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A GUIDE TO TEACHING FIRST-YEAR BASIC DESIGN AND TECHNOLOGY IN JUNIOR HIGH SCHOOLS IN GHANA

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Abstract:
The Basic Design and Technology program was introduced into the Junior High School curriculum in September 2007. It is one of the elective subjects taught at the Junior High School level all over Ghana. A cursory study indicates the existence of problems in the acquisition of practical skills in the Basic Design and Technology (BDT) program offered in the Junior High Schools. No study was found to have been done regarding the actual challenges in skills acquisition in the program. This study, therefore, fills the gap and purposefully focuses on the teaching and the learning outcomes of pupils among other related issues. The study examines the teaching methods of teachers, considering the limited facilities available and how they affect pupils' acquisition of practical skills and competence. The qualitative research method was used for the study which sought to describe the processes for teaching and learning of Basic Design and Technology and to describe the tools used. Implications of the findings are discussed highlighting the importance of using proper teaching and learning approaches, providing qualified teachers, funds, studio/workshop facilities, and teaching and learning materials for effective delivery and learning Basic Design and Technology.

Keywords: a guide, basic design, and technology, junior high school, first-year teaching syllabus, tools

1. Introduction

The Basic Design and Technology program was introduced into the Junior High School curriculum in September 2007. It is one of the elective subjects taught at the Junior High School level all over Ghana. BDT, as it is called today, existed in different forms over the

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decades. However, the focus still remains the same thus, training individuals to acquire practical competence before leaving Junior High School. This means that basic education has been designed to expose individuals to a wide variety of ideas and skills and instills attitudes that will help them cope creatively with their environment and stimulate them to be an asset to their country (CRDD, 2007). However, a cursory study indicated that there were challenges in the acquisition of practical skills in the BDT program. No study was found to have been done regarding the actual challenges in skill acquisitions in the program. This gap, therefore, necessitated a study of this nature: a guide to teaching first-year Basic Design and Technology in the Junior High Schools in Ghana.

Basic Design and Technology adopts the design principles and processes in pre-Technical Skills and pre-Vocational Skills and teaches the application of these principles and processes in various aspects of the three vocational options: Pre-Technical Skills, Home Economics, and Visual Arts. The subject was purposely introduced to train pupils at the Junior High school level to equip them with basic entrepreneurial skills before they enter the Senior High School in the country. This training was also intended to equip individuals who may drop out of school with skills that will help them to be self-employed. Again, it is to help individuals who may have the opportunity to enter the Senior High School, Technical and Vocational schools in the country to become acquainted with the related courses offered in these schools (CRDD, 2007).

A report by the Ministry of Education (2002) on Pre-Tertiary Education Review stated that the courses in our education set-up should be arranged so that there will be a connection from Primary to Junior High School level and from Junior High School level to Senior High School and Technical Institute levels. This shows that pupils in the Basic Schools after studying the BDT are to be introduced to more advanced Technical and Vocational skills at the Senior Secondary School level. The idea is that a new breed of problem solvers with good thinking skills would be trained in Ghana with the JHS curriculum. According to the organization and structure of the BDT syllabus, each pupil is expected to indicate his/her option of interest before the end of the second term of JHS 1 after having gone through almost two terms of instruction in the core principles and skills of the three optional areas (CRDD, 2007). During the final year examination also known as Basic Education Certificate Examination (BECE), the BDT subjects are organized in two folds. Paper one is a theory with 30 marks while paper two is practical with 70 marks.

Teachers who handle BDT subjects are expected to ensure that the critical thinking and problem-solving skills have been captured in the teaching syllabus for BDT in the JHS. In other words, teachers are to make sure that whatever they teach from the syllabus is geared towards the achievement of critical thinking and problem-solving skills. The BDT curriculum is therefore been broken down into the syllabus for the various classes in the JHS. It is expected that the teachers in the JHS develop their schemes of work from this syllabus.

1. Teaching Syllabus

1.1. Introduction

A syllabus is an account of a course of study which is not detailed. It is offered, as a guide to teachers and it is required of them to re-arrange them for effective teaching and learning purposes. The syllabus is drawn from the curriculum objectives. It is an essential document to a practicing teacher because it is the basis for the content to be delivered to the learner. It is usually non-detailed and it is prepared and published by internal and external examining bodies.

1.2 Definition of Syllabus

A syllabus is an account of the course of study which is not detailed. It serves as a guide to teachers. It is required to be re-arranged for effective teaching and learning purposes (Amoakohene, 2006). According to Chudley (1995), a syllabus is a non-detailed statement of various topics of a course of study, which communicates certain portions of the curriculum for teachers and learners to use in schools or colleges. The syllabus indicates what should be covered in the course but it is orderly arranged.

1.3 Types of Syllabus

There are two main types of syllabus namely: the examination syllabus is also known as traditional syllabus and the teaching syllabus also known as Competency-based syllabus (Amoakohene, 2006).

1.3.1 The Examination (Traditional) Syllabus

This syllabus serves as a guide to both the teacher and the learners (students) as to what the pertinent information they may need to know. This vital information includes the following:

- The proper order for the treatment of the content.
- The depth or extent to which topics are to be taught.
- The appropriate teaching and learning methods to be employed.
- The best method and approach for assessing whether or not the students have understood what has been taught (CRDD, 1997).

1.3.2 The Teaching (Competency-based) Syllabus

This is the translation of the traditional syllabus into objectives based syllabus. It has five (5) main columns namely:

- topic / unit;
- specific objective;
- content;
- teaching/learning activity and;
- evaluation.

1.3.2.1 Topic/ Unit

This column contains the topic of the subject to be taught.

Specific objectives: In this column, the expected learning outcome on the terminal behavior expected of the learners is stated when topics treated are listed under each main topic.

1.3.2.2 Content

The content in the third column of syllabus presents a selected body of information that will be needed in teaching a particular topic.

1.3.2.3 Teaching/learning Activity

This is the most effective column where the teaching method or approach that will ensure maximum students participation to bring about each of the stated terminal behaviors is stated.

1.3.2.4 Evaluation

This is the column where suggestions and exercises for evaluating the lesson of each topic are indicated. It also contains the most appropriate means of assessing whether or not the learners can demonstrate the expected behavior (CRDD, 1997).

1.4 Importance of a Teaching Syllabus

According to Amoakohene (2008), the reasons for having a syllabus include the following:

1) A syllabus helps the teacher to plan his/her work over the duration of the course study.
2) It enables the teacher to evaluate the students' sets of standard.
3) It assists both the teacher and the student to know at a glance the topics to be covered within the given period.
4) It ensures standardization of the same course held at different learning centers.
5) It facilitates the planning of the scheme of work.
6) It serves as a guide to both the teacher and the student as to the topics to be covered.
7) It ensures that the same courses held at different centers are assessed to a set standard.
8) It enables the same courses held at different institutions to be standardized.

1.5 Factors to Be Considered in Preparing a Syllabus

In the preparation of syllabus, a lot of factors are considered, and they include:

1) Time factor.
2) The overall aim to be achieved.
3) The related course and past experiences in which the candidates enrolled in the programme/course have had.
4) The reason for the candidates pursuing the course/programme.

5) The length of a class period, i.e. period per week, per month, per year.
6) The job opportunities in the employing community, i.e. industry and commerce.
7) The average number of the pupil to be enrolled per year.
8) The teaching and learning materials and community resources are available to run the course.
9) The duration of the course.

In the planning of a syllabus, an advisory committee is set up which is made up of:

1) Representative of the government.
2) Representative of the examination body, (WAEC).
3) Representative of the appropriate professional body (GNAT, NAGRAT).
4) A representative from industry and commerce.
5) Educationist.

2. Scheme of Work

2.1 Introduction

A scheme of work is described as an orderly arrangement of the main topics, general objectives, and contents, teaching methods, related studies, teaching/learning materials, references, and assignment, in a tabular form. Scheme of work is a detailed arrangement of a syllabus which gives an indication of the order in which the subject matter will be taught. It is more detailed than the lesson order which enables the teacher to know what exactly is to be done. The scheme of work is planned for a particular term or semester and it involves all lesson plans and shows at a glance how the topics are to be covered every week.

2.2 Definition of a Scheme of Work

A scheme of work is a systematic plan of the main topics in the syllabus for teaching purpose. The scheme of work is planned to be used for a particular term or semester. It links all lesson plans and it shows at a glance the topic to be covered every week (Amoakohene, 2006).

2.3 Importance of Scheme of Work

The main importance of the scheme of work is that it breaks down the syllabus into teaching units, showing how many topics of the learners are expected to learn daily, weekly and termly. Among the importance of a scheme of work are the following:

1) It helps to plan the lesson ahead.
2) It puts the syllabus into its natural sequence.
3) It serves as a record of work for the period.
4) It guides the teacher not to deviate from the topics to be treated within the term.
5) Help to know in advance the amount of work to be done each day, week and term.
6) Help the teacher in selection of TLMs and instructional material in the preparation of the lesson plan.

7) It enables a teacher to know where to continue in the absence of the regular teacher.

2.4 Factors to be considered when planning a scheme of work

1) The number of weeks in the term. Usually, the duration within which each unit should be completed is the weekly forecast.
2) The term under consideration. The term under consideration indicates how many topics to be covered in every term.
3) The topics to be covered in a particular term. It helps the teacher to teach the selected topics effectively.
4) The duration for each period (in minutes). This entails breaking the topics in the syllabus in smaller units and assigning the duration of time within each unit.
5) Relevant instructional materials, for teaching and learning the individual topics (charts, models, instructional sheets)
6) The relationships of the topics to other courses of the programme. The teacher must be relating the topics to other courses to facilitate effective teaching.
7) The content (Areas of coverage). The content should contain information that the teacher needs in teaching.
8) Nature of assignment to be given to students. Thus the kind of work to be an assignment to students for example project work or homework, group discussion.

2.4 Scheme of Work Format

Name: **Year:**
Institution: **Term:**
Subject: **Class:**

Week	Duration	Topic	General Objective	Content	Teaching Method	Related Studies	Reference	Assignment	Remark

2.4.5 Scheme of Work 1

Name: Group 68 **Year:** 2014
Institution: Presby J.H.S **Term:** One
Subject: Pre- Technical Skills **Class:** J.H.S. Two

Week	Duration (minutes)	Topic	General Objectives	Content	Teaching Method	Related Subject	TSM/ SSM	Reference	Assignment	Remarks
1	105	General Cleaning								
2	70	Isometric drawing	Acquire the skills for drawing objects in three dimension	Isometric drawing	Discussion and demonstration	Pre-vocational skills	Real objects and charts	Amoakohene, S. K. (2006). Pre-technical Skills for JHS. Unimax Macmillan Publishers Ltd. Accra-North Ghana	Students to explain an isometric drawing	
3	70	Oblique drawing	Draw objects using the oblique axes	Drawing in oblique projection	Discussion and demonstration	Pre-vocational skills	Charts	Amoakohene, S. K. (2006). Pre-technical Skills for JHS.	Draw the object using the oblique axes	
4	70	Perspective drawing	Apply the principles of	Explain perspective drawing and draw given objects using	Demonstration	Pre-vocational	Samples of objects	Amoakohene, S. K (2006).	Students to draw in perspective	

			perspective drawing objects	both the single and two-point perspective drawing.		skills		Pre-technical Skills for JHS.	drawing	
5	70	Principles of orthographic projection	Understand the principles of orthographic projection	Explanation of principles of orthographic projection - first angle - third angle	Discussion and demonstration	Pre-vocational skills	Samples / charts	Amoakohene, S. K. (2006). Pre-technical Skills for JHS. Unimax Macmillan Publishers Ltd. Accra-North Ghana		
5	35	Principles of orthographic project	Understand orthographic projection	Draw objects in orthographic projection	Demonstration and discussion	Pre-vocational skills	Samples of charts	Amoakohene, S. K. (2006). Pre-technical Skills for JHS		
6	35	Class Test								
7	70	First angle projection	Understand first angle projection	Draw plan view, side view and using first angle projection	Demonstration	Pre-vocational skills	Drawing instrument	Amoakohene, S. K. (2006). Pre-technical Skills for JHS	Draw objects in first angle projection	
7	35	Third angle projection	Understand third angle projection	Draw in third angle projection with all the views	Demonstration and discussion	Pre-vocational skills	Drawing instrument	Amoakohene, S. K. (2006). Pre-technical Skills for JHS.	Draw objects in third angle projection	
8	70	Development of prisms	Apply the principles of development of prisms	Explanation of principles of a prism - square - cylinder	Demonstration and Discussion	Pre-vocational skills	Sample hexagonal prism, triangular prism	Amoakohene, S. K. (2006). Pre-technical Skills for JHS.	Students to explain the principles of development of prisms	
9	70	Development of prisms	Apply the principles of development of prisms	Explanation of principles of a prism - hexagonal - triangular	Demonstration and Discussion	Pre-vocational skills	Sample hexagonal prism, triangular prism	Amoakohene, S. K. (2006). Pre-technical Skills for JHS. Unimax Macmillan Publishers Ltd. Accra-North Ghana	Students to practice development of hexagonal and triangular prisms	
10	70	Development of a pyramid	Apply the principles of	Explanation of principles of surface development of	Discussion and demonstration	Pre-vocational	Sample hexagonal	Amoakohene, S. K. (2006).	Explain the principles of	

			surface development of pyramids.	triangular and hexagonal pyramids		skills	pyramids, triangular pyramids.	Pre-technical Skills for JHS. Unimax Macmillan Publishers Ltd. Accra-North Ghana	surface development of pyramids	
11	105	Buffer Period								
12	105	Revision								
13	105	Examination								

Scheme of Work 2

Name: Group 68
Institution: Presby J.H.S
Department: Technical
Subject: Pre- Technical Skills

Year: 2014
Class: J.H.S. Two
Term: Two

Week	Duration (minutes)	Topic	General Objectives	Content	Teaching Method	Related Studies	TSM/ SSM	References	Assignment	Remarks
1	105	General Cleaning								
1	70	Metals (medium carbon steel)	Understand the properties of the metal (medium carbon steel) and uses	Properties of medium carbon steel: toughness, strength, brittleness, hardness	Discussion	Integrated Science	Real Objects, Pictures	Aidoo, F. F. *et al* (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana	State three properties of medium carbon steel	
2	70	Metals (medium carbon steel)	State the range of carbon content of medium carbon steel	The carbon content of medium carbon steel	Discussion	Integrated Science	Real Objects, Charts	Aidoo, F. F. *et al*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Discuss the range of carbon content in medium carbon steel	
2	35	Metals (medium carbon steel)	State the uses of medium carbon steel	Uses of medium carbon steel	Discussion	Integrated Science	Real Objects, Charts	Aidoo, F. F.*etal*., (2008). Basic Design and	State at least three (3) uses of medium carbon	

								Technology for JHS. Sedco Publishing Ltd. Accra	steel	
3	70	Metals (Non-ferrous alloys)	Identify non-ferrous alloys	Identification of non-ferrous alloys (brass, bronze, and soft solder)	Discussion	Integrated Science	Samples of non-ferrous alloys	Aidoo, F. F.*etal*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to collect objects made of alloys.	
4	70	Metals (Non-ferrous alloys)	State the basic composition of non-ferrous alloys.	Composition of non-ferrous alloys - brass (copper + zinc) - bronze (copper + tin) - soft solder (lead + tin)	Discussion	Integrated Science	Real Objects, Pictures	Aidoo, F. F.*etal*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to state the composition of non-ferrous alloys	
5	70	Metals (Non-ferrous alloys)	State the uses of non-ferrous alloys	Uses of alloys: - brass - musical instruments - bronze-church bells - soft solder-soft soldering of electrical parts	Discussion	Integrated Science	Real Objects.	Mensah, &Dacosta (2002), Pre-technical skills for JSS, Adwinsa Publication (Ghana) Ltd.	Students to give examples of uses of brass, bronze, and soft solder.	
6	70	Class Test								
7	70	Aggregates (Fine and coarse)	Understand the term aggregates and differentiate between fine and coarse aggregates.	Types of aggregates Fine (sand) Coarse (stone)	Discussion,	Integrated science	Real Objects (sand, stones)	Aidoo, F. F.*etal*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to discuss the differences between fine and coarse aggregates.	
7	70	Aggregates (Fine and coarse)	State the uses of fine and coarse aggregates	Uses of fine and coarse aggregates.	Discussion,	Integrated science	Real Objects (sand, stones)	Aidoo, F. F.*etal*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to state at least two use each of fine and coarse aggregates.	

8	70	Adhesives	List types of adhesive	Types of adhesive - PVA (polyvinyl acetate) (white glue) - Contact glue	Discussion	Pre-vocational skills	Sample of white glue and contact glue	Aidoo, F. F.*etal*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students the two types of adhesive.	
	70	Adhesives	State the uses of adhesives	Uses of adhesives PVA- for woodwork jointing Contact glue- for laminating, veneers, formica etc.	Discussion	Pre-vocational skills	Sample of white glue and contact glue	Aidoo, F. F.*etal*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students at least three uses of adhesive.	
9	70	Finishes	Identify types of finishes	Types of finishes Polish (lacquer) Paint (emulsion, oil)	Discussion and Demonstration	Carpentry, Visual Art	Samples of polish, paint, and thinner	Aidoo, F. F. *et al*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to identify the types of finishes.	
9	70	Finishes	Uses of finishes correctly	Uses of finishes	Discussion and Demonstration	Carpentry, Visual Art	Samples of polish, paint, and thinner	Aidoo, F. F.*etal*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to demonstrate how to mix emulsion paint with water, oil paint with turpentine, etc.	
10		Buffer Period								
11		Revision								
12		Examination								

Scheme of Work 3

Name: Group 68
Institution: Presby J.H.S
Department: Technical
Subject: Pre- Technical Skills

Year: 2014
Class: J.H.S. Two
Term: Three

Week	Duration (minutes)	Topic	General Objective	Content	Teaching Method	Related Studies	TSM/ SSM	References	Assignment	Remarks
1	70	General Cleaning								
2	70	Setting-out and marking-out tools	Identify the setting-out and marking-out tools	Identification of setting-out and marking-out tools	Identification	Visual Art, Carpentry	Real Objects (Line and Pins, builder's square)	Aidoo, F. F. *et al*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra.	Students to identify setting-out and marking-out tools	
3	70	Setting-out and marking-out tools	Use setting-out and marking-out tools correctly	Uses of setting-out and marking-out tools	Demonstration, Discussion	Visual arts, Carpentry	Real Objects	Aidoo, F. F. *et al*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	State the uses of the following setting-out and marking-out tools i) builder's square ii) Line and pins	
4	70	Cutting tools	Identify the different types of cutting tools	Identification of cutting tools - tenon saw - round file - hand drill and twist drills - bolster	Discussion / Demonstration	Mechanics	Samples of cutting tools	Aidoo, F. F. *et al*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Identify cutting tools from different tools	
5	70	Cutting tools for woodwork	Identify types of cutting tools for woodwork	Types of cutting tools for woodwork A rip saw, crosscut saw, flat chisel, firmer chisel	Discussion Demonstration	Mechanics	Samples of cutting tools -tenon saw crosscut saw, flat chisel.	Aidoo, F. F. *et al*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to sketch and label the various parts of the cutting tools.	
6	70	Cutting tools	Explain how to care for and maintain the cutting tools	Care and maintenance of the tools - clean the tools - oil the tools	Discussion and Demonstration	Mechanics	Sample of marking out tools	Aidoo, F. F. *et al*., (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra	Describe how cutting tools safely	

				- pack them safely						
7	Class Test									
8	70	Molding bricks	Identify the correct tools and equipment for molding bricks	Tools and equipment for molding bricks - molding box - head pan/gauge box - shovel/spade - tamping rod	Demonstration	Building technology	Real objects Charts	Aidoo, F. F. *et al.*, (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to identify molding tools and equipment	
9	70	Molding bricks	Mold bricks to standard size	Molding bricks to the standard size (215 mm x 102.5 mm x 65 mm)	Demonstration	Visual Arts	Real objects Charts	Aidoo, F. F. *et al.*, (2008). Basic Design and Technology for JHS. Sedco Publishing Ltd. Accra Ghana.	Students to mold bricks in a group using laterite	
10	70	Buffer Period								
12	70	Revision								
13		Examination								

3. Brief List and Description of Teaching and Learning Material

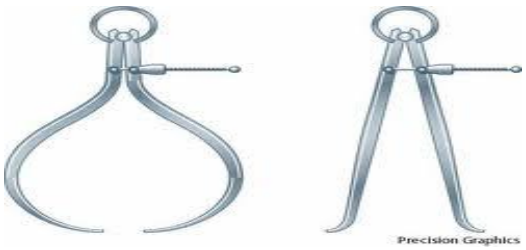
3.1 Introduction

In the field of Education, TLM is a commonly used acronym that stands for "teaching/learning materials." Broadly, the term refers to a spectrum of educational materials that teachers use in the classroom to support specific learning objectives, as set out in lesson plans.

According to NCERT (2005), one of the major aims of TLM is to design, provide, and enable appropriate teaching-learning systems that could realize the identified goals. Below are a brief list and description of TLM'S used in the lesson plan prepared.

A. Calipers

According to Wikipedia, http://www.calipers.com, the free encyclopedia, a caliper is a device used to measure the distance between two opposing sides of an object. A caliper can be as simple as a compass with inward or outward-facing points. The tips of the caliper are adjusted to fit across the points to be measured, the caliper is then removed and the distance read by measuring between the tips with a measuring tool, such as a ruler. The Oxford dictionaries also described caliper as an instrument for measuring external or internal dimensions, having two hinged legs resembling a pair of compasses and in-turned or out-turned points.



B. Spade

Macmillan dictionary described a spade as a sturdy digging tool having a thick handle and a heavy flat blade that can be pressed into the ground with the foot. Also in Oxford dictionaries, a spade is been described as a tool with a sharp-edged, typically rectangular, metal blade and a long handle, used for digging or cutting earth, sand, turf, etc.

C. Nails

A slim, pointed piece of metal hammered into the material as a fastener (American Heritage, 2009). A nail is also described in dictionary.com as a slender, typically rod-

shaped rigid piece of metal, usually in any of numerous standard lengths from a fraction of an inch to several inches and having one end pointed and the other enlarged and flattened, for hammering into or through wood, other building materials, etc., as used in building, in fastening, or in holding separate pieces together.

D. Pliers

Pliers are a variously shaped hand tool having a pair of pivoted jaws, used for holding, bending, or cutting. In Encyclopaedia Britannica also described pliers as a tool that consists of a pair of metal first-class levers joined at a fulcrum positioned closer to one end of the levers, creating short jaws on one side of the fulcrum, and longer handles on the other side. This arrangement creates a mechanical advantage, allowing the force of the hand's grip to be amplified and focused on an object with precision. The jaws can also be used to manipulate objects too small or unwieldy to be manipulated with the fingers.

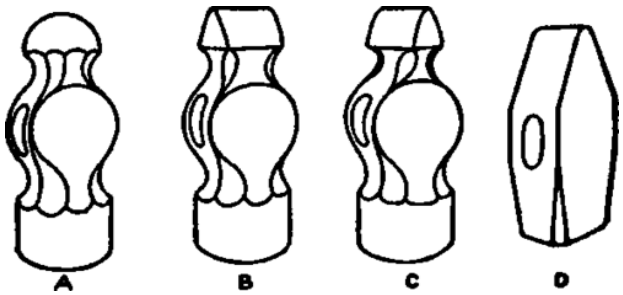
E. Tape Measure

A tape measure or measuring tape is a flexible form of a ruler. It consists of a ribbon of cloth, plastic, fiberglass, or metal strip with linear-measurement markings. It is a common measuring tool, It design allows for a measure of great length to be easily carried in pocket or toolkit and permits one to measure around curves or corners

F. Hammer Heads

The main part of a hammer is the head, which can end in a claw or a ball-peen on the opposite side. Additionally to the head, a hammer has a neck, which is the part of the handle that connects to the head and is a little bit thinner than the handle; and a handle,

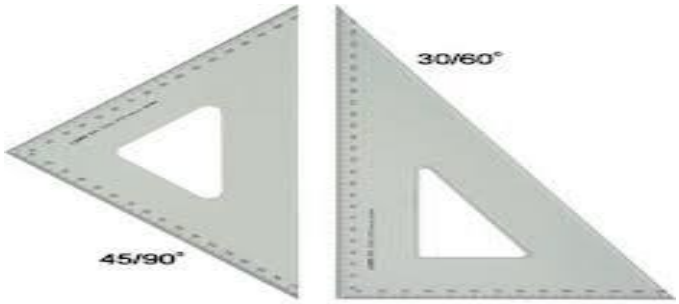
which can be made of wood or metal, depending on the type of hammer. Hammers are mostly used as tools but have sometimes been used as weapons.



G. Set Squares

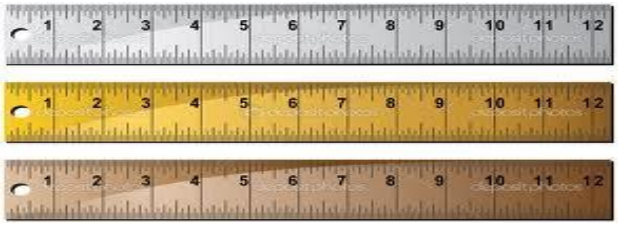
Set squares are generally made from Plastic or celluloid material. They are triangular in shape with one corner, a right angle triangle. A pair of set squares (30°–60°) and 45° (45° set square are generally provided. with Protractor) facilitate marking of angles as shown in the figure below.

They are used to draw lines at 30°, 60° and 45° to the vertical and horizontal.



H. Rulers

A straight edge strip as of wood or metal, for drawing straight lines and measuring lengths. According to Macmillan dictionary, an object used for measuring or for drawing straight lines, consisting of a long flat piece of plastic, wood, or metal marked with units of measurement.



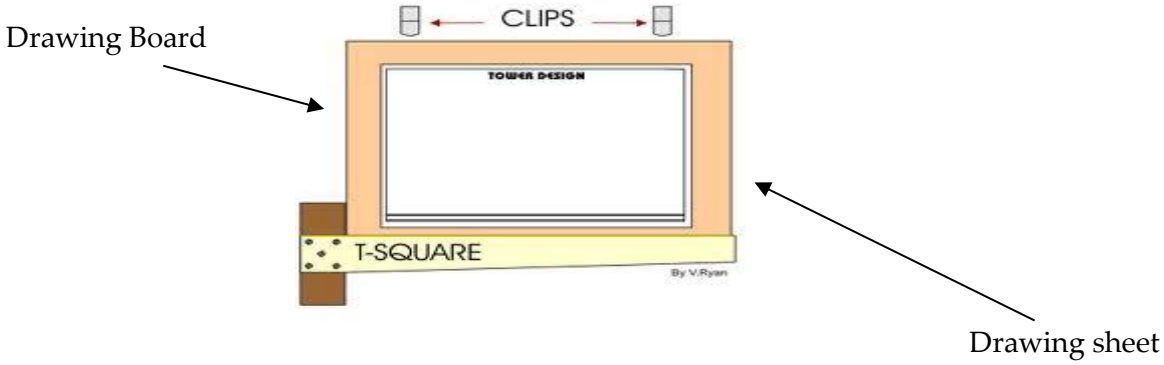
I. T-square

T-squares are made from hardwood. A T-square consists of two parts namely the stock and the blade joined together at right angles to each other by means of screws and Pins.

Stock is made to slide along the working edge and the Blade moves on the Drawing board.

J. Drawing Board

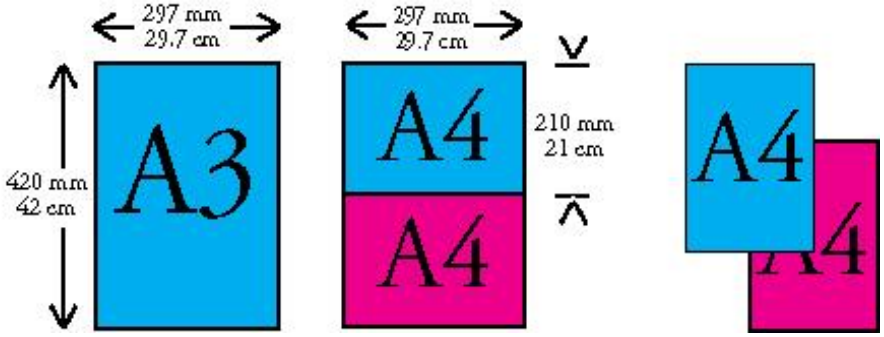
Drawing board is made from strips of well-seasoned softwood generally 25 mm thick. It is cleated at the back by two battens to prevent warping. One of the shorter edges of the rectangular board is provided with a perfectly straight ebony edge which is used as a working edge on which the T-square is moved while making Drawings.



K. Clips

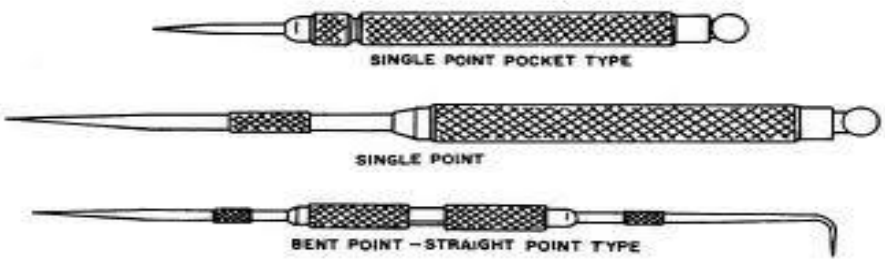
They are produced from metal or plastic used to fasting or hold drawing sheet onto the drawing board.

L. Drawing sheets



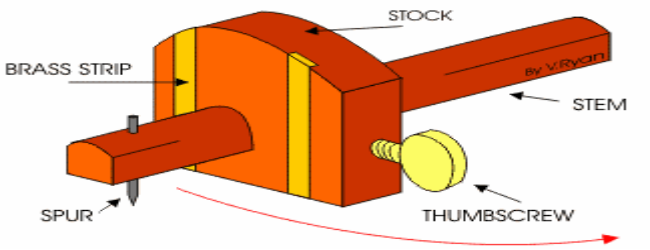
M. Scriber

A sharply pointed tool used for marking lines on wood, metal, or ceramic.



N. Marking or cutting gauge

According to International Textbook Company (1903), A marking gauge, also known as a scratch gauge, is used in woodworking and metalworking to mark out lines for cutting or other operations. Tolpin, Jim (2007) also described the marking gauge as the purpose of the gauge is to scribe a line parallel to a reference edge or surface. In nutshell, the gauge has a sharp point called a spur. This is made from hardened steel and is the part that 'scribes' the line into the surface of the wood. The distance between the stock and the spur can be adjusted by loosening the thumbscrew which allows the stock to slide along the stem. The thumbscrew can then be tightened once the correct distance has been reached.



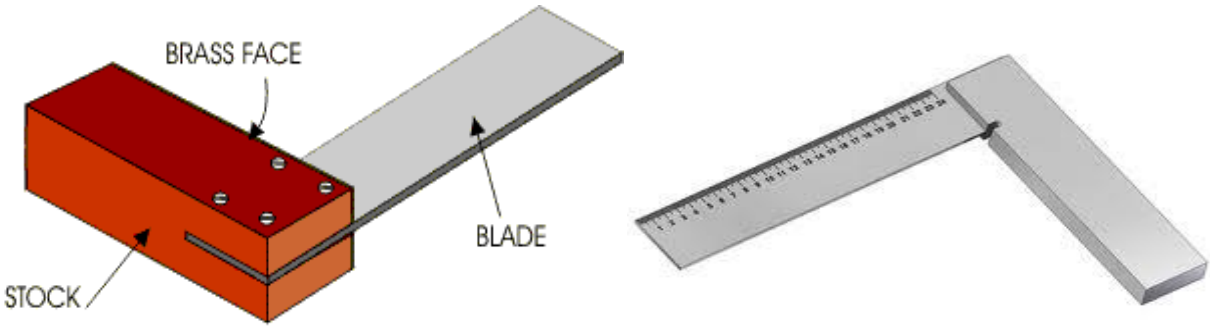
O. Marking knife

A marking knife is a woodworking layout tool. It is used to scribe a line to be followed by a hand saw or chisel when making woodworking joints and other operations. Marking knives have a steel blade which is sharpened to a knife edge. The purpose of the knife edge is to sever fibers as the marking knife is drawn over them. This produces a very accurate line which aids in making accurate cuts with the saw or chisel. The blade is of tool steel with a hardwood or plastic handle. These instruments are generally used when laying out across the grain. They are avoided when laying out with the grain as the blade tends to follow the fibers, resulting in inaccurate lines.


P. Try – Square

A try- a square is woodworking or a metal working tool used for marking and measuring a piece of wood. The square refers to the tool's primary use of measuring the accuracy of a right angle, (90 degrees); to try a surface is to check its straightness or correspondence to an adjoining surface. A traditional try square has a broad blade

made of steel that is riveted to a wooden handle or 'stock'. The inside of the wooden stock usually has a brass strip fixed to it to reduce wear. Some blades also have graduations for measurement. Modern try squares may be all-metal, with stocks that are either die-cast or extruded (WATT, 2002).

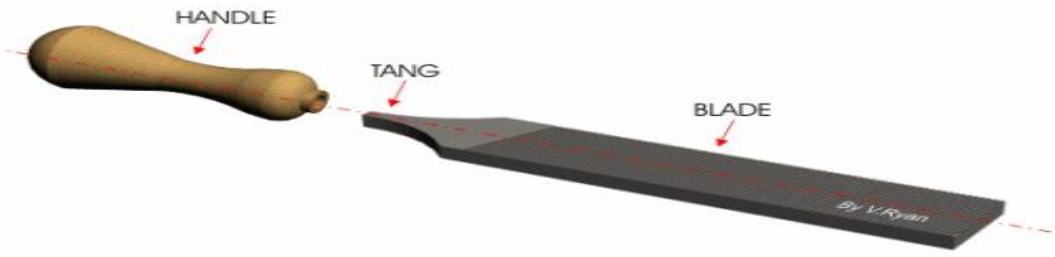


Q. Brick Mould

A shaped cavity or frame made of wood or metal used to give a definite form or the shape of which something may be constructed. (Bricks, blocks)

R. Hand or flat file

The handle of a file is made from a block of wood such as pine or beech and is shaped ergonomically to fit the hand comfortably. The handle is pushed onto the tang of the file after the tang has been heated to red heat on the blazing hearth. This is a traditional way of permanently fitting the handle onto the file blade.

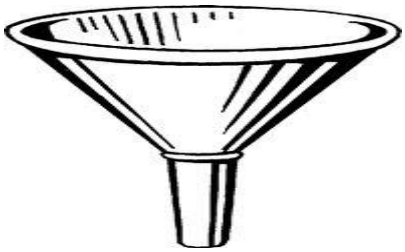


S. Glue

A strong liquid *adhesive* obtained by boiling collagenous animal parts such as bones, hides, and hooves into hard gelatin and then adding water.

T. Funnel

A *funnel* is a pipe with a wide mouth, good for feeding, often conical mouth and a narrow stem.



U. Paint

Paint is any liquid, liquefiable, or mastic composition which, after application to a substrate in a thin layer.

V. Chalk Box

It is a rectangular or cuboids made of wood or paper (card).

4. Lesson Plan

4.1 Introduction

A lesson plan is an instructional prescription or guide that describes or shows how resources that are facilities, time, content and teaching will be organized so that the learners will acquire and develop the highest degree of knowledge and skills expected (Amoakohene, 2008).

4.2 Definition of Lesson Plan

A lesson plan is an instructional material that describes how resources and topics will be organized so that a large number of learners will develop the highest degree of knowledge, attitude, and skills (Amoakohene, 2006).

A lesson plan is an instructional guide that shows how resources both human and physical will be organized so that the students will acquire and develop the expected knowledge and skills (Sarfo, 2007).

4.3 Importance of Lesson Plan

The lesson plan has various advantages. Some of these are:

- It helps the teacher to select the right instructional materials (e.g.) textbook, charts, to be used.
- It enables the teacher to present his/her lesson logically.
- It enables all the desirable instructional objectives to be achieved.
- It serves as a record of work done so that topics are not repeated when treated.
- It gives the teacher self-confidence in that he/she has a well-planned document. that can be referred to anytime he or she is in trouble.
- It enables the teacher to prepare the test items using the instructional objectives formulating the lesson plan.

4.4 Factors to consider when planning a lesson

According to Amoakohene (2008) the main factors to consider when planning a lesson should include:

- **Topic**: Consider whether the topics selected for the lesson are taken from the scheme of work or syllabus.
- **Expected Learning Outcomes**: The instructional objectives will clearly state the content of the lesson topic that by the end of the behavioral change can be measured
- **Instructional Materials**: The instructional materials are support materials that supplement the teacher's or student's work in the classroom/workshop.
- **Time/Duration**: The period of time must be considered so that the rate of delay can be controlled.
- **Classroom / Workshop**: The place where the lesson will be presented must be known and prepared. This ensures comfortability for both the teacher and the students throughout the instructional period.

- **Activities to be assigned**: For successful evaluation of the lesson, student activities (i.e. class exercise, projects and assignments) must be identified and included in the lesson plan.

4.5 Lesson Plan Format

Institution: **Lesson Number:**
Department: **Class:**
Subject: **Duration:**
Topic: **Date:**
Instructional Objectives:
References:
Teacher/Learning Resources:

Teacher Support materials (T.S.M)
Student Support materials (S.S.M)

TLM	Content/Stage/ Step/ Time	Teacher's Activity	Students' Activity	Major Ideas/ Core Points
	Stage 1 Introduction (Time) Stage 2 Development Step 1 (Time) Step 2 (Time) Step 3 (Time) Stage 3 Application (Time) Stage 4 Conclusion (Time)			

Assignment:
Submission Date:
Remarks:

Sample Lesson Plan 1

Institution: Presby J.H.S
Department: Technical
Subject: Pre- Technical Skills
Topic: Isometric Drawing

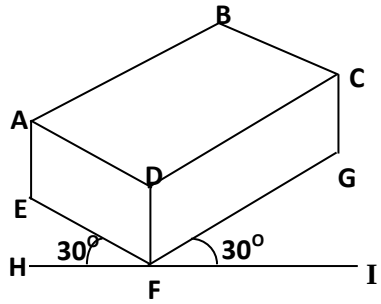
Lesson No.: One
Term: One
Duration: 70 minutes
Date: 13/07/2015

Instructional Objectives: By the end of the lesson pupil will be able to:
1. Explain isometric drawing.
1.1 State the first three procedures in an isometric drawing.
1.2 Draw a given object in isometric.

Teaching/Learning Materials: TLMs: model, charts.
Relevant Previous Knowledge: Students have been playing with models such as chalk box, packing cases, cane, etc.
Advanced Preparation: Teacher read on various books gathered TLMs.

References:
Green, J. N. (1994). *Technical Drawing for School Certificate.* Lagos: Spectrum Books Limited.
Kasamira, P. (1993). *Basic Design and Technology for Junior High Schools.* Accra: Sedco Publishing Ltd. Pp. 34-37

TLM	Stages/Steps/ Estimated Time	Teacher's Activity	Students' Activity	Major Ideas / Core Points
	Stage 1: Introduction Review of relevant previous knowledge **(10 minutes)**	A teacher asks students to draw different shapes (e.g.) square, rectangle	Listen and draw different shapes.	
	Stage 2: Development **Step 1:** Explanation of Isometric drawing **(10 minutes)**	Teacher defines Isometric drawing to the students. Explain to them.	Students listen and ask questions.	Isometric drawing is the process of drawing an object to an angle of 30°
Written principles of Isometric drawing on a manila card.	**Step 2: P**rocedures of Isometric drawing **(15 minutes)**	A teacher explains the principles of isometric drawing with the aid of models and charts.	Students observe the model and charts	Procedures of Isometric Drawing: 1) Each of the three surfaces of the object is inclined at an equal angle of 30° to the plane of projection. 2) The principal edges are called the isometric axes. 3) The measurements are always taken along the isometric axes or a line

				parallel to them. 4) The same seal is used on all the three isometric axes.
Drawing of an isometric block on the chalkboard.	**Step 3:** Isometric drawing of objects **(15 minutes)**	The teacher demonstrates and assists students to draw an object from the charts.	Draw object using drawing instruments.	1) Draw a vertical line and mark off the height of the object. 2) Draw the two 30° lines using a 30° set square and measure the length of as shown below 3) Draw the other vertical and 30° lines as required. 4) Complete the drawing and line in. 
	Stage 3: Application **(15 minutes)**	Let students draw some selected object from the chart posted on the board.	Draw the following object from the chart.	
	Evaluation **(10 minutes)**	A teacher asks the following questions; 1) Explain the term isometric drawing. 2) State the first three procedures of isometric drawing. 3) Draw a given object in isometric.	Listen and answer a question.	

Assignment: Draw the development of prism from your pupil's book 2.
Submission Date: 14/08/2015
Remarks:

Sample Lesson Plan 2

Name: Group 68
School: Presby J.H.S
Subject: Pre-Technical Skills
Topic: Development of Prisms
Class: J.H.S Two
Lesson Number: Two
Duration: 45 minutes
Date: 20/07/2015

Instructional Objectives: By the end of the lesson, students will be able to:
1.1 Explain at least two (2) principles of surface development;
1.2 State at least one (1) importance of surface development of an object.

Teaching/Learning Materials: TLMs: a chart with drawing objects.
Relevant Previous Knowledge: Students have seen funnels and matches box.
Advanced Preparation: Teacher read on various books and gathered TLMs.

References:
Green, J. N. (1994). *Technical Drawing for School Certificate.* Lagos: Spectrum Books Limited
Kasamira, P. (1993). *Basic Design and Technology for Junior High Schools.* Accra: Sedco Publishing Ltd. Pp. 34-37.

TLM	Stages/Steps/ Estimated Time	Teacher's Activity	Students' Activity	Major Ideas / Core Points
Chart withdrawn objects like funnels matchbox, etc	**Introduction:** Review of relevant previous knowledge **(5 minutes)**	A teacher asks students how they make a car out of milk tin.	Students provide their answers orally.	
	Stage 2: Development **Step 1:** Principles of surface development of prisms **(10 minutes)**	The teacher demonstrates and discusses the topic	Students observe the demonstration and contribute to the discussions.	Principles of surface prisms: 1) Draw the plan and front elevation. 2) Divide the plan into a convenient number of parts. 3) Project the points on the plan to the elevation.
	Step 2: Importance of surface development **(15 minutes)**	Teacher discusses the importance of surface development	Students listen attentively and ask questions	Items like funnels, buckets, etc are made by drawing their patterns on a flat sheet of metal, cut out and folded. The drawn pattern is known as the development of the surface.

	Stage 3: Application **(15 minutes)**	Let students draw patterns of some selected object from the chart posted on the board and fold them into respective objects	Students draw the patterns and fold them into respective objects	
	Conclusion (10 minutes)	Go over the main points with students through demonstration and question and answer techniques.	Students listen and answer questions.	

Assignment: Draw any two objects on the chart in isometric.
Submission Date: 21/08/2015
Remarks:

Sample Lesson Plan 3

Name: Group 68
School: Presby J.H.S
Subject: Pre-Technical Skills
Topic: Metals (Non-Ferrous Alloys)
R.P.K: Students Have Seen Different Kinds Of Non-Ferrous Alloys.

Class: JHS Two
Lesson Number: Three
Duration: 45 minutes
Date: 27/08/2015

Objectives: By the end of the lesson, students will be able to:
1.0 Identify at least two (2) non-ferrous alloys
1.1 State at least two (2) basic composition of non – ferrous alloys
1.2 State at least two (2) uses of non-ferrous alloys

Advance Preparation: Teacher reads on various books and gathered TLMs
Teaching/Learning Materials: TLMs: alloys, brass, bronze and soft solder
Relevant Previous Knowledge: Students have been seeing metals

References:
Owusu, A. A., Nuerty, S. R., and Caesar, M. K. (2008).*Basic design and technology for JHS students book 3*. London: Macmillan publishers. Pp. 68-74.
Tawiah, V. N. (2009). *Basic Design and Technology (Pre-technical Skills Option) for Junior High Schools.* Accra: Aki Ola Publications. Pp. 51-54.

TLM	Content/ Stages/Steps/ Estimated Time	Teacher's Activity	Students' Activity	Major Ideas/ Core Points
	Stage 1: Introduction Review of students previous knowledge **(4 minutes)**	The teacher introduces the lesson by asking students to mention examples of aggregates	Students brainstorm and contribute listen to the review.	
The real object of alloys; brass, bronze, and soft solder	**Stage 2:** Development **Step 1:** Identification of non-ferrous alloys **(10 minutes)**	Teacher shows samples of non-ferrous alloys and helps students to identify them	Students contribute to the discussion and identify the alloys.	**Examples of non-ferrous alloys:** Brass, bronze and soft solder
	Step 2: The basic composition of non-ferrous alloys **(10 minutes)**	Through discussion, the teacher discusses the composition of brass, bronze, and soft solder	Students contribute by mentioning the composition of non-ferrous alloys.	**Composition of non-ferrous alloys:** 1) brass (copper + zinc); 2) bronze (copper + tin); 3) soft solder (lead + tin).
	Step 3: Uses of non-ferrous alloys **(5 minutes)**	A teacher asks students to give users of brass, bronze, and soft solder	Students give uses of non-ferrous alloys and write down notes.	**Uses of non-ferrous alloys** 1) brass – musical instrument 2) bronze- church bells 3) soft solder – electrical parts
	Stage 2: Application **(5 minutes)**	A teacher asks students how soft solder is used to solder electrical parts.	Students listen to a question and answer it orally: A flux is used to improve the binding properties of a soldier before joining electrical parts.	
	Stage 3: Evaluation **(10 minutes)**	Teacher evaluates the lesson by asking the following questions; 1) State at least two (2) basic composition of non-ferrous alloys. 2) State at least two (2) uses of brass, bronze, and soft solder.	Students answer questions into their exercise books.	

Assignment: Define the term aggregate.
Submission Date: 28/08/2015
Remarks:

Sample Lesson Plan 4

Name: Group 68
Institution: Presby J.H.S
Subject: Pre- Technical Skills
Topic: Aggregates

Class: J.H.S 2
Lesson No: Four
Duration: 70 minutes
Date: 04/07/2015

Relevant Previous Knowledge: Students have seen samples of sand and stone before.
Instructional Objectives: By the end of the lesson, the student will be able to:
1.0 Define the term aggregates.
1.1 State the two (2) types of aggregates.
TLM/SSM: Sand and stone.
Advanced Preparation: Teacher read on aggregates and gathered TLMs for the lesson

References:
Acquaye, E.A. (1987). *Basic Design and Technology for JHS (1, 2 and 3).* London: Macmillan Publishers Ltd.
Nash, W. G. (1992). *Brickwork*. London: Stanley Thorne Publishers Limited.

TLM	Content/ Stage/ Step/ Estimated Time	Teacher's Activity	Students' Activity	Major Ideas / Core Points
Sand	**Stage 1:** Introduction Review of students' previous knowledge **(5 minutes)**	The teacher uses questions and answer method to introduce the lesson on aggregates; What is needed in building a foundation of a house?	Students listen and answer question; 1) stones 2) sand 3) cement	
	Stage 2: Development **Step 1:** Definition of aggregates **(10 minutes)**	Teacher through discussion gives an explanation of aggregates.	Students contribute to the discussion and come out with definition and write down the final one by the teacher	Aggregate is the term used to describe sand (fine particles) or crushed stone (gravel) used in making mortar or concrete.
	Step 2 Types of aggregates **(10 minutes)**	A teacher asks students for examples of aggregates and discusses the examples with them.	Students contribute to the discussion and mention examples.	Types of aggregates: 1) fine aggregates (sand) 2) coarse aggregate (stone)
	Application **(5 minutes)**	The teacher asks students how they use aggregates to perform construction jobs.	Students respond to question orally.	
	Conclusion **(5 minutes)**	The teacher asks the students to answer the following question:	Students write and answer questions in their exercise books.	

		1. Define the term aggregate 2. State the two (2) types of aggregates.		

Assignment: State and explain two types of adhesives.
Submission Date: 05/08/2015
Remarks:

Sample Lesson Plan 5
Institution: Presby J.H.S
Department: Technical
Subject: Pre-Technical Skills
Topic: Adhesives
Class: J.H.S Two
Lesson No.: Five
Duration: 60 Mins
Date: 11/07/2015

Instructional Objectives: By the end of the lesson, the pupil will be able to:
1. Define the term adhesive
2. State at least two (2) types of adhesives.
3. State at least one (1) characteristic of each of the types of adhesive.

Teaching and Learning Materials (TLMs): Charts and real objects
Previous Knowledge: Students have seen white glue, super glue and binding materials from wood workshop, etc.
Advance Preparation: Teacher reads on adhesives and obtains binding materials such as super glue, white glue, etc.

References:
Aidoo, F.F., Ashitey, T., Incoom, P. K., Ofori, M. E., and Walker, F. (2008).*Basic Design and Technology for J.H.S Two*. Accra: Sedco Publications Limited. Pp. 180-183.
Kasamira, P. (1993). *Basic Design and Technology for Junior High Schools.* Accra: Sedco Publishing Ltd. Pp. 40

TLM	Content /Stage / Step/ Estimated Time	Teacher's Activity	Students' Activity	Major Ideas/ Core Points
Chart	**Stage 1 :** Introduction Review of pupil's R.P.K **(5 minutes)**	The teacher asks students to identify materials that are used for binding.	Students discuss to identify materials used for binding: 1) super glue 2) gum 3) tape	

Real	**Stage 2:** **Step 1:** Definition of adhesive **(10 minutes)**	The teacher asks students: What are adhesives?	Students brainstorm to define adhesives.	The adhesive is a bonding agent used for gluing a piece of wood and other materials.
Chart	**Step 2:** Types of adhesives **(10 minutes)**	The teacher asks students to state the two main types of adhesives	Students brainstorm by stating the two types of adhesives; 1) acetate; 2) contact glue.	Types of adhesives: 1) polyvinyl /acetate; 2) contact glue.
	Step 3: Characteristics of adhesives **(10 minutes)**	The teacher describes the two types and asked students to state the characteristics of the types.	Students answer by stating the characteristics.	Characteristics of Poly-vinyl/acetate" 1) Has low water resistance; 2) Has low heat resistance.
	Stage 3: Application **(10 minutes)**	The teacher asks students what they will use to fix wood on a plastic tube.	Students discussed on means to fix wood and plastic by using polyvinyl acetate.	
	Stage 4: Evaluation **(10 minutes)**	The teacher asks the students the following questions to evaluate the lesson: 1) What is an adhesive? 2) State two (2) types of adhesives.	Students answer questions into their exercise books.	

Assignment: State two properties of adhesive.
Submission Date: 12/08/2015
Remarks:

Sample Lesson Plan 6

Name: Group 68
Institution: Presby J.H.S
Department: Technical
Subject: Pre-Technical Skills
Topic: Finishes

Class: J.H.S Two
Lesson No.: Six
Duration: 70 mins
Date: 18/07/2015

Instructional Objectives: By the end of the lesson pupil will be able to:
1. Define the term finishes.
2. State at least one (1) reason for applying finishes.
3. State at least one (1) common type of finishes.
Previous Knowledge: Students have seen a mixture of polish, paint, and decoration from their various houses.
Advance Preparation: Teacher reads about finishes and obtained materials like polish and paints.

Teaching And Learning Materials (TLMs): classrooms, tables, and chairs

Reference:

Aidoo, F. F., Ashitey, T., Incoom, P. K., Ofori, M. E., and Walker, F. (2008). *Basic Design and Technology for J.H.S Two.* Accra: Sedco Publication Limited. Pp. 184-189.

Curriculum Research and Development Division (CRDD) (1997). *Teaching Syllabus for Basic Design and Technology for J.H.S. (1, 2,3).* Accra: Ministry of Education.

TLM	Content /Stage/ Step/ Estimated Time	Teacher's Activity	Students' Activity	Major Ideas/ Core Points
	Stage 1: Introduction Review of pupil's R.P.K. **(5 minutes)**	The teacher asks the students what they use in polishing materials.	Students response; 1) Paint 2) Polish	
	Stage 2: **Step 1:** Definition of finishes **(5 minutes)**	Through discussion, the teacher came out with the definition of finishes.	Students take part in the discussion process.	A finish refers to a liquid base use to protect the surface of materials from corroding.
Classroom Tables Chairs	**Step 2:** Reasons for applying finishes. **(15 minutes)**	The teacher uses the classroom as an example of the finish and asks students to state the reason for applying a finish.	Students discuss to state reasons for applying finishes.	The reasons for applying a finish are: 1) for the protection of materials surfaces; 2) for decoration purposes; 3) for hygienic purposes.
	Step 3: Types of finishes **(7 minutes)**	The teacher asks students to state the types of finishes.	Students brainstorm by stating the types of finishes.	The types of finishes are: 1) polish (lacquer) 2) paint (emulsion and oil)
	Stages 3: Application **(9 minutes)**	A man finishes his building without applying a finish to the surface, how do you advise him to keep his building from corroding?	Students discussed to apply knowledge obtained to advise him to use polish or paint	
	Stage 4: Evaluation **(4 minutes)**	1) Define a finish 2) State two common types of finishes. 3) State at least one reason for applying finishes.	Students answer questions into their exercise books.	

Assignment

1. Differentiate between setting-out and marking-out tools.
2. Explain at least two uses of setting – out and marking – out tools.

Submission Date: 19/08/2015

Remarks:

Sample Lesson Plan 7

Name: Group 68
Institution: Presby J.H.S
Subject: Pre - Technical Skills
Topic: Setting-Out and Marking-Out Tools

Class: JHS Two
Lesson No. Seven
Duration: 70 minutes
Date: 25/07/2015

Instructional Objectives: By the end of the lesson students will be able to:
1. Explain setting-out and marking-out tools.
2. Identify setting-out and marking-out tools.

Teaching/Learning Materials (TLMs): Real object, Information sheet. S. S. M: Real object, Information sheet pupil's textbook.
Relevant Previous Knowledge: Students have been seeing people using some tools at the carpentry's workshop.
Advanced Preparation: Teacher reads on the topic and gathered TLMs for the lesson

References:

Adjei-Yeboah, W. (2002). *Pre-Technical Skills Made Ease*. Accra: Wiles Press Limited.
Caesar, M. K. (2002). *Pre-Technical Skills Book 2.* Accra: Smartline Limited.

TLM	Stage/Steps/ Content/ Estimated Time	Teacher's Activity	Students' Activity	Major Ideas / Core Points
	Introduction: Review of pupil's R.P.K. **(5 minutes)**	The teacher asks students; What do they use to draw straight lines?	Student listen and answer question as; 1) Rule; 2) Line.	
	Step 1: Development Explanation of setting-out and marking-out tools. **(10 minutes)**	Teacher discusses with pupils setting-out and marking-out tools.	Students contribute to the discussion.	Setting out and marking out: is a process of transforming shapes into a piece of work. It involves measuring and marking out the individual shapes and sizes onto material from which the project is to be made.
List of tools on the manila card.	**Step 2:** Identification of marking-out and setting-out tools, **(10 minutes)**	Teacher through questions and answer assist students to mention all the setting-out and marking-out tools and list them on the chalkboard.	Students listen to the explanation and contribute.	Marking out and setting out tools. • marking gauge; • odd – leg calipers; • builders square; • lines and pins; • dot punch and centre punch;

				• try-square.
	Application **(10 minutes)**	The teacher let students answer the following questions. Identify the following tools as a setting – out and marking – out tools. 1) marking knife; 2) line and pins; 3) builders square.	Students answer questions into their exercise books.	
	Conclusion **(5 minutes)**	Go over the key point using questions. 1) Explain setting-out and marking-out tools. 2) Identify two each of setting-out and marking-out tools.	Listen and answer questions orally.	

Assignment: Sketch the following setting-out and marking-out tools.
a. Cutting-gauge
b. Builder's square
Submission Date: 26/08/2015.
Remarks:

Sample Lesson Plan 8

Name: Group 41
Institution: Marakazj H.S.
Department: Technical
Subject: Pre- Technical Skills
Topic: Cutting Tools

Class: J.H.S Two
Lesson Number: Eight
Duration: 70 Minutes
Date: 03/07/2015

Relevant Previous Knowledge: Students Have Been Seeing Common Cutting Tools In Their Houses E.G. Knife, Cutlass.
Objectives: By The End Of The Lesson The Students Will Be Able To:
1. Identify At Least Three (3) Types Of Cutting Tools.
2. State At Least Two (2) Techniques For Handling The Different Cutting Tools On Wood, Metal, And Brick.
3. Describe At Least Two (2) Care And Maintenance Of Cutting Tools.
Advance Preparation: Teacher Consults Relevant Books for More Information And Gathers Teaching And Learning Materials.

References:
Amoakohene, S. K. (2006). *Pre-Technical Skills for J.H.S (Book 1).* Accra North: Unimax Macmillan Publication.
Grundy, J. T. (1987). *Construction Technology*. London: Edward Arnold Publishers Ltd.

TLM	Content/Stage/ Step/Estimated Time	Teacher's Activity	Students' Activity	Major Ideas/ Core Points
Crosscut saw, hack saw, firmer chisel, flat chisel, jack plane, smoothing plane, flat file and hand file.	**Stage 1:** Introduction Review of pupil's relevant previous knowledge. **(5 minutes)** **Stage 2:** Development **Step 1:** Identification of cutting tools. **(15 minutes)**	The teacher asks students to mention three tools used for cutting at their various homes. Teacher displays various types of cutting tools on the bench for the students to identify them.	Students respond; 1) knife 2) cutlasses 3) blade Students observe the cutting tools and name them: 1) Firmer chisel 2) Jack plane 3) Flat file	Types of cutting tools: **Saw:** - crosscut saw - hacksaw **Chisel:** - firmer chisel - flat chisel **Plane:** - jack plane - smoothing plane **Files:** - flat file
	Step 2: Care and maintenance of cutting tools **(20 minutes)**	The teacher assists students to demonstrate care and maintenance of tools.	Students observe, practice and write down notes.	Care and maintenance for tools: - clean tools after using them. - oil metal part of tools after use. - do not use tools without a handle.
	Stage 3: Application **(10 minutes)**	You have been given a piece of timber to cut across the grains, which type of tool will you use?	Students response 1) Crosscut saw 2) Tenon saw	
	Stage 4: Evaluation **(5 minutes)**	The teacher asks the following questions: 1) Name two types of cutting tools. 2) Describe one care and maintenance for cutting tools.	Students listen to the questions and answer orally.	

Assignment: Draw a crosscut saw and name its parts.
Submission Date: 04/08/2015
Remarks:

Sample Lesson Plan 9

Institution: Presby J.H.S
Department: Technical
Subject: Pre-Technical Skills
Topic: Moulding Bricks

Class: J.H.S 2
Lesson No.: Nine
Duration: 70 minutes
Date: c10/07/2015

Instructional Objectives: By the end of the lesson, students will be able to:
1. Explain the term molding of bricks.
2. State at least three (3) tools and equipment for molding bricks.
3. State at least one (1) use each of the tools used for molding bricks.

Previous Knowledge: Students have seen blocks, mold box, sand, etc on contractors' site.
Advance Preparation: Teacher has read more on the molding of blocks and also visited construction sites to see practically how to mold blocks.

References:

Aidoo, F. F., Ashitey, T., Incoom, P. K., Ofori, M. E., and Walker, F. (2008). *Basic Design and Technology for J.H.S Two.* Accra: Sedco Publications Limited. Pp. 203 310.

Adjei-Yeboah, W. (2002). *Pre-Technical Skills Made Ease*. Accra: Wiles Press Limited.

TLM	Content / Stage/ Step/ Time	Teacher's Activity	Students' Activity	Major Ideas / Core Points
	Stage 1: Introduction Review of R.P.K **(5 mins)**	The teacher asks students; What do we use in walling?	Students brainstorm to answer the question as; 1) mud 2) bricks	
Real object	**Stage 2:** Development **Step 1:** Explanation of molding of bricks **(10 minutes)**	The teacher asks students to explain the molding of bricks.	Students discuss to explain molding of bricks.	Explanation of molding of bricks: Molding of bricks is the process of shaping cement mortar by using a block mold box.
Mold box Head pan Shovel/Spade Tamping rod	**Step 2:** Tools and equipment for molding bricks **(20 minutes)**	Teacher discusses with pupils the tools and equipment used for molding bricks.	Students take part in the discussion.	Tools and equipment used for molding bricks are: 1) mold box; 2) head pan; 3) shovel/spade; 4) tamping rod.
	Step 3: Uses of the tools for molding bricks/blocks	The teacher demonstrates on board and asks students to list the uses of the tools.	Students participate to list the uses of the tools	Uses of each tool for molding bricks: 1) Mould box-for molding of blocks;

	(15 minutes)			2) Head pan –for batching the sand; 3) Shovel –for mixing the sand; 4) Tamping rod –for consolidating of the mortar.
	Stage 3: Application **(20 minutes)**	A man had molded bricks and the bricks broke immediately, how will you advise him?	We will advise the man to use the tamping rod.	
	Stage 4: Evaluation **(5 minutes)**	1. Explain the molding of bricks. 2. State four tools used for molding bricks. 3. State at least one use of each of the tools for molding bricks.	Students answer questions into their exercise books.	

Assignment: State the types of boring tools.
Submission Date: 11/08/15
Remarks:

5. Test Items Construction

5.1 Introduction

The test is a formal systematic procedure for measuring a sample of learning. It makes one demonstrate one's level of ability, mastery or competency in a specific area. A test is, therefore, an instrument used to determine academic changes in a learner.

5.2 Definition of Test

A test is a device that makes an individual demonstrates his or her level of ability, mastery or competency in a specific area of study. It is used to determine, evaluate or analyze the teaching process (Amoakohene, 2008).

The purpose of every lesson is to help change the learners' behavior. Another purpose is to help the learners to acquire skills and knowledge. Test result and specific objectives are vital for evaluating the learners. Therefore the test item must be selected carefully. This means that what has been taught should be with reference to that specific objective of the lesson and must be used in the test items constructed. The two main types of test items are easy and objective type test (Amoakohene, 2008; Archer, 2008).

5.3 Importance of Test Items

- It ensures good learning habit;
- It helps learners to know their strength;
- It helps the teacher to organize his teaching activities;
- It enables the teacher to grade learners into groups;
- It helps parents in guiding their wards.

5.4 Types of Test Items

Test item refers to the nature of the test. The two main types of test items are objective and essay type test item.

A. Essay Test

In this type of test, students are made to read, understand, analyze and give meaning to the item. The student has to search his/ her brain, organize information before coming out with answers. The thought should be presented in an organized form/ manner in the form of unity in complete and meaningful sentences. The subjective opinion of the scoring is not entirely eliminated (Sarfo, 2007).

B. Types of Subjective Test

There are two types:

- Restricted response;
- Extended response.

C. Objective Type Test

According to Aidoo (2008), the objective test is a test for which the correct response is predator mind and testers need not arrange and write any lengthy response.

The objective test can be categorized into two these are:

- The supplied test;
- The selection response type.

The supply types test asks the student to supply a word, phrase, figure, symbol, etc. as an answer to a question or in completion of the statement. Whiles in the selection type students are given some responses from which they are to make their choice.

5.5 Marking Scheme of Test

The marking scheme helps the teacher to assign marks to the items fairly. It enables the teacher to avoid awarding marks anyhow thus being unfair to some of the students.
Any other teacher with the marking scheme in place can handle the same subject by following the scheme and award mark respectively.

A. Types of Marking Scheme

There are two major types of marking scheme.
These are Analytic and Global method.

a. Analytic/Point/Key Method

It is a form of model answers, which the examiner prepares an outline of the essential elements or points that he expects the examinee to raise. For each point that is raised indicate the mark to be assigned to the point.

b. Global/Holistic/Impression Method

This is a procedure in which the scorer simply needs the whole easy for a general impression of its adequacy and quality. The tester awards mark depending on the quality impressions he/she makes. This method involves more of impressionistic scoring than the analytic method.

5.6 Sample Test Item-Objectives

End of First Term Examination
Presby Junior High School: Form One

Section A: (40 Marks)
Instructions: Answer all questions by ticking the correct option.

1. Which of the following is a cutting tool?
   a. Cross-cut saw
   b. Pickaxe
   c. Pencil
   d. Tape measure
2. Cutting of brick/block in construction can be done by the use of
   a. Bolster

b. Chisel
c. Mallet
d. Rip-saw

3. What technical name is given to sand in mortar?
   a. Sand aggregate
   b. Fine aggregate
   c. Coarse aggregate
   d. Normal grade
4. A……metal contains iron.
   a. Aluminum
   b. Ferrous
   c. Non-ferrous
   d. Zinc
5. In the isometric drawing, the inclined axis meets at an angle of …….
   a. 120°
   b. 30°
   c. 180°
   d. 45°
6. Cast iron is used for making……
   a. Paint
   b. Lorry Tyre
   c. Box iron
   d. Cutlasses
7. A builder's square is a tool used for ……..
   a. Marking out
   b. Setting-out
   c. Working out
   d. Stepping out
8. Walling is the method of
   a. Arranging bricks and blocks
   b. Building a house
   c. Joining blocks together
   d. Forming walls

9. Which of the following is not an article made of nylon
   a. toothbrush bristles
   b. vanity mirror
   c. plumbing fitting
   d. clothing

10. Which part of the trowel is used for picking mortar?
   a. the shank
   b. the handle
   c. the blade
   d. the ferrule

Note: Question 11-15 demand true or false answer

11. In first angle orthographic projection, the front elevation is always on top of the plan True / False.
12. The cylinder is an example of a pyramid. True / False.
13. Oblique drawing can be done with the aid of 30° set square. True / False
14. Quality good and should be free from any form of impurities (e.g. vegetation). True / false.
15. Non-ferrous metals do not rust. True / False.

Match the following with their correct responses

Column A	Column B
16. Fine aggregate	Marking gauge
17. Marking-out tool	Sand
18. Setting-out tool	Ferrous
19. A …….. metal contains iron	A liquid compound used to bind surfaces of materials such as wood, metals, and plastics together.
20. Adhesive	Builder's square

Section B (60 Marks)

Provide short answers to questions in this section. Answer all questions in this section. Each question carries 20 marks.

1. (a) List three (3) tools used for drawing (6 marks)
   (b) For each of the tools mentioned in 1 (a) state its uses (6 marks)
   (c) State the difference between isometric and oblique drawings (8 marks).
2. Briefly explain the following properties of metal.
   (a) Toughness (5 marks)
   (b) Brittleness (5 marks)
   (c) Ductility (5 marks)
   (d) Malleability (5 marks)
3. The side of a hexagonal prism is 25 mm and the height is 50 mm. draw the following
   (a) The front elevation (5 marks)
   (b) The plan (5 marks)
   (c) The development of surface (5 marks)

5.7 Marking Scheme for Test

Section A (40 Marks)

1	A	Crosscut saw
2	A	Bolster
3.	B	Fine aggregate
4.	B	Bolster
5.	A	120°
6.	C	Box iron
7.	D	Cast iron

8. D Forming a wall
9. C Plumbing fitting
10. C The Blade
11. True
12. False
13. False
14. False
15. True
16. Sand
17. Marking gauge
18. Builder's square
19. Ferrous
20. A liquid compound used to bind surfaces of materials such as wood, metals, and plastics together

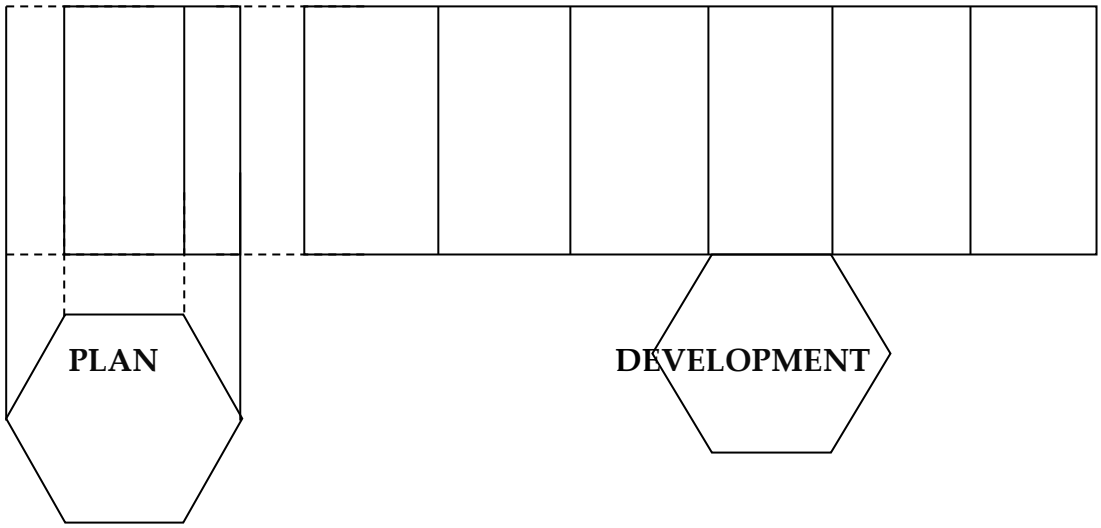
Section B (60 Marks)

1.
(a) Tee square, compass, drawing board, set squares, rule, pencil, protractor, clips. (Any three tools mentioned of these)
(b) Tee square: used with a set square to draw vertical and inclined lines.
Compass: used to construct arcs and circles.
Drawing board: it is used to support the drawing paper.
Rule: it is used to take measurements

2.
Toughness: It is the property of a metal to withstand shocks or impact without breaking.
Brittleness: The ability of a metal to break without bending.
Ductility: It describes the property of a metal to be stretched cold without breaking.
Malleability: The ability of a metal to be hammered, bend or rolled without breaking.

3.

F. Elevation



6. Conclusion

The Basic Design and Technology program seems to be suffering so much in terms of unavailable logistics and funding for the various subject areas to enable the teachers to have adequate resources to teach effectively. The lack of logistics places limitations on the practical knowledge and skills that pupil needs to learn on the program as the curriculum requires. In view of this pupil's graduate from JHS without acquiring practical competence. The problems can be resolved through adequate resourcing, infrastructure, and effective teaching and learning activities in the BDT in order to train and develop young individuals to acquire technical and vocational skills.

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References

Acquaye, E. A. (1987). *Basic Technical Skills for J.S.S. (1,2,3).* London: Macmillan Publishers Ltd.

Adjei-Yeboah, W. (2002). *Basic Technical Drawing for Junior Secondary School.* Accra: Adwinsa Publications.

Agyenim-Boateng, J. (2002). *Pre-technical Skills for Junior High Schools*. Kumasi: 'Prof' Quarm Printing Press.Pp 27-28.

Aidoo, F. F., Ashitey, T., Incoom, P. K., Ofori, M. E., and Walker, F. (2008). *Basic Design and Technology for Junior High Schools.* Accra: Sedco Publishing Ltd. Pp. 39-135.

Amevordzie, V. B. (1987). *Building Construction for Senior Secondary Schools.* (2nded). London: Longman Group Limited. Pp. 25-39.

Amoakohene, S. K. (2006). *Pre-Technical Skills for J.S.S. (1).*Accra-North: Unimax Macmillan Publishers Ltd.

Amoakohene, S. K. (2008).*Teaching and Learning in Higher Education.*Asafo – Kumasi: Sleeps Publication Ltd.

Archer, F. (2008). *Measurement and Evaluation in Education.* Kumasi: Paks Publication, Pp. 128-130

Caesar, M. K. (2002). *Basic Design and Technology for JHS Book 3*. Accra: Kabkork Publishing Ltd.

Chudley, R. (1995). *Constriction Technology Handbook*. London: Longman Group Ltd.

Curriculum Research and Development Division (CRDD) (1997). *Teaching Syllabus for Basic Design and Technology for J.H.S. (1,2,3)* Accra: Ministry of Education.

Curriculum Research and Development Division (CRDD) (2007). Teaching Syllabus for Basic Design and Technology for JHS. Accra, Ghana: Ministry of Education Science and Sports.

Green, J. N. (1994). *Technical Drawing for School Certificate.* Lagos: Spectrum Books Limited.

Grundy, J. T. (1987).*Construction Technology*: London: Edward Arnold Publishers Ltd.

Kasamira, P. (1993). *Basic Design and Technology for Junior High Schools.* Accra: Sedco Publishing Ltd.

Mensah, P., and Dacosta, J. (2002). *Pre-Technical Skills for J.S.S Book 1.* Accra: Adwinsa Publication Legon.

Ministry of Education (2002). Report of the Education Review Committee on Pre-Tertiary Education, Accra.

Owusu, A. A., Nuerty, S. R., and Caesar, M. K. (2008). *Basic Design and Technology for JHS (Book 2).* London: Macmillan Publication Ltd.

Sackey, J. K. N. (1994). *Motivate Woodwork Technology*. London: Macmillan Publication Ltd.

Slaven, R. (1991). *Basic design and technology.* Accra: Macmillan Publisher Limited.

Tawiah, V. N. (2009). *Basic Design and Technology for JHS.* Accra: Aki-Ola Publications Co. Ltd.

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