous process in the workshop. He further stated that after installation of the required equipment, it becomes the responsibility of the technical teachers to keep the equipment in good condition for effective use. This responsibility involves constant checking as well as minor repairs of equipment. Walton (1976) stated that, worn out tools such as oil stones, chisels, screw-drivers and blades of woodwork machines should be reconditioned to perform the functions they are designed for effectively.

William (1990) revealed that little maintenance is needed for most hand tools and portable power tools. Hand saws should be kept free from dust by rubbing the blade with steel wool. A coat of wax or silicon will protect the blade from moisture and reduced friction while sawing. According to the author, portable power saws may or may not need lubrication. Some have sealed bearings and self lubricating mechanical parts. Generally you need to put heavy grease in gear driven mechanisms. Apply silicon to adjusting knobs, screws and movable parts outside motors and drives. Keep all saws clean and free from moisture or resin build up. Periodically check all power cords for deterioration and damage. Replace any defective part of the machine and saw blades should be regularly sharpened and set.

Oduh (1999), noted that the negligence on maintenance of various equipment in vocational education hindered the effective training for self employment. The programme of technical education should be functional to the needs of society. According to Banjo (1974), the most important characteristics of technical education is that it should be selected and designed to cover the spectrum of engineering needs of the community for skills and personnel.

The success of woodwork programme depends largely on the effectiveness of woodwork teachers to operate, use and maintain the basic woodwork equipment provided in

the school workshops. Where woodwork teachers could not operate, use and maintain woodwork equipment for continuous use in training of woodwork students, technical training will suffer and this will lead to the production of highly unskilled personnel who are unemployable and unproductive.

As stated by Uzoagulu (1992), competent woodwork teachers with functional equipment would enable schools achieve functional educational objectives. The functionality of equipment can only be ensured through prompt maintenance because central focus of woodwork teachers is the production of competent and skillful woodwork personnel who would be effective in the performance of woodwork skills (Ekong, 2000).The areas of skills required by woodwork teachers for maintenance of woodwork equipment are highlighted below as stated by Ekong. These are:

1. Servicing, sharpening, fixing and minor repairing of cross-cutting, dimension saw machine.
2. Servicing of planning machine, including, removing, sharpening and fixing of blades.
3. Servicing of thickness machine, changing of belts, oiling, greasing of bearings, sharpening of blades, fixing of blades on the cutter block.
4. Servicing of band saw machine, sharpening of saw blade, fixing and adjusting the pulleys to tension the blade, repairing of broken blades and folding the blades.
5. Servicing of spindle moulder, checking and fixing of safety guards, removing of cutter block, removing of blades, sharpening of blades, fixing blades or cutter block, greasing of the bearings.
6. Servicing and repairing of other machines, such as: mortising machine, pillar drilling machine, sanding machine and lathe machine.
7. Removing and repairing faulty parts of various types of machines.

8. Sharpening of saw teeth e.g. grinding, sharpening, honing, gumming, jointing and setting.
9. Sharpening of blades and chisels.

Conceptual Framework

The schema represents the study link concept on the skill required by teachers to carry out their activities in wood workshops in tertiary institutions in North-Western Nigeria. For teachers to carry out their activities effectively in wood workshop they requires skills in cutting, planning, joint making, assembling, finishing and maintenance of tools and equipment skills. The skills are developed for training the teachers for them to be able to carry out their teaching and learning activities in the workshop. This will enable the teachers to effectively transfer the practical skills to students who will on the long run becomes employable in the labour market for efficient delivery of service to the society.

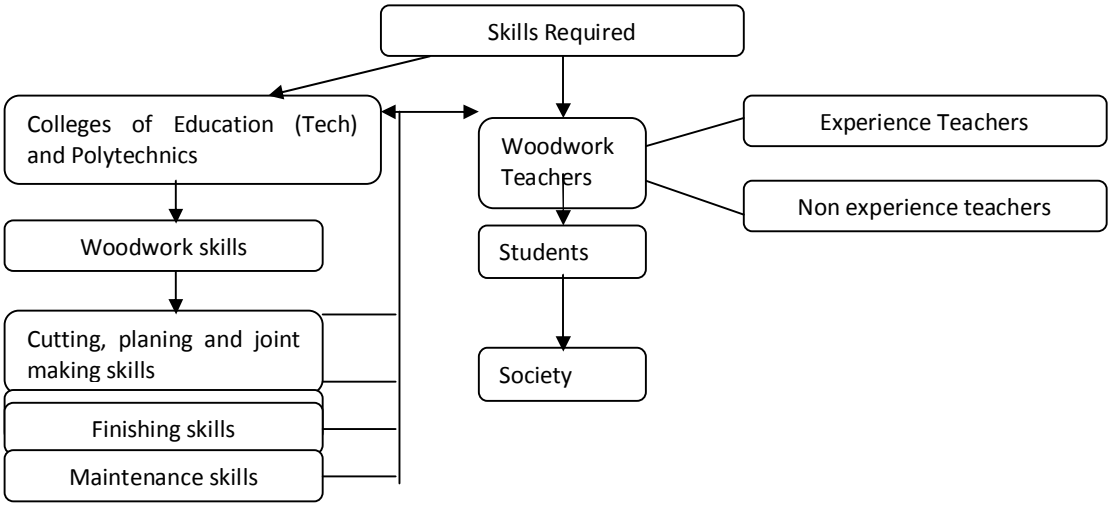

Figure. 1. Schematic Diagram of Skills Required in Wood Workshops.

Source: Researcher.

Related Empirical Studies

Fagbemi (2001) conducted a study to find out the skills improvement needs of woodwork teachers for maintenance of woodwork equipment in senior secondary schools in Ekiti state. Specifically, three research questions and two hypotheses were addressed. The population of the study was made up of all the woodwork teachers who are currently engaged in the teaching of woodwork in the senior secondary schools in Ekiti state. There was no sampling as the entire population was used for the study. Questionnaire was used for data collection from the respondents. Frequency distribution, mean and t-test were used in analyzing the data. Result of the study showed that, woodwork teachers in Ekiti state did not acquire the skills required for maintenance of woodwork equipment during their pre-service training, in addition, lack of fund, lack of spare parts, lack of incentives to motivate technical teachers and poor maintenance culture hindered the ability of technical teachers in carrying out maintenance work on technical equipment in secondary schools. The results also revealed that woodwork teachers need skill re-training on the maintenance of woodwork equipments. Result of hypotheses tested at 0.05 level showed that effective performance at the senior secondary schools was not influenced by experience. Recommendations were made based on the findings of the study. These include: Organizing re-training programme inform of seminars, workshops, or in-service training on the maintenance of equipment for woodwork teachers in addition, adequate provision of funds to purchase spare parts and materials for maintenance of woodwork equipment. The study conducted by Fagbemi has good relationship with the present study under taking by the researcher because the two studies are concern with identification of skills required by woodwork teachers in managing wood workshops and also the two studies uses a structured questionnaire for data collection and mean and t-test statistic are used in answering the research questions and hypotheses

testing. The differences in the two studies is that the former dealt with only one aspect of skill in woodwork that is maintenance skill while the former is dealing with many skills which includes: cutting, planing, joint making, assembling, finishing and maintenance of tools and equipment.

Ogbu (2004) conducted a study on the technical competency needs of block laying/bricklaying and concreting teachers in government technical colleges in Anambra, Ebonyi and Enugu states of Nigeria. Five null hypotheses were formulated and were analyzed with the use of t-test. The study made use of a total population of 21 teachers of blocklaying/bricklaying and concreting in Anambra, Ebonyi and Enugu states. Survey research design was used for the study; a questionnaire was developed to elicit information for the study. The findings of the study showed that there is need is need for in service training for brocklaying/bricklaying and concreting teachers. It was also recommended that curriculum planners can also benefit the from the identified competency improvement needs in planning and developing the curriculum content of in service training programme. This study is related to the present study because both of them focus on skill needs by teachers in woodwork technology in tertiary institutions. Ogbuôs differs from the present study because his study identify teachers competency needs in block/bricklaying while the current study seek to identify skills required by woodwork teachers in woodwork skills in tertiary institutions.

Onyebuchi (2004), carried out a study to determine the management skills required by teachers for improvement in operating woodwork laboratory in Technical Colleges in Abia and Enugu states. Five research questions were developed and answered in consonance with what the study sought to find out. Four null hypotheses were formulated and tested at the probability of 0.05 level of significance. Structured questionnaire was developed and used for the study. The questionnaire was used for collecting data from 201 respondents made up

of 119 experienced and 82 non ï experienced woodwork teachers in Technical Colleges of Abia and Enugu states. The data collected were analyzed using Mean, Standard Deviation and Improvement Required Index (IRI) to answer the research questions; and t-test statistic for testing the hypothesis. Findings from the study revealed that all the four management skill areas (planning, organizing, coordinating and evaluating) were agreed upon as needed responsibilities of woodwork teachers in operating woodwork laboratories. The study further revealed that woodwork teachers require improvement in nine planning skills, 12 organizing skills, eight coordinating skills and nine evaluating skills. The result of the Null-hypotheses tested showed that there was no significant difference between the mean ratings of the responses of experienced and non ï experienced teachers. On the improvement required by woodwork teachers in planning, organizing, coordinating and evaluating skills for operating woodwork laboratory in Technical Colleges of Abia and Enugu states, the respondents agreed that teachers require improvement in all the management skill areas. In the study, it was recommended that management skills in wood which woodwork teachers require improvement should be develop into a package by the state government through the assistance of their curriculum experts and use it for retraining woodwork teachers in management of Technical Colleges laboratories. Onyebuchiôs study is related to this study because the two studies focus on what teachers require to improve their performance in wood workshop. The method of data collection and analysis adapted by the two studies are also similar.

Summary of Review of Related Literature

The review of literature related to this study is presented under the conceptual and theoretical framework. In the conceptual framework a schema is used to show the relationships of the variables in the study. The review of the available literatures showed that woodwork teachers require skills in order to be able to effectively carry out their activities in

wood workshops. Some of the skills identified in the reviews include: Wood preparation skills, wood assembling skills, wood finishing skills and maintenance of tools and equipment skills. Competencies required by woodwork teachers to effectively carry out the above listed skills were enumerated in the review.

With regards to the related empirical studies reviewed, it has been discovered that many authors work on management and maintenance skills required by woodwork teachers for improvement of wood workshop operations. From the study, it was revealed that woodwork teachers lack the required skill to be able to effectively conduct themselves in the workshop. However, this researcher feels that the skills identified by the researchers, despite the fact that the skills are lacking by the woodwork teachers, it still insufficient. There are other important skill areas that are not covered by the studies reviewed which a woodwork teacher requires to effectively carry out wood workshop activities, these are: wood preparation skills, assembling skills, finishing skills and maintenance of tools and equipment skills. This is the gap which this study sought to fill.

CHAPTER III

METHODOLOGY

The procedure adopted for this study is presented under the following subheadings: Design of the Study; Area of the Study; Population of the Study; Instrument for Data collection; Validation of the instrument; Reliability of Instrument; Method of Data collection; and Method of Data Analysis.

Design of the Study

Descriptive survey research design was adopted for the study. The use of this design for this study is appropriate because it allow the researcher to elicit information from the respondents. According to Gall, Gall, and Borg (2007), a survey is a method of data collection using questionnaire or interviews to collect data from a sample that has been selected to represent a population to which the findings of the data analysis can be generalized. In this study a questionnaire on the skills required by teachers to carry out their activities in wood workshops in tertiary institutions in North Western Nigeria was used to collect information from the respondents.

Area of the Study

This study was carried out in tertiary institutions in North-Western Nigeria which consists of seven States, namely: Kaduna, Kano, Katsina, Jigawa, Zamfara, Sokoto and Kebbi States. The institutions affected by this study include: Federal College of Education (Technical) Bichi, Kano State Polytechnic, Kaduna Polytechnic, Kaduna state College of Education Kafanchan, Hassan Usman Polytechnic Katsina, Federal College of Education Sokoto, Waziri Umar Federal Polytechnic Birnin Kebbi. These institutions offer woodwork technology courses at Nigerian Certificate of Education (NCE) level, which is the main concerned of the study.

Population for the Study

The population for this study consists of 46 woodwork teachers from the eight selected tertiary institutions in North Western Nigeria. The population is made up of 24 teachers from four Colleges of Education and 22 teachers from four Polytechnics in the zone. The breakdown of the population distribution of woodwork teachers in the zone is as shown in Appendix D, page 75.

Sample and Sampling Technique

Since the population of the woodwork teachers in the zone is small the entire population Was used for the study.

Instrument for Data Collection

The instrument for data collection was a structured questionnaire titled Questionnaire of Skills Required by Tertiary level Woodwork Teachers (QSRTLWT), which consisted of 64 items developed by the researcher from literature reviewed. The instrument was made up of two parts. Part one was on respondentôs personal data; while part two consists of 64 items that are designed to provide answers to the research questions. Part two was sub divided in to five sections A-E. section A answered research question 1, section B answered research question 2, section C answered research question 3 and section D answered research question 4. A five point Likert scale response mode was used to determined the skills required by woodwork teachers in all the sections of the part two of the questionnaire. The response options are as follows: Very highly required (VHR), Highly required (HR), Moderately required (MR), Slightly required (SR) and Not Required (NR)

Validation of the Instrument

To ensure the validity of the instrument, the questionnaire was face-validated by three lecturers in the field of Industrial Technical Education, University of Nigeria, Nsukka, the validates were requested to critically examine the items in the instrument with the specific purposes of the study and make useful suggestions to improve the quality of the instrument. The inputs and criticisms of the validates helped in improving the final copy of the instrument.

Reliability of the Instrument

To ensure reliability of the instrument, the researcher adopted a test-retest technique. The test was administered at federal college of education Gombe, Gombe state in the North-Eastern Nigeria which is not in the area of the study. five woodwork teachers were used for the pilot test, the two tests were administered within interval of one week and the two results were correlated using Pearsons product Moment Correlation Coefficient. The result obtained revealed a positive correlation of ór = 0.97 for research question one, r = 0.75 research question two, r = 0.99 research question three and r = 0.73 research question four.

Method of Data Collection

The instrument was administered to the respondents by the researcher with the help of four research assistants. The research assistants distributed the questionnaires in two Colleges of Education (Sokoto and Kafanchan) and two Polytechnics (Kaduna and Birnin kebbi) while the researcher distributed the questionnaires in two Polytechnics (Kano and Katsina) and two Colleges of Education(Bichi and Gusau). The respondents were given three days to respond to the instrument, the researcher with the help of the research assistants retrieved back the completed copies of the instrument for analysis.

Method of Data Analysis

The research questions were answered using the Mean responses of the respondents while t-test statistic was used to test the Null Hypotheses at 0.05 level of significance. Therefore, if t-calculated is greater than or equal to t-table then we reject the Null hypothesis but if t-calculated is less than t-table we accept the Null hypothesis. For decision making, the real limit of numbers for the likert scale was used for interpretation as follows:

4.50 ï 5.00 = Very highly required (VHR)

3.50 - 4.49 = Highly required (HR)

2.50 - 3.49 = Moderately required (MR)

1.50 - 2.49 = Slightly Required (SR)

0.50 ï 1.49 = Not Required (NR)

Any Mean value between 3.50 to 5.00 means required while any value from 3.49 and below implied not required.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

This chapter presented the analysis and interpretation of data for answering the research questions and hypotheses.

Analysis of Research Questions

The four research questions advanced by the researcher were answered as follows:

Research Question 1

What are the skills required by woodwork teachers in cutting, planing and joint making in wood workshops in tertiary institutions in the North Western Nigeria?

Answer to this research question is presented in Table 1.

Table 1

Mean Rating of the Responses of Experienced and Less Experienced Woodwork Teachers on the Skills Required in Cutting, Planing and Joint making in Wood Workshops in Tertiary Institutions in North Western Nigeria

S/NO	**ITEM STATEMENT**	Mean	REMARK
1	correct grasp of the saw handle while cutting	4.45	HR
2	Rip along the grain	4.13	HR
3	Cut across the grain	4.05	HR
4	cut small tenons	3.98	HR
5	Cut concave and convex curves	3.92	HR
6	Set of gauge on a circular sawing machine	4.58	HR
7	Cut mitre on a circular saw machine	3.95	HR
8	Handle stock while cutting on circular saw	4.10	HR
9	Cut and trenches using circular saw	3.78	HR
10	The use of push stick	3.70	HR
11	Handle plane correctly	4.45	HR

12	Set correct level of cutting iron	4.15	HR
13	Correct grasp of the handle and the toe	3.83	HR
14	Plane the face side	4.15	HR
15	Plane the face edge	4.13	HR
16	Test flatness using Try -square and winding stick	4.45	HR
17	Correct use of marking gauge	4.03	HR
18	Plane end grains	4.35	HR
19	Set depth of cut of a jointer machine	3.85	HR
20	Feed stock on the planer	4.00	HR
21	Sett of the front table of a planer	4.10	HR
22	Correct use of a push block	4.08	HR
23	Correct use of try square in marking out joints	4.30	HR
24	Correct application of marking gauge in gauging lines	4.60	HR
25	Set sliding bevel when marking out dovetail joint	4.25	HR
26	Using backsaws in cutting out waste	3.65	HR
27	Correct use of chisels and mallet to remove wastes.	4.35	HR

Data in Table 1 on skills required by teachers in cutting, planing and joint making indicates that all 27 skills are highly required. All the items have a Mean score between 3.70 and 4.60.

Research Question 2

What are the skills required by woodwork teachers in assembling of woodwork projects in wood workshops in tertiary institutions in North Western Nigeria?

Answer to this research question is presented in Table 2.

Table 2

Mean Rating of the Responses of Experienced and Less Experienced Woodwork Teachers on the Skills Required in Assembling Wood Project in Wood Workshops in Tertiary Institutions in North Western Nigeria

S/NO	**ITEM STATEMENT**	Mean	REMARK
28	Interpret working drawing	4.48	HR
29	Correct use of cramps and clamps	4.45	HR
30	Correct use of scrap blocks when assembling projects	4.00	HR
31	Trail assembling of the project	4.10	HR
32	Sub - assembling of large projects	4.10	HR
33	Apply Glue	3.98	HR
34	Removal of surplus glue	3.70	HR
35	Test squareness of the work before final clamping	4.30	HR
36	Knock down fitting assembly	3.75	HR
37	Assemble using screw and nails	3.95	HR

Data in Table 2 on skills required by teachers in assembling wood projects indicated that all the 10 assembling skills are highly required by woodwork teachers. All the items have Mean scores between 3.70 and 4.48.

Research Question 3

What are the skills required by woodwork teachers in wood finishing and finishes application in wood workshops in tertiary institutions in the North Western Nigeria?

Answer to this research question is presented in Table 3.

Table 3

Mean Rating of the Responses of Experienced and Less Experienced Woodwork Teachers on the Skills Required in Finishing and Finishes Application in Wood Workshops in Tertiary Institutions in North Western Nigeria

S/NO	**ITEM STATEMENT**	Mean(X1)	REMARK
38	Remove dry adhesive from the surface of the project	3.80	HR
39	Scrape the project	3.58	HR
40	Dent rising hot water and sponge	3.30	MR
41	Remove grease and oil from the surface of the project	3.65	HR
42	Patching of nails holes, scratches and cracks	3.60	HR
43	Sand the work with abrasives	3.50	HR
44	Apply sanding sealer application	3.60	HR
45	Apply wood filler	3.55	HR
46	Select build up finishes	3.75	HR
47	Load the brush with finish	3.40	MR
48	Apply finish with brush	3.56	HR
49	Apply finish with pad and foam	3.30	MR
50	Apply finish with spray gun	3.93	HR
51	Select ideal air pressure (psi) when spraying	4.20	HR
52	Correct use of roller in applying finishes	3.90	HR

Data in Table 3 on finishing and finishes application skills required by teachers revealed that 12 skills are highly required; while three are moderately required. Items have Mean values between 3.30 and 4.20.

Research Question 4

What are the skill required by woodwork teachers in maintenance of tools and equipment in wood workshops in tertiary institutions in the North Western Nigeria?

Answer to this research question is presented in Table 4.

Table 4

Mean Ratings of the Responses of Experienced and Less Experienced Woodwork Teachers on the Skills Required in Maintenance of Tools and Equipment in Wood Workshops in Tertiary Institutions in North Western Nigeria

S/NO	**ITEM STATEMENT**	Mean	REMARK
53	Remove circular saw blade	4.00	HR
54	Sharpen circular saw blade	4.23	HR
55	Oil and grease ball bearings	3.80	HR
56	Oil and grease screws and slides in planner, machine	3.60	HR
57	Sharpen band saw blade	4.13	HR
58	Repair of broken band saw blade	3.90	HR
59	Sharpen ripsaw teeth	4.20	HR
60	Sharpen cross-cuts aw teeth	4.10	HR
61	Sharpen hand plane blades	4.05	HR
62	Sharpen planer machine blades	4.03	HR
63	Remove and replace planer machine blades	4.35	HR
64	Replace or recondition of worn out tools	4.40	HR

Data in Table 4 on maintenance skills required by woodwork teachers indicates that all 12 skills are highly required. Items have Mean values between 3.60 and 4.40.

Test of Hypotheses

The four hypotheses were formulated for this study. Data for testing them and the findings are presented below in Table 5 to 8.

Hypothesis One

There is no significant difference in the mean responses of experienced and less experienced teachers on the skills they require for wood cutting, planing and joint making in the wood workshop.

The data for testing hypothesis one are presented in Table 5.

Table 5

The t-test Analysis of Mean Ratings of the Responses of Experienced and Less Experienced Woodwork Teachers on the Skills they Required for Wood Cutting, Planing and Joint making in Wood Workshops in Tertiary Institutions in North Western Nigeria

S/NO	**ITEM STATEMENT**	Experienced Teacher $\bar{x}_1$	Non-Experienced Teacher $\bar{x}_2$	t-cal	Remarks
1	correct grasp of the saw handle while cutting	4.62	4.14	1.799	NS
2	Rip along the grain	4.00	4.36	-1.189	NS
3	Cut across the grain	4.12	3.93	.943	NS
4	cut small tenons	4.15	3.64	2.203	S
5	Cut concave and convex curves	4.00	3.75	.714	NS
6	Set of gauge on a circular sawing machine	4.42	4.86	-2.324	NS
7	Cut mitre on a circular saw machine	4.08	3.71	1.482	NS
8	Handle stock while cutting on circular saw	4.31	3.71	3.134	S
9	Cut and trenches using circular saw	3.69	3.93	-.854	NS
10	The use of push stick	3.85	3.43	1.089	NS
11	Handle plane correctly	4.38	4.57	-.639	NS
12	Set correct level of cutting iron	4.23	4.00	.902	NS
13	Correct grasp of the handle and the toe	3.58	4.29	-2.527	NS

14	Plane the face side	4.27	3.93	1.156	NS
15	Plane the face edge	4.12	4.14	-.096	NS
16	Test flatness using Try - square and winding stick	4.46	4.43	.120	NS
17	Correct use of marking gauge	3.96	4.14	-.483	NS
18	Plane end grains	4.31	4.43	-.491	NS
19	Set depth of cut of a jointer machine	3.85	3.86	-.044	NS
20	Feed stock on the planer	4.00	4.00	0.000	NS
21	Sett of the front table of a planer	4.15	4.00	.650	NS
22	Correct use of a push block	4.04	4.14	-.340	NS
23	Correct use of try square in marking out joints	4.46	4.00	1.811	NS
24	Correct application of marking gauge in gauging lines	4.62	4.57	.222	NS
25	Set sliding bevel when marking out dovetail joint	4.38	4.00	1.102	NS
26	Using backsaws in cutting out waste	3.69	3.57	.351	NS
27	Correct use of chisels and mallet to remove wastes.	4.31	4.43	-.491	NS

NS stands for Not Significant, S stands for Significant

Decision ï Reject Ho at 0.05 level if t cal > 1.96, given df =38.

Data in Table 5 indicates that the t ï test analysis of the Mean responses of experienced and less experienced teachers on skills they required in wood cutting, planing and joint making in wood workshops in tertiary institutions in North Western Nigeria. The analysis shows that two items (4 and 8) have calculated t ï values more than the table t ï value of 1.96 at 38 degrees of freedom at 0.05 level of significance. The null hypothesis of no significant difference in the Mean rating of experienced and less experienced woodwork teachers was, therefore, accepted

from the analysis. It can be inferred that experienced and less experienced woodwork teachers shared common opinions on these items.

Table 6

Hypothesis Two

There is no significant difference in the Mean responses of experienced and less experienced teachers on the skills they require in assembling woodwork project in wood workshops in tertiary institutions in North Western Nigeria .

The data for testing hypothesis two are presented in Table 6.

Table 6

The t-test Analysis of Mean Ratings of the Responses of Experienced and Less Experienced Teachers on the Skills they Required on Assembling Woodwork Projects in Wood Workshops in Tertiary Institutions North Western Nigeria

S/NO	ITEM STATEMENT	Experienced Teacher $\bar{x}_1$	Non-Experienced Teacher $\bar{x}_2$	t	Remarks
28	Interpret working drawing	4.65	4.14	1.956	NS
29	Correct use of cramps and clamps	4.38	4.57	-.687	NS
30	Correct use of scrap blocks when assembling projects	3.85	4.29	-1.397	NS
31	Trail assembling of the project	3.96	4.36	-1.726	NS
32	Sub - assembling of large projects	4.00	4.29	-1.224	NS
33	Apply Glue	4.00	3.93	.239	NS
34	Removal of surplus glue	3.92	3.29	1.814	NS
35	Test squareness of the work before final clamping	4.46	4.00	1.897	NS
36	Knock down fitting assembly	3.85	3.57	1.070	NS
37	Assemble using screw and nails	3.96	3.93	.120	NS

Data in Table 6 indicates that the t-test analysis of experienced and less experienced teachers on skills they require in assembling woodwork project. The analysis shows that all items have calculated t-values less than the table t-value of 1.96 at 38 degrees of freedom at 0.05 levels of significance. The null hypothesis of no significant difference in the Mean rating of experienced and less experienced woodwork teachers was therefore accepted based on the analysis, it can be inferred that experienced and less experienced teachers shared identical opinions on these items.

Hypothesis Three

H_{o3}: There is no significant difference in the Mean responses of experienced and less experienced teachers in the skills they require in wood finishing and finishes application in wood workshops in tertiary institutions in North Western Nigeria.

The data for testing hypothesis three are presented in Table 7

Table 7

The t-test Analysis of Mean Ratings of the Responses of Experienced and Less Experienced on the Skills they Required on Wood Finishing and Finishes Application in wood workshops in tertiary institutions in North Western Nigeria

S/N	ITEM STATEMENT	Experienced Teacher $\bar{x}_1$	Non-Experienced Teacher $\bar{x}_2$	t-cal	Remarks
38	Remove dry adhesive from the surface of the project	3.88	3.64	.664	NS
39	Scrape the project	3.92	2.83	3.864	S
40	Dent rising hot water and sponge	3.42	3.07	.913	NS
41	Remove grease and oil from the surface of the project	3.62	3.71	-.274	NS

42	Patching of nails holes, scratches and cracks	3.69	3.43	.701	NS
43	Sand the work with abrasives	3.46	3.57	-.278	NS
44	Apply sanding sealer application	3.69	3.43	.807	NS
45	Apply wood filler	3.69	3.29	1.135	NS
46	Select build up finishes	3.77	3.71	.142	NS
47	Load the brush with finish	3.38	3.43	-.104	NS
48	Apply finish with brush	3.73	3.23	1.075	NS
49	Apply finish with pad and foam	3.35	3.21	.306	NS
50	Apply finish with spray gun	3.92	3.93	-.014	NS
51	Select ideal air pressure (psi) when spraying	4.08	4.43	-1.209	NS
52	Correct use of roller in applying finishes	4.00	3.79	.930	NS

From Table 7, only item 39 have a calculated t-value more than the table t-value of 1.96. It can be deduced from the above table that there is no significant difference in the Mean responses of experience and less experienced woodwork teachers on the skills they acquired in wood finishing and finishes application. Therefore, the null hypothesis is there accepted based on the opinions of these items.

Hypothesis Four

There is no significant difference in the Mean responses of experienced and less experienced teachers on the skills they require on maintenance of woodwork tools and equipment in wood workshops in tertiary institutions in North Western Nigeria.

The data for testing hypothesis four is presented in Table 8.

Table 8

The t-test Analysis of Mean Ratings of the Responses of Experienced and Less Experienced Woodwork Teachers on the Skills they Required for Maintenance of Tools and Equipment in Wood Workshops Tertiary Institutions in North Western Nigeria

S/NO	ITEM STATEMENT	Experienced Teacher $\bar{x}_1$	Non-Experienced Teacher $\bar{x}_2$	t-cal	Remarks
53	Remover circular saw blade	3.92	4.14	-.650	NS
54	Sharpen circular saw blade	4.15	4.36	-.643	NS
55	Oil and grease ball bearings	3.69	4.00	-.934	NS
56	Oil and grease screws and slides in planner, machine	3.77	3.29	1.166	NS
57	Sharpen band saw blade	4.15	4.07	.311	NS
58	Repair of broken band saw blade	3.92	3.86	.154	NS
59	Sharpen ripsaw teeth	4.35	3.93	1.447	NS
60	Sharpen cross-cuts aw teeth	4.08	4.14	-.206	NS
61	Sharpen hand plane blades	4.04	4.07	-.112	NS
62	Sharpen planer machine blades	4.12	3.86	1.015	NS
63	Remove and replace planer machine blades	4.31	4.43	-.491	NS
64	Replace or recondition of worn out tools	4.35	4.50	-.782	NS

Data in Table 8 contains the t- test analysis of the Mean responses of experienced and less experienced teachers on the skills they require in maintenance of woodwork tools and equipment in wood workshops in tertiary institutions in North Western Nigeria. The analysis shows that all items 53 to 64 have calculated t-values below the table value of 1.96. It can be deduced from the above table that experienced and less experienced teachers shared common opinions on these items.

Findings of the Study

The following were the findings of the study:

The following woodwork skills are required by both Experience and Less experienced woodwork teachers in tertiary institutions in North Western Nigeria. These skills are:

1. Correct grasp of the saw handle while cutting.
2. Rip along the grain.
3. Cut across the grain.
4. Cut small tenons.
5. Cut concave and convex curves.
6. Set of gauge on a circular saw.
7. Cut miter on a circular saw.
8. Handle stock while cutting on circular saw.
9. Cut trenches using circular saw.
10. The use of push stick.
11. Handle plane correctly.
12. Set correct level of cutting iron.
13. Correct grasp of the handle and toe.
14. Plane the face side.
15. Plane the face edge.
16. Test flatness using Try square and winding stick.
17. Correct use of marking gauge.
18. Plane end grains.
19. Set depth of cut of a jointer machine.

20. Feed stock on the plane.

21. Set the front table of a planer.

22. Correct use of push block.

23. Correct use try square in marking out joints.

24. Correct application of marking gauge in gauging lines.

25. Set sliding bevel when marking out dovetails.

26. Using backsaws in cutting out waste.

27. Correct use of chisels and mallet to remove wastes.

28. Interpret working drawing

29. Correct use of cramps and clamps.

30. Correct use of scrap blocks when assembling projects.

31. Trial assembling of projects

32. Sub assembling of large projects.

33. Apply glue.

34. Removal of surplus glue.

35. Test squareness of work before final clamping.

36. Knock down fittings assembly.

37. Assemble using screws and nails.

38. Remove adhesives from the surface of the project.

39. Scrape the project.

40. Dent rising using hot water and sponge.

41. Remove grease and oil from the surface of the project.

42. Patching of nails holes, scratches and cracks.

43. Sand the work with abrasives.

44. Apply sanding sealer.

45. Apply wood filler.

46. Select build up finishes.

47. Load the brush with finish.

48. Apply finish with brush.

49. Apply finish with pad and foam.

50. Apply finish with spray gun

51. Select ideal air pressure (psi) when spraying.

52. Correct use of roller in applying finishes.

53. Remove circular saw blade.

54. Sharpen circular saw blade.

55. Oil and grease ball bearings.

56. Oil and grease screws and slides in planer machine.

57. Sharpen band saw blade.

58. Repair of broken band saw blade

59. Sharpen rip saw blade

60. Sharpen cross cut saw blade

61. Sharpen hand plane blades

62. Sharpen planer machine blades

63. Remove and replace planer machine blades

64. Replace or recondition of worn out tools.

The finding revealed that all the 64 skills items are required by woodwork teachers in the tertiary institutions in North Western Nigeria.

Findings on the Hypotheses

With regard to the hypotheses, the following findings were made:

There is no significant difference in Mean responses of experienced and less experienced teachers in 62 out of the 64 items of the skills identified.

Hypothesis one of no significance difference in the Mean responses of experienced and less experienced woodwork teachers on the skills they required in cutting, planing and joint making in wood workshops in tertiary institutions was tested by the use of the respondents scores of item one to 27. The test revealed no significant difference in the Mean ratings of 23 out of 27 items on the survey instrument between experienced and less experienced woodwork teachers at 0.05 significant levels. It was found that there are significant differences in the Mean rating of experienced and less experienced teachers at the 0.05 level of significance on two items. These are:

1. Cutting tenons and
2. Handling stock while cutting on circular

Hypothesis two of no significant difference in the Mean responses of experienced and less experienced teachers on the skills they required in assembling wood projects in wood workshops in tertiary institutions, was tested by the use of respondentsô scores of items 28 to 37. The test revealed no significant difference in the Mean ratings of all the 10 items between experienced and less experienced teachers at 0.05 level of significant.

Hypothesis three of no significant difference in the Mean responses of experienced and less experienced woodwork teachers on the skills they required in finishing and finishes

application in wood workshops in tertiary institutions, was tested by the use of respondents scores of items 38 to 52. The test revealed that there is no significant difference in the Mean ratings of 14 out of 15 items between experienced and less experienced teachers at 0.05 level of significant. This means that finishing skills required by woodwork teachers are not influenced by experienced.

It was found out that there is significant difference in the Mean rating of experienced and less experienced teachers at the 0.05 level of significance on one item no. 39. This item is:

1. Scrape the project.

Hypothesis four of no significant difference in the Mean ratings of experienced and less experienced teachers in the skills they require on maintenance of woodwork tools and equipment in wood workshops in tertiary institutions was tested by the use of the respondent scores of items 53 to 64. The test revealed no significant difference in the Mean ratings of all the items of experienced and less experienced woodwork teachers at 0.05 levels of significance. This means that maintenance skills required by woodwork teachers are not influenced by experienced.

Discussion of the Findings

The skills required by woodwork teachers in cutting, planing and joint making in wood workshops in tertiary institutions were analyzed and established as being required by woodwork teachers. This finding is in line with Sara (2000) that more than 60 per cent of the staff teaching woodwork in tertiary institutions could not perform the skills or provide technical services they were expected to teach others despite their high level paper qualification. Therefore, there is need for retraining of teachers to update their knowledge and skills in woodwork.

The analysis of research question two presented in table 2 provided such findings as indicated by the Mean ratings of woodwork teachers, the skills required by woodwork teachers

in assembling of woodwork projects in wood workshops were all agreed as being required. This indicates that teachers are deficient in skills in assembling woodwork projects. This called for retraining of woodwork teachers to keep them abreast with the trend of events. This finding is in line with Hackett (1979) who pointed out that the purpose of retraining is a means of improving the present job performance. There should be constant retraining of woodwork teachers to make them up-to-date for effective discharge of their duties in the wood workshop.

The analysis of the research question three as analyzed in table 3, the findings of this table shows that all the skills that are needed on wood finishing and finishes application by woodwork teachers for effective performance in the wood workshops are required by the teachers. Therefore, there is the need for re-training of woodwork teachers for better performance in the workshop. According to Fitts (1977), a comprehensive knowledge of the skills and competencies in finishing of woodwork projects and tactful selection of wood finishes is essential for teachers of woodwork of higher education level. Fitts explained that a competent woodwork teacher must be skilled in the selection of appropriate materials in guiding the students to carry out successful projects using the selected materials through planned practical activity.

In the analysis of research question four presented in table 4, the findings revealed that the skills required by woodwork teachers in maintenance of tools and equipment in wood workshops are required. This can be achieved based on the findings, through practical training of teachers. Oranu (1996) suggested that maintenance of tools and equipment should be the responsibility of the technical teachers after the installation, to keep the equipment in good condition for effective use. The results also revealed that woodwork teachers required maintenance skills in the area of servicing, replacement of parts and sharpening of tools. This

supports the earlier findings of Banjo (1974) that staff of tertiary institutions could not perform the skill or technical services they were to teach to others. In ability to acquire maintenance skills on the woodwork tools and equipment lead to ill-prepared teachers. Therefore there should be constant re-training of technical teachers to expose them to uses and maintenance of the latest tools and equipment.

Tertiary institution teachers should not only be resourceful in order to use equipment and tools in the workshop but should also maintain and manage properly the available ones.

Null Hypotheses

The result of the null hypothesis shows that there is no significant difference in the skills required by experienced and less experienced woodwork teachers on wood cutting, planing, joint making, assembling, finishing and finishes application as well as maintenance of tools and equipment. This means that the skill required by experienced and less experienced teachers are the same.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter is concerned with the summary of the research problem, purpose of the study and its methodology. The summary of findings, conclusions, recommendations and suggestion for further research are also presented.

Re-Statement of the Problem

Changes in Colleges of Education (Technical) and Polytechnics that offer woodwork technology at NCE level graduates have been in programme structure, curriculum content and implementation. Primarily, the objective of NCE (Technical) programme is to produce technical teachers for basic technology in Junior Secondary Schools and Primary Education levels. Unfortunately, NCE (Technical) graduates are weak in the practice of their trades. Therefore, poor NCE (Technical) graduates is a reflection of the quality of teachers in tertiary institutions. Woodwork teachers in tertiary institutions are expected to be well equipped with relevant skills for effective performance and transmission of skills to their students.

Woodwork as a subject is skill oriented aimed at equipping students with basic skills in cutting, planing, joint making, assembling, finishing and finishes application as well as maintenance of tools and equipment. Woodwork teachers have to show mastery of these skills for proper transmission to would be teachers.

The problem of this study, therefore, is to identify the skills required by teachers to carry out their activities in the wood workshops in tertiary institutions in North Western Nigeria. The specific purposes of the study are to: identify the skills required by teachers in:

1. Cutting, planing and joint making of wood in wood workshops in tertiary institutions in North Western Nigeria.

2. Assembling of woodwork projects in wood workshops in tertiary institutions in North Western Nigeria.
3. Wood finishing and finishes application in wood workshops in tertiary institutions in North Western Nigeria.
4. Maintenance of woodwork tools and equipments.

Summary of Procedures Used

In the study, a survey research was used for the study. The study covered all the woodwork teachers in tertiary institutions that offer woodwork technology at NCE level in North Western Nigeria. These institutions are: Federal College of Education (Technical) Bichi, Kano State Polytechnic, Kaduna Polytechnic, Katsina Polytechnic, Kaduna State College of Education Kafanchan, Federal College of Education (Technical) Gusau, Federal College of Education Sokoto and Federal Polytechnic Birnin Kebbi. The population of the study was made up of 46 woodwork teachers from the affected institutions. A structured questionnaire with 64 items which consist of two sections was used. Section A consisted of items on personal data of the respondents. Section B consisted of items based on the research questions. The response categories, was structured according to the five point responses of Very Highly Required (VHR), Highly Required (HR), Moderately Required (MR), Slightly Required (SR) and Not Required (NR).

Summary of Findings

From the analysis of data in chapter four, the following findings were made from the study:

1. The woodwork teachers in tertiary institution in North Western Nigeria did not have the required skills in wood cutting, planing, joint making, wood project assembling, finishing

and finishes application as well as maintenance of woodwork tools and equipment during their pre-service training.

2. It was found out that the in ability of the tertiary institutions graduates to function effectively after graduations in the North Western Nigeria, is attributed to lack of the required woodwork skills of their teachers.
3. It was found that woodwork teachers in tertiary institutions in North Western Nigeria required skills training in wood cutting, planing, joint making, assembling of woodwork project, wood finishing and finishes application as well as maintenance of tools and equipment.
4. There is no significant difference in the Mean rating of the responses of experienced and less experienced woodwork teachers on the skills required by woodwork teachers in cutting, planing and joint making in wood workshops in tertiary institutions in North Western Nigeria in 25 out of 27 items from the responses of the respondents. Only two items out of 27 are found significant.
5. There is no significant difference in the Mean rating of the responses of experienced and less experienced teachers in the skills required by woodwork teachers in assembling woodwork projects in wood workshops in tertiary institutions in North Western Nigeria in all the 10 items from the responses of the respondents.
6. There is no significant difference in the Mean responses of experienced and less experienced woodwork teachers on the skills required in finishing and finishes application in wood workshops in tertiary institutions in North Western Nigeria in 14 out 15 items from the responses of respondent, only one item was found significant.

7. There is no significant difference in the Mean rating of responses of experienced and less experienced woodwork teachers in skills required in maintenance of woodwork tools and equipment in wood workshops in tertiary institutions in North Western Nigeria in all the 12 items of the responses of the respondents.

Conclusions

Based on the findings of this study, it can be concluded that woodwork teachers in tertiary institutions in North Western Nigeria required improvement on the following woodwork skills: wood cutting, planing, joint making, assembling woodwork project, wood finishing and finishes application as well as maintenance of woodwork tools and equipment for effective teaching and learning of woodwork skills.

Implications of the Study

The study has implications for woodwork teachers, teacher training institutions, Nigerian commissions for colleges of education and Government. The overall implication to the woodwork teacher lies on the demand of large body of skills for him to acquire. He has to understand that the activities involved in woodwork teaching and learning does not stop at class room instruction only but practical activities in the workshop for effective skill transfer to the student. Therefore woodwork teaching and learning cannot be handled haphazardly.

The training institutions will find the study appropriate in the training and re- training of wood woodwork teachers for effective performance in the tertiary institutions in North West Nigeria.

The implication of the finding of this study to the Nigerian Commission for Colleges of Education (NCCE) is in the area of curriculum development for teacher training institution. The

skills identified can be integrated in the teacher training curriculum for effective training of NCE technical teachers for primary and junior secondary schools.

The implication of this study to the Government is that of provision of avenue for training and re-training of woodwork teachers especially tertiary institutions teachers because of their vital role in the training of teachers of primary and secondary schools, because the quality of tertiary institutions teachers determines the effectiveness of their products.

Recommendations

The following recommendations are made from this study:-

1. The identified skills required by teachers of woodwork should form the basis for the workshop training to be organized by the training institution as an in-house training.
2. Curriculum planners can use the identified skills in cutting, planing, joint making, assembling, wood finishing and finishes application as well as maintenance of wood work tools and equipment in developing teacher training curriculum of the in-service training programme.
3. Emphasis should be attached to practical examination after each semester, in order to instill in the learners the important of practical exercise for skill acquisition. This will also make the tertiary institution teachers to strive hard to update their skills for imparting same to the learners.

The above recommendations if implemented will no doubt improve the skills of woodwork teachers for carrying out their activities in wood workshops in tertiary institutions in North Western Nigeria.

Suggestions for Further Research

1. Investigation should be carried out on the effective utilization of woodwork tools and equipment in tertiary institutions in North Western Nigeria.
2. Competency need of woodwork teachers for teaching woodwork practical skills in technical colleges for effective participation in the world of work.

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APPENDICES

Appendix A
Letter of request for validation

Department of Vocational Teacher Education,
Industrial Technical Education Unit,
University of Nigeria,
Nsukka.
October 22, 2012

Dear Sir/ Madam,

REQUEST FOR INSTRUMENT VALIDATION

I am a postgraduate student of the above named department, university of Nigeria, Nsukka, currently undertaking a research project aimed at investigating the **"Skills Required by Teachers to carry out their Activities in Wood Workshop in Tertiary Institutions in North Western Nigeria".**

Attached is the copy of the questionnaire, purpose of the study, research questions and hypotheses. You are please requested to vet the items for clarity and relevance of their consistency and validity.

Please use the sheet provided for general comments and suggestion you deem necessary. Your response will be held in strict confidence. Thanks

Yours faithfully,
Umar Lawal
PG/M.ED/10/52441

Appendix B

Request for Completion of Questionnaire

Department of Vocational Teacher Education,

Industrial Technical Education Unit,

University of Nigeria Nsukka,

October 28, 2012.

Dear Sir/Madam,

REQUEST TO RESPOND TO A QUESTIONNAIRE

I am a post graduate student in the Department of Vocational Teacher Education, University of Nigeria, Nsukka, currently undertaking a research project. The title of the project work is ñ**Skills Required by Teachers to carry out their Activities in Wood Workshop in Tertiary Institutions in North western Nigeria**

The attached questionnaire is to elicit the necessary information for the research project. You are requested to respond to the items as objectively as possible.

Any information supplied will be treated confidential and will be used strictly for the research work. Thanks.

Yours Faithfully,

Umar Lawal

Appendix C

Questionnaire

Appendix C

SKILLS REQUIRED BY TERTIARY- LEVEL WOODWORK TEACHERS

SECTION A: personal data.

Instruction: Check (ã) against the option that is applicable to you.

1. Years of experience as a Woodwork teacher:

(a)---below 6years

(b)--- 6years and over

SECTION B:

This section consists of six parts, you are required to check (ã) in the column that indicates your level of agreement on the skills required by teachers to carry out their activities in wood workshops in tertiary institutions. The response categories are: Very highly Required-(VHR), Highly required-(HR), Moderately required (MR), Required (R) and Not Required (NR).

Indicate the extent to which you think the following wood cutting, planing and joint making skills are required by teachers in tertiary institutions.

S/N	Item Statements	Response Options				
		VHR	HR	MR	R	NR
1	Correct grasp of the saw handle while cutting.					
2	Rip along the grain					
3	Cut across the grain					
4	Cut small tenons					
5	Cut concave and convex curves.					
6	Set of gauge of a circular sawing machine.					
7	Cut mitre on a circular saw machine					
8	Handle stock while cutting on a circular saw.					
9	Cut and trenches using circular saw					
10	The use of push stick					
11	Handle plane correctly					
12	Set correct level of cutting iron					

13	Correct grasp of the handle and the toe.					
14	Plane the face side					
15	Plane the face edge					
16	Test flatness using Try-square and winding stick.					
17	Correct use of marking gauge					
18	Plane end grains					
19	Set depth of cut of a jointer machine.					
20	Feed stock on the planer					
21	Sett of the front table of a planer.					
22	Correct use of a push block.					

23	Correct use of Try square in marking out joints					
24	Correct application of making gauge in gauging lines					
25	Set sliding bevel when marking out dovetail joint					
26	Using backsaws in cutting out waste.					
27	Correct use of chisels and mallet to remove wastes.					

Indicate the extent to which you think the following wood assembling skills are required by teachers in tertiary institutions.

S/N	Item Statements	VHR	HR	MR	R	NR
28	Interpret working drawings					
29	Correct use of cramps and clamps					
30	Correct use of scrap blocks when assembling projects					
31	Trail assembling of the project					
32	Sub- assembling of large projects					
33	Apply Glue					
34	Removal of surplus glue					

35	Test squareness of the work before final clamping					
36	Knock down fittings assembly					
37	Assemble using screw and nails					

Indicate the extent to which you think the following wood finishing skills are required by teachers in tertiary institutions.

S/N	Item Statements	Response Options				
		VHR	HR	MR	R	NR
38	Remove dry adhesive from the surface of the project.					
39	Scrape the project					
40	Dent rising hot water and sponge					
41	Remove grease and oils from the surface of the project					
42	Patching of nails holes, scratches and cracks					
43	Sand the work with abrasives					
44	Apply sanding sealer application					
45	Apply wood filler					
46	Select build up finishes					
47	Load the brush with finish					
48	Apply finish with brush					
49	Apply finish with pad and foam					
50	Apply finish with spray gun					
51	Select ideal air pressure (psi) when spraying					
52	Correct use of roller in applying finishes					

Indicate the extent to which you think the following wood maintenance skills are required by teachers in tertiary institution

S/N	Item Statements	Response Options				
		VHR	HR	MR	R	NR
53	Remove circular saw blade					
54	Sharpen circular saw blade					
55	Oil and grease ball bearings					
56	Oil and grease screws and slides in planer, machine					
57	Sharpen band saw blade					

58	Repair of broken band saw blade.					
59	Sharpen ripsaw teeth					
60	Sharpen cross-cut saw teeth.					
61	Sharpen hand plane blades					
62	Sharpen planer machine blades.					
63	Remove and replace planer machine blades.					
64	Replace or recondition of worn out tools.					

Appendix D

Population Distribution of Woodwork Teachers in North-Western Nigeria

Appendix D

Population Distribution of Woodwork Teachers in North-Western Nigeria

s/no	Institution	No. of Teachers
1	Federal College of Education (Technical), Bichi	6
2	Kaduna State College of Education Kafanchan	5
3	Federal College of Education (Tech) Gusau	7
4	Shehu Shagari College of Education Sokoto	6
5	Kaduna Polytechnic	10
6	Kano Polytechnic	3
7	Federal Polytechnic Birnin Kebbi	7
8	Hassan Usman Polytechnic	2
	Total	46

Appendix E

Research Question One

Appendix E

Pearsons product Moment Correlation

N	X	X^2	Y	Y^2	XY
1	23	529	23	529	529
2	20	400	21	441	420
3	21	441	20	400	420
4	20	400	20	400	400
5	19	361	20	400	380
6	23	529	23	529	529
7	20	400	20	400	400
8	22	484	23	529	506
9	23	529	23	529	529
10	19	361	22	484	418
11	18	324	19	361	342
12	20	400	20	400	400
13	23	529	24	576	552
14	21	441	23	529	483
15	20	400	20	400	400
16	24	576	23	529	552
17	21	441	22	484	462
18	19	361	20	400	380
19	20	400	21	441	420
20	22	484	22	484	484
21	23	529	23	529	529
22	23	529	21	484	506
23	21	441	21	441	441
24	20	400	21	441	420
25	19	361	22	484	418
26	21	441	22	484	462
27	20	400	21	441	420
TOTAL	544	11450	560	12108	11761

$$r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[N \sum x^2 - (\sum x)^2][N \sum Y^2 - (\sum Y)^2]}}$$

1. N=27
2. ∑ X= 544.
3. ∑X^2 = 11450
4. ∑Y = 560
5. ∑Y^2 = 12108
6. ∑XY= 11761
7. 27(11761)- 544x560= 317547-304640= 12907
8. 12907/ (27X11450-$(544)^2$ X(27X12108-$(560)^2$)
9. =12907/(309150-295936)X(326916-313600)
10. 12907 /13214X13316
11. 12907= 12907= 0.97
    175957624 13264.90
12. r=0.97

Appendix F

Research Question Two

Appendix F

Pearson Product Moment Correlation

N	X1	X^2	Y1	Y^2	XY
1	23	529	23	529	529
2	20	400	21	441	420
3	21	441	20	400	420
4	20	400	20	400	400
5	19	361	20	400	380
6	23	529	23	529	529
7	20	400	20	400	400
8	22	484	23	529	506
9	23	529	23	529	529
10	19	361	22	484	418
TOTAL	210	4434	215	4641	4531

$$r=\frac{N\sum x\,Y-(\sum x)(\sum Y)}{\sqrt{[(N\sum x^2 - (\sum x)^2(N\sum Y^2-(\sum Y)^2]}}$$

1. N=10
2. $\sum x$= 210
3. $\sum X^2$ = 4434
4. $\sum Y$ =215
5. $\sum Y^2$ = 4641
6. $\sum XX$ = 4531
7. 10(4531) - 210x215= 45310-45150=160
8. $\frac{160}{\sqrt{10x(4434-(210)^2(10x4641-(215)^2)}}$.
9. $\frac{160}{\sqrt{(44340-44100)(46410-46225)}}$
10. $\frac{160}{\sqrt{240x185}}$
11. $\frac{160}{\sqrt{44400}}$
12. $\frac{160}{210.7}$ =0.75 , r = 0.75

Appendix G
Research Question Three

Appendix G

Pearson Product Moment Correlation

N	X1	X^2	Y1	Y^2	XY
1	23	529	23	529	529
2	20	400	21	441	420
3	21	441	20	400	420
4	20	400	20	400	400
5	19	361	20	400	380
6	23	529	23	529	529
7	20	400	20	400	400
8	22	484	23	529	506
9	23	529	23	529	529
10	19	361	22	484	418
11	18	324	19	361	342
12	20	400	20	400	400
13	23	529	24	576	552
14	21	441	23	529	483
15	20	400	20	400	400
TOTAL	312	6528	321	6907	6708

$$r = \frac{N\sum xY - (\sum x)(\sum Y}{\sqrt{[(N\sum x^2 - (\sum x)^2][N\sum Y^2 - (\sum Y)^2]}}$$

1. N= 15
2. $\sum X = 312$
3. $\sum X^2 = 6528$
4. $\sum Y = 321$
5. $\sum Y^2 = 6907$
6. $\sum XY = 6708$
7. 15x6708-312x321=100620-100152=468
8. $$\frac{468}{\sqrt{15x6528-(312)^2\ (15x6907-(321)^2}}$$
9. $$\frac{468}{\sqrt{\quad}}$$

(97920-97344)(103605-10341)

10. $\frac{468}{\sqrt{576x564}} = \frac{468}{\sqrt{324864}}$

$\frac{468}{569.97} = 0.99$

r=0.99

Appendix H
Research Question Four

Appendix H

Pearson Product Moment Correlation

N	X1	X^2	Y1	Y^2	XY
1	23	529	23	529	529
2	20	400	21	441	420
3	21	441	20	400	420
4	20	400	20	400	400
5	19	361	20	400	380
6	23	529	23	529	529
7	20	400	20	400	400
8	22	484	23	529	506
9	23	529	23	529	529
10	19	361	22	484	418
11	18	324	19	361	342
12	20	400	23	529	460
TOTAL	248	5158	257	5531	5333

$$r=\frac{N\ \square\ x\ Y-(\square x)\ (\square Y)}{\sqrt{[(N\square\ x^2\ \ddot{\imath}\ (\square x)^2(N\square Y^2-(\square Y)^{2]}}}$$

1. N= 12
2. $\square X=248$
3. $\square X^2 = 5158$
4. $\square Y =257$
5. $\square Y^2 = 5531$
6. $\square Y= 5273$
7. $12x5333-248x257=63996-63736=260$
8. $$\frac{260}{\sqrt{(12x5158-(248)^2\ (12x5531-(257)^2}}$$
9. $$\frac{260}{\sqrt{(61896-61504)(66372-66049)}}$$

10. $\sqrt{392 \times 323}$ / 260

11. $\sqrt{126616}$ / 260 $= \frac{260}{355.83} = 0.73$

r=0.73