

KNUST

Developing instructional resources from selected recycled materials for art education

By

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DECLARATION

I hereby declare that this submission is my own work towards the PhD degree and that to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the university, except where due acknowledgment has been made in the text.

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ABSTRACT

Instructional resources are known to play important roles in arousing learners' thoughts, feelings, and interests and motivating them to develop high interest in subject matter, and improving teachers' competencies in lesson delivery towards achievement of lesson objectives. In Ghana, Art teachers are expected to use instructional resources in the classroom but they are

not provided with materials to create the needed resources. Some of the Art teachers also lack the skills to improvise so the teachers teach their lessons without practical and interactive instructional resources. This study therefore focused on exploring the possibility of recycling waste papers, plastics and fabrics into simple instructional resources that would facilitate the teaching of topics within the Creative Art, Basic Design and Technology (BDT), and General Knowledge in Art (GKA) curricula for Primary, Junior and Senior High Schools in Ghana. The resources that were developed through the exploration were tested in Primary, Junior and Senior High Schools by selected class teachers to ascertain how effective the developed resources can aid learners to understand lessons taught in those topics. The outcome of lessons that were taught with the developed instructional resources were compared with lessons in which the teachers used no instructional resources. To promote recycling and sustain classroom use of instructional resources, selected Art Education students, practising Art teachers and College of Education students were trained to acquire the relevant skills in recycling waste materials to create instructional resources for teaching Art at the various educational levels. A teaching guide that can be used to train practising Art teachers and College of Education students in Ghana's Colleges of Education on practical ways to recycle and create instructional resources for teaching Art was developed. Three research questions that guided the study were: 1 a) How can paper, plastic and fabric wastes be used to develop instructional resources for teaching Art? 1 b) How will the developed instructional resources impact on teaching and learning of Art? 2) How can Art Education students, practising Art teachers and College of Education students acquire the skills for developing instructional resources from waste materials for teaching Art? 3) What are the requisites for designing an appropriate teaching guide on recycling to create instructional resources for teaching Art from waste materials? The study adopted qualitative enquiry, exploratory, quasi-experimental, participatory action and descriptive research methods

with participant observation and interviews to gather the required data. The population studied consisted of a purposive and convenience sample of 17 Art Education students in KNUST, 25 practising Art teachers in Kumasi (Primary = 6, JHS =14, SHS = 5) and 100 Art students from Offinso College of Education in the Ashanti Region. The exploration proved that paper, fabric and plastic waste materials can be safely recycled to create appropriate instructional resources for teaching topics under Creative Art, Basic Design and Technology (Visual Art option) and General Knowledge in Art. Testing the developed instructional resources showed that when appropriate instructional resources are used for teaching and learning of Art, lessons become very practical, interactive, interesting and real to learners which helps them to achieve more in their academics as against teaching them without the use of instructional resources. From the training, it was deduced that the Art Education students, practising Art teachers and the College of Education students found it useful for them to be trained to recycle waste materials to create instructional resources to support teaching and learning. The instructional plan that was used for the training sessions and the findings of the research, which informed the development of the teaching guide, offers opportunity for more practising Art teachers and College of Education students to be trained to recycle and create instructional resources for teaching and learning. The study recommends that waste materials should be explored and recycled by classroom teachers for effective teaching and learning of Art and other subjects at the Primary, Junior and Senior High Schools in Ghana.

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The logo of KNUST (Kwame Nnamdi University, Nsukka) is centered in the background. It features a yellow eagle with its wings spread, perched on a shield. Above the eagle is a black mortar and pestle with a red flame rising from it. A yellow banner at the bottom contains the text 'WJ SANE NO' in black capital letters.

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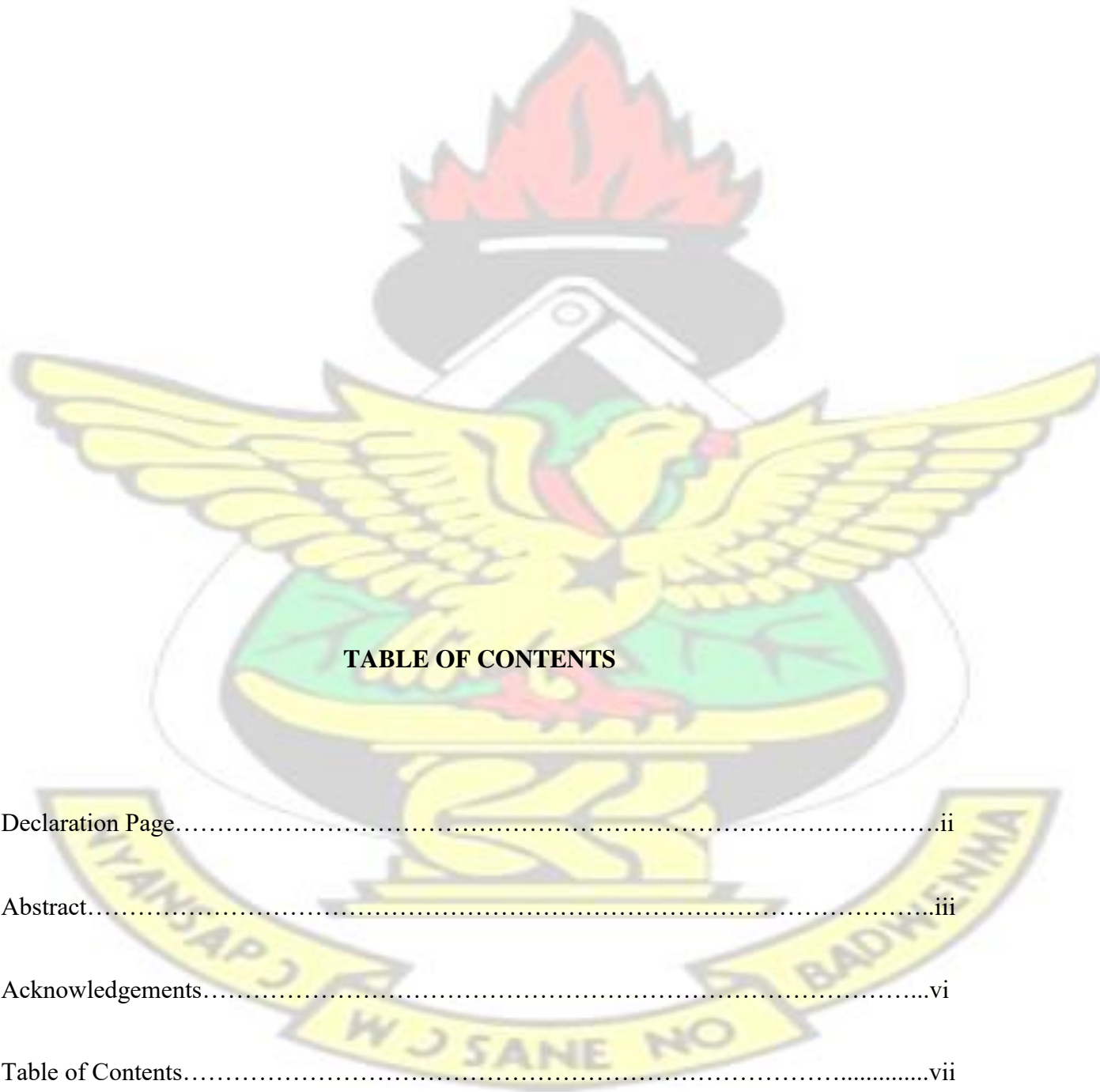


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ABBREVIATIONS

KNUST: Kwame Nkrumah University of Science and Technology

JHS: Junior High School

SHS: Senior High School

BDT: Basic Design and Technology

GKA: General Knowledge in Art

GES: Ghana Education Service



CHAPTER ONE

INTRODUCTION

1.1 Overview of Chapter One

The chapter introduces the study by outlining the background of the study, the problem that was studied and objectives of the study. In addition, the delimitation and the importance of the study have also been discussed.

1.2 Background to the Study

The Concept of Waste

Waste is any product or substance that has no further use or value to the person or organisation that owns it, and which is, or will be, discarded. However, what may be discarded by one party may have value to another (Caulfield, 2009). The amount of waste generated, and its actual or potential negative effects on the environment, are matters of concern to governments and communities at large. Addressing the Green Global Growth Forum in Copenhagen Denmark, President Mahama said the menace of plastic waste should be treated with the utmost seriousness it deserves and called for a concerted effort to help mitigate the effects of plastic waste on human health and the environment (Annan, 2014). Today, the nature of waste has changed from materials that could more easily bio-degrade, to the synthetic materials that do not degrade easily. This situation is causing lots of problems for the environment and its inhabitants. In Ghana waste materials are mostly dumped on landfill sites or are burnt as shown in Plate 1.1.



Plate 1.1: Scenes of waste disposed at landfill sites

Waste Disposal or Burning and Associated Environmental Problems

Waste is perceived to be a problem for many reasons: waste disposal can harm the environment and human health; space for landfills is becoming scarcer; costs are increasing to use existing and replace landfills (Caulfield, 2009). Disposing of waste into landfills or burning has huge environmental impacts and can cause serious environmental problems. Some waste on landfill sites will eventually rot, but not all, and in the process of the decomposition, they produce noxious smells from the methane gas (a greenhouse gas 20 times more potent and harmful than carbon dioxide) it generates which is explosive and contributes to the greenhouse effect (Vergara & Tchobanoglous, 2012; Cho, 2012; Green Choices, 2002). According to Green Choices (2002), leachate produced as waste decomposes causes water pollution and open dumping sites also attract vermin and cause litter in an environment, which can cause the break out of diseases and also create nuisance in the environment. Incinerating waste tends to produce toxic substances such as dioxins (a group of chemicals that are formed during combustion processes such as waste incineration), which cause air pollution and contribute to acid rain,

while the ash from incinerators contain heavy metals and other toxins that are all harmful to the inhabitants in the environment (Vergara & Tchobanoglous, 2012). Dioxins are extremely toxic even in very low doses. It can build up in our bodies and it can cause cancer and may affect hormones and unborn children (Jucyte, Kevelaitis, Renzhong, Hirschpold, Varona & Debin, 2005). The Energy Information Administration as cited by Boehlke (2010) explains that these gases destroy the earth's ozone layer and contribute to significant climate changes or global warming.

Disposing of waste in the environment also choke gutters and drainage ways thereby causing flooding when it rains. A recent example is the Wednesday 3rd June 2015 flooding in Accra that was caused mainly by choked drainage systems by all manner of waste materials. Drains clogged by plastic bags and other waste items overflowed, causing a massive flood in which at least 150 people were reported dead out of which 90 were burned alive when the runoff water carried fuel into a fire (Hinshaw, 2015). Apart from the loss of lives the flooding also destroyed a lot of properties (Hinshaw, 2015). Every year when the flooding occur during the raining season, a lot of discussions and lamentation are made on the air waves by experts and the citizenry on the issue tentatively and nothing is heard of it again when the dust settles. Government sets up committees to look into the situation, some buildings which are perceived to be on water ways are demolished and nothing is heard of the situation again until it reoccurs the following year (Acheampong, 2010). Unfortunately, choked drains as a result of disposing waste materials in them which are the main cause of flooding in the country have not been given the needed attention by both inhabitants and the authorities responsible.

Flooding of the cities during the raining season has therefore become a cyclic cataclysm (Acheampong, 2010).

Humans are not the only ones affected by improper garbage disposal, animals too are. Boehlke (2010) indicates that a heap of waste materials on a dumping site can be carried by rain into water-bodies to suffocate and contaminate marine animals leading to the death of millions each year. This contamination destroys the habitat of these animals and can also affect humans as fish that feast from these contaminated areas are caught by fishermen for human consumption.

Waste disposal or burning is not just a serious problem, it is also a growing problem. Because of the significant and growing environmental, social and economic challenges presented by waste, there are active campaigns against waste incineration with a focus on waste recycling. But according to Schiessler, Thorpe, Jones and Philips (2007), the problems that waste poses to societies can be controlled if societies become environmentally efficient recycling societies and are ready to act right to prevent the indiscriminate disposal of waste. This will ensure the protection of human health and the environment against the harmful effects of waste. In this regard, the researcher believes that in Ghana, rather than throwing away waste or burning them to pollute the environment, they can be recycled to create useful instructional resources for teaching, to give meaning to the global call to reduce, reuse and recycle as the only acceptable ways of disposing trash (Katar & Baigadar, 2010). But this can only be done through explorations with waste materials and through education.

The Concept of Instructional Resources and their Importance to Teaching and Learning

Instructional resources are aids to teaching and learning. They are items that help to raise teaching and learning from verbalization to practical making learning real and meaningful to learners (Okobia, 2011 as cited in Ikerionwu, 2000). That is they help to make concepts, abstracts and ideas concrete in the teaching and learning process (Olawale, 2013). According to Yildirim (2008), instructional resources act as supporting elements which makes teaching

and learning easy, lively, interesting, enrich the education and teaching setting, facilitate learning, simplify and clarify knowledge that is put across to learners. They cover all physical means a teacher might use to implement instruction and facilitate learners' achievement of instructional objectives (Scanlan, 2003). Instructional resources which are educational inputs are of vital importance to the teaching and learning of any subject in the school curriculum.

It is well known in education that teaching and learning experiences that involve the learner actively in concrete examples are retained longer than abstract experiences. Many educationists agree that instructional resources bring about improvement in the teaching and learning process as well as permit teachers and students to interact as human beings in a climate where people control their environment for their own best purposes (Olawale, 2013). The application of instructional resources in the classroom enables the teacher to present and illustrate abstract concepts practically to attract and sustain the attention of learners (Thompson, 2001). This classroom environment helps to make learners to comprehend easily with what they are taught. The creative use of teaching resources will increase the probability that students would learn more, retain better and bring about the skills they are expected to perform. Apart from their ability to process meaningful sources of information, instructional resources help the teacher with the means for extending his or her horizon of experience as well as providing the teacher with rich sources of procuring communicative materials for teaching and learning (Olawale, 2013; Saglam, 2011). The use of instructional resources overcome the limitations of time, space and size by helping students to understand things that are too small or too big, or too slow or too fast. They break language barriers and clarify difficulties involved in teaching and learning and in the end make lessons more meaningful (Olawale, 2013). Again the use of instructional resources saves time and thus enables students grasp concepts more effectively

and faster. They help teachers to also use different teaching and learning methods (Olawale, 2013).

The results of a research work by Igbo and Omeje (2014) revealed that teachers improve the performance of learners by utilising teacher-made instructional resources in teaching to help the learners comprehend easily with what they are taught. Again the findings of a research work by Nwike and Onyejebu (2013) revealed that secondary school students of Orumba South Local Government area who were taught with instructional resources in agricultural science performed better in their academics than those that were taught without instructional resources. In the same vein, Popoola (1980) as cited in Oladejo, Olosunde, Ojebisi and Isola (2011) investigated the effect of instructional resources on the academic achievements of students in Ogun State in Nigeria. In this research, achievements of students in schools with adequate instructional resources and achievements of students in schools without adequate instructional resources were compared. The results showed a significant difference in the achievements of the two sets of students with the students in the schools that used adequate instructional resources performing far better than the students in schools without adequate resources. According to Croft (2000), an effective learning to the professional use of instructional resources can positively affect students' achievements. Recee and Walker (2001) advise the use of instructional resources to enhance students' learning experience and stress the link between poor learning and low performance with the failure to use instructional resources in the teaching and learning process. A Chinese proverb sums up the need to use practical and interactive teaching resources as it says "I hear and I forget. I see and I remember. I do and I understand" (Poole & Sky-McIlvain, 2009).

Teacher-made Instructional Resources

Teacher-made instructional resources are constructed resources developed by teachers in their respective subjects or subject areas for easy teaching and learning. In this case, the teacher acts as the improviser by composing instructional or teaching resources that will make teaching and learning easy. It involves the ability of the teacher to make or invent teaching resources in the absence of already made instructional resources for the purpose of meaningful interaction between the teacher and the learners in the classroom to facilitate teaching and learning processes.

In the 1960s and 1970s, Ghana supplied schools with instructional resources for teaching and learning purposes and Teacher Training Colleges also taught their students to develop skills in instructional resource preparation. Today, Ghanaian schools are no longer supplied with instructional resources (Opoku-Asare, 2004; 2000). Currently, College of Education students are taught about the uses of instructional resources in the classroom, their advantages to the teaching-learning process and encouraged to use instructional resources in the classroom. The College students are not given the practical skills they can use to create their own instructional resources for teaching (Osei-Sarfo, 2013).

1.3 Statement of the Problem

Background study on Creative Art, Basic Design and Technology (Visual Art option) and General Knowledge in Art (GKA) teachers revealed that these teachers teach their lessons with only text books and teacher notes with some adding blackboard illustrations because the schools lack practical and interactive instructional resources (Ampeh, 2011; Agbenatoe, 2011; Bofo-Agyemang, 2010; Owusu-Koranteng, 2009). This situation, the teachers attributed mainly to the lack of the provision of materials and the technical skills to create the needed instructional resources for teaching and learning. Opoku-Asare (2004) also reports that

classroom teachers in Ghana do not use non-book instructional resources because of lack of practical experience in the development of instructional resources. From the literature it is obvious that the use of instructional resources are very vital in the classroom and waste disposal and burning are also harmful to the environment; so to remedy the lack of materials to create instructional resources for teaching, Art teachers could be taught skills in recycling to enable them create basic instructional resources to teach their lessons. This research work therefore explored ways in which waste plastics, fabrics and papers could be recycled to create useful and appropriate instructional resources for teaching Creative Art, the Visual Art component of Basic Design and Technology and General Knowledge in Art (GKA) in Primary, Junior and Senior High Schools respectively.

1.4 Objectives of the Study

- 1 a) To explore and recycle paper, plastic and fabric wastes to create instructional resources for teaching selected topics in Creative Art, Basic Design and Technology, and General Knowledge in Art.
- 1 b) To evaluate the effectiveness of the developed instructional resources by testing them in schools at the Primary, Junior High School (JHS) and Senior High School (SHS) levels.
- 2) To train selected Art Education students, practising Art teachers and College of Education students the process involved in the exploration and development of instructional resources from the waste materials.
- 3) To design a teaching guide that Art Tutors in Ghana's Colleges of Education could use to train their students, which can also be used to train practising Art teachers in waste recycling to create instructional resources for teaching Art.

1.5 Research Questions

1 a) How can paper, plastic and fabric wastes be used to develop instructional resources for teaching Art?

1 b) How will the developed instructional resources impact on teaching and learning of Art?

2) How can Art Education students, practising Art teachers and College of Education students acquire the skills for developing instructional resources from waste materials for teaching Art?

3) What are the requisites for designing an appropriate teaching guide on recycling to create instructional resources for teaching Art from waste materials?

1.6 Delimitation

This research is limited to working with waste papers, plastics and waste fabrics because of their availability all over Ghana and also for the fact that they can be collected for free. The Creative Art, Basic Design and Technology (Visual Art option) and General Knowledge in Art curricula for Ghana's Basic, Junior and Senior High education were the only ones that the researcher worked with. Creative Art topics for which resources were created for teaching were the following:

- Colour
- Elements and Principles of Design
- Perspective
- Weaving and Stitching

- Printmaking
- Construction and Assemblage

Basic Design and Technology topics were:

- Hand papermaking
- Colour
- Principles of Design
- Perspective
- Weaving and Stitching
- Visual Communication
- Printmaking
- Construction and Assemblage

General Knowledge in Art topics were:

- Colour
- Principles of Design
- Perspective
- Printmaking
- Figure Drawing

Only the listed curricula and topics were considered because the syllabus for each level was broad and could not be covered within the study period. The rest of the topics will be considered in a post doctoral research work. The study was conducted in Kumasi and Offinso in the Ashanti Region of Ghana.

1.7 Limitation

The practising Art teachers had to be trained individually in their schools or in their homes at weekends and some also could not make time to be trained because of their tight schedules at school. This situation did not make it possible for all the teachers to be trained within the period.

1.8 Definition of Terms

1. **Waste:** waste materials in this work refer only to solid waste.
2. **Waste fabrics:** pieces of unwanted fabrics on the floors of garment makers and unwanted clothes ready to be thrown away.
3. **Waste papers:** unwanted papers from homes, classrooms, offices and printing presses.
4. **Waste plastics:** waste plastics refer to any material made of plastic that is normally discarded after its original or intended use.
5. **Recycling:** using waste materials to create other useful items.
6. **Instructional resources or teaching resources:** concrete items or objects that are used in teaching to help make an instruction more real and practical to students. In this work instructional resources and teaching resources both mean the same thing and they will be used interchangeably.
7. **Mould:** wooden frame covered with a rubber mesh used for forming sheets of paper by hand.
8. **Deckle:** a wooden frame placed on the edges of a mould to define the edges of a sheet in hand papermaking.
9. **Pulping:** the process of blending materials like paper and fabric scraps in water.
10. **Pulp:** the end product of blended materials like paper and waste fabrics with water.
11. **Couching:** transferring a wet sheet from a mould onto a felt.

12. **Paper mulberry:** a plant grown for papermaking because of the high cellulose content in its inner bark.
13. **Cellulose:** the main substance in the cell walls of plants, which is used in making plastic products and paper.
14. **Pre-consumer waste:** this includes all the waste manufacturers generate during processing of products.
15. **Post-consumer waste:** this consists of all types of household waste that consumers no longer need or use and are disposed off.
16. **Warp:** this is a set of parallel continuous yarns that acts as the foundation of a woven fabric.
17. **Weft:** this is another set of yarns which interlaces the stretched warp to obtain a woven fabric.
18. **Box paper:** an empty box to be discarded.

1.9 Importance of the Study

The project brings to light the usefulness and reuse of waste items to ease pressure on landfills and other places like gutters and roadsides where waste materials collect. This could go a long way to protect the environment. The project identifies the processes that waste papers, plastics and fabrics can be recycled to produce items that serve as instructional materials for teaching and learning of Art. Teaching the tertiary level Art Education students, Art teachers and College of Education students the processes of creating instructional resources from waste aids can challenge the students and teachers to learn how to make their own teaching resources from waste materials to enhance their teaching and learning. Again as the teachers use the resources to teach it can also inform their students that waste scraps can be put to another use instead of

just throwing them away. The teaching guide will provide a step-bystep process of waste recycling to create instructional resources for teaching in Art. As a result, this will serve as an effective instructional delivery guide for the Art tutors in Ghana's Colleges of Education as well as for the officials at the Ghana Education Service Teachers' Resources Centres across the country. The study will benefit the nation by enhancing the teaching and learning of Art in Ghana and also help solve some of Ghana's environmental problems.

1.10 Organisation of the Rest of the Text

Chapter Two: chapter two contains the review of related literature.

Chapter Three: research methodology, the exploratory work, testing the instructional resources and the training sessions have been presented in chapter three.

Chapter Four: chapter four contains the description of all the findings gathered from the exploration, testing and training exercise.

Chapter Five: the findings gathered from the exploration, testing and training exercise have all been discussed and analysed in chapter five.

Chapter Six: this chapter provides summary of the research findings, conclusions and recommendations of the study.

KNUST

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Overview of Chapter Two

The chapter provides a review of literature related to waste, recycling, instructional resources and theories that are in connection with teaching and learning and the use of instructional resources. The purpose was to collect and compare ideas of different authors from a variety of sources to use as a foundation of what is already known about the topic. The review explored the following sub-topics:

2.2 Empirical Review

2.2.1 Waste and its Effects on the Environment

2.2.2 Textile waste

- Why Textile Waste Recycling?
- Recycling Textile Waste: What Has Been Done
- Obstacles in Textile Waste Recycling

2.2.3 Waste papers

- Why Waste Paper Recycling?
- Recycling Waste Paper: What Has Been Done
- Obstacles in Waste Paper Recycling

2.2.4 Waste plastics

- Why Plastic Waste Recycling?
- Recycling Plastic Waste: What Has Been Done
- Obstacles in Plastic Waste Recycling

2.2.5 The Need for Educating Individuals in Waste Recycling

2.2.6 Safety Measures to Take in Waste Recycling

2.2.7 Instructional Resources

- What are Instructional Resources?
- Why use Instructional Resources in Teaching and Learning
- Types of Instructional Resources
- Selecting Instructional Resources for Teaching
- Instructional Planning

2.3 Theoretical Review

2.3.1 Dale's Cone of Experience

2.3.2 Active Learning

2.3.3 Multiple Intelligences

2.2.1 Waste and its Effects on the Environment

The Concept of Waste

The term „waste“ can be defined as something which the owner or user no longer values, and has been thrown away or is something an individual does not want anymore, and wants to dispose of (Zaman & Lehmann, 2011; Klemmer, Mandengenda, Siwale, Lwanga, Esch, Stenstrom, Bakker, Ishengoma, During, Ree, 2007). Waste is an inevitable by-product of any process that one can think of. The notion of waste is relative in two main respects. First, something becomes a waste when it loses its primary function for the user. The second perspective is that what is considered waste with regard to this primary function may be useful for a secondary function. In other words, somebody's waste is often somebody else's secondary raw material (European Commission Waste Prevention Handbook, 2012; Garlipp, 2010; Bontoux & Leone, 1997).

Caulfield (2009) and European Commission Waste Prevention Handbook (2012) share a common view that waste is the end of a product's life cycle, which if not treated properly, causes costly environmental impacts and depletes valuable resources. It represents scarce resources such as energy, paper, oil, and precious metals of which the world has a limited quantity and so a new way of conserving these limited resources is key to tackling the waste problem (European Commission Waste Prevention Handbook, 2012).

Waste Generation

The amount of waste generated each year continues to rise across the world because of rising global consumption patterns, which in turn put immense pressure on ecosystems. Growing waste loads point to inefficiencies in production, distribution and consumption processes (European Commission Waste Prevention Handbook, 2012). The European Union Report on Waste Management (2010) concurs with the view that the living standards today mean that

people are buying more products. Consumers have much more choice and products are designed to have shorter life span with sophisticated packaging. There are also many more single-use and disposable products available now. Advances in technology also mean that now people own and use many more personal items, and also change these items frequently.

This lifestyle may have increased the world's quality of life, but it also means that now the world is generating huge amounts of waste than before (Vergara & Tchobanoglous, 2012; European Union Report on Waste Management, 2010).

European Commission Waste Prevention Handbook (2012) purports that households produce waste in the consumption stage of the lifecycle of products, which is diverse in its composition. Household wastes are complex in nature, ranging from food scraps, garden cuttings, magazines, newspapers, batteries, plastic bags, bottles, construction waste, furniture to discarded clothing. In addition to waste generated by employees at the workplace, the packaging of some products by businesses and industries ensure that huge amounts of waste streams are generated when the products are purchased. Also, the manufacturing process in business and industries ensure that a lot of pre-consumer waste is produced (European Commission Waste Prevention Handbook, 2012). The generation of waste therefore has a direct relationship with the consumption of raw materials (Vergara & Tchobanoglous, 2012; European Commission Waste Prevention Handbook, 2012; Zaman & Lehmann 2011; European Union Report on Waste Management, 2010).

2.2.2 Textile Waste

There are two types of textile waste: pre-consumer and post-consumer waste. Pre-consumer waste includes all the waste manufacturers generate during processing of fibres into fabrics and all floor cuttings that garment manufacturers generate. On the other hand, post-consumer textile

waste consists of all types of garments or household textiles that consumers no longer need or use and, therefore, dispose of (Caulfield, 2009). Barry (2000) explains that while the textile industry has a long history of being careful with its resources, a large proportion of unnecessary waste is still produced each year, much of which is either incinerated or disposed of in landfills. One reason for the increase in textile waste is consumer reaction to changes in fashion, both in clothing and household interior designs. Seasonal changes in fashion means that clothes become outdated quickly, encouraging replacement and disposal of old clothes. This trend allows manufacturers to increasingly use new raw materials to develop clothing in response to this „throwaway society“ we find ourselves in (Barry, 2000).

Why Textile Waste Recycling?

The disposal of large volumes of textile waste is a growing problem for the apparel industry. Barry (2000) explains that textile recycling is one of the oldest forms of recycling, having started in 1813 when Benjamin Law of West Riding area of Yorkshire in United Kingdom started the process of „pulling“, which involved breaking down woollen textiles into their constituent fibres so that they could be re-spun into fresh thread. Caulfield (2009) cites that textile waste in landfill sites contributes to the formation of leachate, which is the liquid produced from the decomposition of textile waste within the landfill as it decomposes, which has a high potential to contaminate ground water. The rising costs, reduction of available space and concerns for the environment are making burying and land filling of textile waste declining options for disposing textile waste (El-Nouby, Azzam, Hohamed, & El-sheikl, 2005). Incinerating textile waste in large quantities emits organic substances such as acidic gases and dust particles which are all harmful to humans and the environment (Caulfield, 2009). Beukering and Duraiappah (1996) point to recycling of textile waste as economically beneficial

in developing countries because it provides significant employment opportunities to a large informal sector. The labour intensity of certain recovery processes of textile waste enables numerous people to get some kind of job to do in order to generate income. Caulfield (2009) acknowledges that recovering textile waste or recycling is a multibillion dollar global industry that performs a vital social and environmental function and provides employment for millions of people all around the world. By recycling textile waste, merchants are reducing the demand and use of virgin resources (Caulfield, 2009). Bullman (2007) adds that reducing textile waste, reusing materials and products, and recycling are some of the most powerful ways individuals, households, institutions and businesses can use to protect their communities and the environment. Barry (2000) estimates that 95% of the textile waste that are land-filled or incinerated every year could be recycled.

Recycling Textile Waste: What Has Been Done

According to Barry (2000), one of the major uses for recycled textile waste is in the making of cleaning and wiping rags. This involves the discarded clothing being stripped of all added materials such as buttons and zips before being cut into strips to make the wiping rags. The process of filling or flocking is similar to that of wiping rags, with external attachments being removed before the material is shredded into pieces. As the shredded fabric will be hidden from sight when finally used, the individual fibres resulting from this process do not need to be separated by colour or quality (Barry, 2000). The use of textile waste as a filling or flocking material in the United Kingdom has benefited greatly from legislation which prohibits the use of foam in certain furnishings. Textile waste has also been used by some innovative merchants for a wide range of other purposes such as for soundproof blocks, insulation, roofing felt, and as pollution control filters (Barry, 2000). RecyclingCenters.org (2013) shares the view of Barry

(2000) that shredded fabric waste fibres can be compressed for mattress production, and textiles sent to the flocking industry are shredded to make filling material for car insulation, roofing felts, loudspeaker cones, panel linings and furniture padding. On a very small scale, Yeboah (2012) tested the feasibility of producing art paper from fabric waste and found that cotton waste fabrics and the paper mulberry fibre could produce good quality art paper.

El-Nouby et al. (2005) assert that only a small portion of each textile waste type is being recycled or reused today. In this era of limited resources and increasing population, it is necessary to reclaim and reuse as many resources as possible, but this is however, not the case, as much of the cotton waste that is generated goes directly to landfills. Unlike cotton, wool clothing and other types of woollen products have been torn apart and the fibres reused in clothing and wool rugs by the textile industry for many years. On the need to recover and reuse as many waste resources as are available and possible, Caulfield (2009) explains that more often than not, all textile waste scraps are unrealised sources of valuable raw materials that can be regenerated into saleable and usable products through collection, sorting, reengineering and reprocessing. When this is carried out properly, the liability of “waste” is turned into an asset just as a patent company trademarked “Flip™” uses textile waste collected from the floor of garment manufacturing facilities to produce carrier bags and wrapping materials (Caulfield, 2009).

Obstacles in Textile Waste Recycling

El-Nouby et al. (2005) as cited in Yeboah (2012) indicate that textile waste can be used in different ways according to the raw material type, but attempts to reclaim and reuse fibres from old garments, scraps, and rags have encountered large problems which have always prevented the development of a practical and commercial approach to recycling these waste resources.

One problem is that some attempts to reuse waste materials into useful products have turned out to produce relatively low value goods which often have a very short useful life. This problem of making low value goods from waste materials is echoed by Caulfield's (2009) assertion that turning „waste“ into an asset does not happen just like that but depends largely on specific training and development. Limited and inadequate data regarding the amounts and types of textile waste in a country is also an impediment to intelligent and effective recovery and regeneration of textile waste.

According to Caulfield (2009), limited efforts to stimulate waste resource recovery through policy instruments that influence recycled demand, like the United Kingdom legislation on filling and flocking (Barry, 2000) downplay waste recycling and create a greater pull in the resource recovery system. The recovery of post-consumer textile waste is dependent on consumers, so the use of recycled materials and products cannot be achieved with an uneducated public, implying the need for public education on recycling and reuse of waste (Caulfield, 2009). This point brings to bear that recycling cannot be achieved without education which gives credence to the researcher's objective to train selected Art Education students, practicing Art teachers and College of Education students on waste recycling to create useful instructional resources for teaching and learning purposes.

2.2.3 Waste Papers

According to The Department of Industrial Policy and Promotion in India (2011), paper is made from cellulose fibres which are obtained from plants. The world has a huge appetite for using paper, even in these days of „paperless“ office. For example, Australians use more than 3.5 million tons of paper each year, but only 11% of Australia's office paper is currently being recycled, with nearly 9 out of 10 sheets of office paper being thrown away. Much of what is

being thrown away is virgin paper with no recycled content, which ends up in landfills (The Department of Environment and Conservation in Australia, 2005). After the primary use of paper, it often makes its way to trash bins and thus comes to be termed as “waste paper”. Forstall (2002) describes waste paper as all manner of discarded paper products which is of no use to the people who own them. The Department of Environment and Conservation in Australia (2005) explains that in the past waste papers from households, offices and schools were thought of as worthless, fit only to be thrown away. But the truth is the different kinds of already used papers are not worthless because they can be recycled, reused and remade into other useful products. Regarding waste papers as worthless and throwing them onto landfills means society misses out on these other uses of waste papers (The Department of Environment and Conservation in Australia, 2005).

Why Waste Paper Recycling?

According to Levlin, Grossmann, Ervasti, Saint-Amand, Faul, Stawicki, Miranda, Stanic, Read, Hooimeijer, Lozo, Cochaux, Ringman, Bobu and Blanco (2010), paper recycling is the reprocessing of waste paper in a production process either to produce useful paper or to produce some other useful product. The Department of Environment and Conservation in Australia (2005) stipulates that replacing virgin paper with recycled paper is a big step in the right direction. Post-consumer waste paper is an important renewable raw material source for the paper industry and can contribute immensely towards the reduction of virgin or use of new raw materials for papermaking (Department of Industrial Policy and Promotion in India, 2011). From the environmental perspective, the systematic collection and recycling of waste paper can significantly reduce the generation of municipal solid waste. That is, the removal of post- consumer and pre-consumer waste paper from the garbage cycle would considerably

reduce the environmental load on the eco-system. This can translate into lesser requirements of landfill sites which can lower the formation of greenhouse gases like methane upon decomposition of cellulose (Department of Industrial Policy and Promotion in India, 2011).

The processes involved in collecting post-consumer paper waste for recycling presents an opportunity for income and employment generation. Waste paper collection is an industry in itself. In the developed countries, large workforces of semi-skilled and skilled individuals are engaged in a scientific and organised manner to improve the recovery targets for waste paper. For example, in India M/s ITC Ltd., a leading paper manufacturer is running a programme for waste paper collection called “Wealth out of Waste” Model, employing over 4,000 people (Department of Industrial Policy and Promotion in India, 2011). Planet Ark Environmental Foundation (2012) purports that the main drivers leading to increased paper recycling have traditionally been economic, but during the last decade environmental and ecological concerns have become increasingly important. As the paper industry strives towards full sustainability, recycling must become an important component of the supply chain. Bratkovich, Bowyer, Fernholz and Howe (2008) add that in the past it was common to landfill old newspapers, used office paper, worn-out cardboard boxes, and other paper and paperboard products, but today recycling initiatives, combined with an expanding recycling mind-set, have changed much of how society thinks about, and responds to paper trash.

Recycling Waste Paper: What Has Been Done

According to the Department of Industrial Policy and Promotion in India (2011), the Indian paper industry uses waste paper as raw material for making paper. In the early 70s, the share of waste paper used as raw material for making paper in India was only 7%, whereas now waste

paper constitutes the major raw material base for the paper industry in India with 47% share in total production. About 550 mills in India use waste paper as the primary fibre source for producing newsprints and cardboard. Planet Ark Environmental Foundation (2012) explains that recycled paper is used to re-manufacture paper products like office paper, packaging papers, toilet paper, egg cartons, soundproofing, furniture and cardboard.

Levlin et al. (2010) also expresses that waste paper is used for producing insulation for construction. The insulation is made from a composite of recycled paper such as cardboard, newspaper and telephone directories. In addition to being more environmentally friendly than conventional fibre glass insulation, insulation produced from cardboard, newspaper and telephone directories, according to Levlin et al. (2010), is denser and good for both sound reduction and increased airflow. Again, Levlin et al. (2010) share that waste paper is used for art and handicraft. Many museums all over the world collect paper, in most cases not only for the material itself, but for the images depicted on it, such as drawings or print, and nowadays, three-dimensional objects made out of recovered paper also have high artistic value. Many artists have discovered the creative potential of waste paper and are using it in different ways to express themselves. Although this kind of activity may not provide a significant commercial outlet for recovered paper, it does have an important role to play in improving the consumer's perception of recovered paper as a valuable raw material and not as a waste product that must be thrown away (Levlin et al., 2010).

Obstacles in Waste Paper Recycling

According to Villanueva and Eder (2011), almost every type of waste paper can be recycled, but processing can be hindered or even made impossible if the waste paper comes into direct contact with other waste like hazardous waste, health care waste, household waste, food waste, or if waste paper contains materials that are difficult to separate, like oil, or adhesives.

Therefore, paper mills who recycle waste paper consider it very essential that the collected waste paper is not contaminated with the above mentioned waste types. Contaminated papers are not acceptable for paper manufacturing both for technical reasons like processing machines cannot accept the contaminated waste paper and also for health and safety reasons (Villanueva & Eder, 2011). Separating bins for paper and other waste and educating individuals about their use can reduce contamination and reduce unnecessary land-filling of waste paper (The Department of Environment and Conservation in Australia, 2005).

Another obstacle to waste paper recycling that Levlin et al. (2010) have cited is the lack of supportive legislation by governments to support and push the paper recycling agenda to encourage individuals to get involved in waste paper recycling. This attitude retards the growth of waste paper recycling. Purchasing recycled products completes the recycling process. By buying and using products with recycled contents, primary resources are conserved. Governments, as well as businesses and individual consumers, each play an important role in making the recycling process complete (Aggarwal, 2010).

2.2.4 Waste Plastics

Plastic is the general term for a wide range of synthetic or semi-synthetic polymerization products (Pal, Nigam, Akolkar & Kamyotra, 2009). According to the Intermediate Technology Development Group (n.d), waste plastics are from mainly three places in the society. These are a) industrial plastics which can often be obtained from large plastic processing manufacturing and packaging industries; b) commercial plastics which are often available from workshops, craftsmen, shops, supermarkets and wholesalers; c) domestic or household plastic waste which can be obtained from residential areas, streets and parks. Plastics are used to produce everyday products (Jucyte et al., 2005).

Contemporary lifestyles nowadays are not viable without plastics and product designers are increasingly opting for plastics for their products, because plastics are lightweight, have great durability, resistance to chemicals and water, are safe to use, have excellent thermal and electrical insulation properties, and are not very expensive to produce. However, plastics come with many persistent environmental problems (Pal et al., 2009). Increase of plastic production and use means an amplification of plastic waste in the municipal refuse (Jucyte et al., 2005). The quantum of plastic waste is ever increasing due to the increase of plastic products as packaging application in the recent years (Pal et al., 2009).

Why Waste Plastic Recycling?

Intermediate Technology Development Group (n.d.) confirms that in Europe and America, scarce petroleum resources are used for producing an enormous variety of plastics for a wider variety of products. Mangizvo (2012) report that environmental groups estimate that every year 500 billion to one trillion plastic products are manufactured and used worldwide. Plastic waste litter has therefore become an environmental nuisance in most cities and towns across the world because of their widespread use and that if no corrective measures are taken, the negative impacts caused by waste plastics will haunt societies and destroy the environment for generations to come. According to Jucyte et al. (2005), the indiscriminate usage of plastic products demands good management for plastic waste because a lot of social problems are brought up along with the use of plastic products. According to Mangizvo (2012), plastics are not easily biodegradable after their entry into the environment and can be in the environment for years without decomposing. It has been found that, the average plastic carrier bag is used for five minutes, but takes 500 years to decompose (Sharma, 2008). Since plastics are very light, they are easily blown by the wind and can travel long distances to pollute the environment.

Plastic bags can find their way onto streets, parks, and into gutters and waterways. Waste plastics in the environment choke drains when it rains to cause flooding. Plastic bags are capable of holding rain water for several days, thereby providing breeding habitats for mosquitoes. The prevalence of improperly disposed plastic bags has been linked to the spread of malaria in some developing countries (Mangizvo, 2012).

Mudgal (2011) cites the mounting body of evidence which indicates that substantial quantities of plastic waste are polluting marine and other habitats. An issue of particular concern is that giant masses of plastic waste have been discovered in the North Atlantic and Pacific oceans. According to the European Commission Report on Plastic Waste (2013), harm to the coastal and marine environment and to aquatic life follows from the 10 million tonnes of litter, mostly plastic, which end up in the world's oceans and seas annually, turning them into the world's biggest plastic dump. Waste products in the Atlantic and the Pacific oceans are estimated to be about 100 million tonnes, about 80% of which are plastics. This is causing severe damage to seabirds, whales, turtles, marine mammals and countless fishes. As Mudgal (2011) indicates, the widespread presence of plastic waste has resulted in numerous accounts of wildlife becoming entangled with plastic waste, leading to choking, injury, impaired movement and in some cases, resulting in death. Livestock or grazing animals also die when they ingest waste plastics. Concerns have therefore been raised regarding the effects of plastic ingestion by animals as there is some evidence to indicate that toxic chemicals from plastics can enter the food chain through animals and accumulate in body tissues to cause harmful effects for humans (Mudgal, 2011).

Mangizvo (2012) asserts that at times, waste plastics are burnt to reduce their presence in the environment but this results in the release of toxic heavy metals and emission of noxious greenhouse gases like dioxins and furans. These cause air pollution and also contribute to global

warming and climate change. Western Couriers cited in Boehlke (2010) confirms that as plastic water bottles break down, they can release “Deha”, a type of carcinogen that can cause reproductive problems, liver issues and unwanted weight loss. This type of chemical can leach into the soil and cause contamination that can reach plant and animal life as well as water sources. Because plastics have a higher energy value, leaving so much of it in landfills is not only an environmental hazard, it is a huge waste of valuable resources that could be used to produce electricity, heat, or fuel (Cho, 2012). Technologies that can tap waste plastics as a resource provide multiple benefits: they help clean up the environment, reduce greenhouse gas emissions, and decrease the use of virgin raw materials (Cho, 2012).

Recycling Waste Plastic: What Has Been Done

Plastic waste materials can be recycled in a variety of ways and the ease of recycling varies among raw material type, package design and product type (Hopewell, Dvorak & Kosior, 2009).

Plastics that can be recycled are first sorted, shredded and rid of impurities like paper.

The shreds are then melted and formed into pellets, which can be made into other products (Cho, 2012). According to Jucyte et al. (2005), plastics can be broken down into fibres and used for polyester fabrics; they can also be rolled into clear sheets or tape band for video and audio cassettes. Waste plastics are also recycled to create plastic cups, packages for processed meat, egg cartons and containers for drinks. In addition recycled plastics are used to create products like trash cans, recycling bins, engine oil containers, detergent bottles, disposable plastic bowls, television sets, hard plastic products such as rulers and pens (Jucyte et al., 2005).

Aert in Arkansas and Virginia-based Trex recycle waste plastic packaging and polythene bags into outdoor decking material, fencing, doors and windows. Coca Cola is recycling its plastic bottles and has opened the world’s largest bottle-to-bottle recycling plant in Spartanburg, SC

to produce 100 million pounds of recycled plastics each year. Agilyx, an Oregon-based company, produces processing systems that convert ground unsorted plastic of all types into synthetic crude oil (which can be refined into ultra-low sulphur diesel, gasoline, or jet fuel), as well as synthetic lubricants and greases (Cho, 2012). A number of other companies in the United States, Asia and Europe are also producing liquid fuel from plastic wastes. Also a Pennsylvania-based Eco-Clean Burners, Inc. burns plastic pellets (made from un-recycled waste plastic) to create energy to produce electricity for industrial boilers and companies that use steam during the manufacturing process. Based on technology developed in South Korea, the process produces no harmful emissions (Cho, 2012). Currently, the United Nations Environmental Programme, International Environmental Technology Centre is conducting a pilot project in Cebu and Philippines, to convert waste plastic packaging, plastic bags, Styrofoam and disposable cups mixed with waste paper and wood into solid fuel briquettes for use as a coal substitute and fuel to power cement kilns, power plants, industrial heat/steam boilers and stoves (Cho, 2012). Also in the Philippines, another ingenious and simple, albeit small-scale, use for discarded plastic involves converting discarded plastic soda bottles into solar bottle bulbs to help light the dark homes of thousands of the poor.

Developed by students and inspired by the Appropriate Technology Collaborative, the “bulb” is made from a one-litre soda bottle that is filled with purified water and bleach, and then inserted tightly into the roof of a house. The clear water disperses the sunlight and functions like an electric light bulb (Cho, 2012). With all this effort to recycle waste plastics, majority of plastic waste still are being disposed off in landfills around the world.

Obstacles in Waste Plastic Recycling

Friends of the Earth (2008) claim that plastic is light but bulky to collect and store so some people avoid collecting them, even though waste plastic collection has become extremely popular. Many people also collect plastic waste with strong markets and ignore other plastic waste streams in the environment. There is an almost limitless range of products that can be produced from plastic waste. However, the market for recycled plastic products is limited due to the inconsistency of the raw materials use for producing plastic products and recycled plastics can be contaminated by the mixing of types. Many manufacturers will only incorporate well-sorted plastic waste in the manufacturing of their products (Cho, 2012; Hopewell, Dvorak & Kosior, 2009; Intermediate Technology Development Group, n.d.).

As Jucyte et al. (2005) assert, the biggest problem with plastic recycling is that it is expensive to automate the sorting of plastic waste, and sorting manually is also very labourintensive. Furthermore, the breathing of indoor air pollution by workers in the plastic waste recycling industry is very dangerous. The working place of plastic recycling companies is covered with fumes and the smell of melting plastics, which can cause nausea. Bromine dioxins are formed if plastics are burnt or melted for recycling. Bromine dioxins can be created through the outlets of plastic waste recycling industries, which affect the environment. Also the heat and pressure of the moulding and extruding processes involved in plastic recycling may release organic compounds plus heavy metals (Jucyte el at., 2005).

Another problem with plastic waste recycling has to do with the fact that people believe products made with recycled materials will not perform as well as those made with virgin materials and so the demand for plastic waste recycling materials is determined by their marketability. If the recycled products are in high demand, recycling of the waste material persists. But, if the demand for the end products of the recycled material is low or nonexistent, there will be little need for recycling. Businesses prefer to use virgin materials rather than

recycled materials if availability and prices are the same. Recycled plastic materials have difficulty competing with virgin materials unless there are price advantages. If markets for recyclables are to be strong, individuals and business consumers must put priority on purchasing products having recycled material content (Jucyte et al., 2005).

This review brings to light the harm that fabric, paper and plastic wastes can cause to the environment, which justifies the need for recycling them instead of dumping them in landfill sites or incinerating them. The literature justifies this research work as important and necessary as it highlights the need to give second life to waste fabrics, paper and plastics through recycling.

2.2.5 The Need for Educating Individuals in Waste Recycling

The key to any recycling programme is participation, which is greatly influenced by motivation (Levlin et al., 2010). People could be motivated by extrinsic or intrinsic rewards. Usually, extrinsic rewards consist of a payment for collecting materials. This solution can be very effective but extrinsically-motivated behaviour does not continue on its own when the inducement is withdrawn. On the other hand, intrinsic rewards fulfil a person's need to have an impact on their world, producing satisfaction to individuals. For these reasons, intrinsic behaviour tends to last longer than extrinsically-motivated behaviour in waste recycling (Levlin et al., 2010). As Levlin et al. (2010) have explained that the more knowledgeable people are about recycling, the more likely they will practise it and feel satisfied with their actions. Thus, regardless of the motivation, environmental education, awareness campaigns and positive examples of recycling are effective means for developing environmentally responsible behaviour in people. Future potential for increase in waste recycling is mainly associated with

households. Considering that household collection consists of numerous sources of waste materials, environmental education and the raising of awareness are very important factors for individuals who make up households to increase the collection of waste materials for waste recycling (Levlin et al., 2010).

Environmental education could be accomplished by different means; for instance through programmes for schools, civic and community groups; educational curricula and class projects; and community events. All of these have been tried with varying degrees of success. Furthermore, environmental awareness could be promoted by different channels, such as: press conferences, especially when an awareness campaign is starting, public service announcements, mass media like broadcasting, newspaper, magazine, press release, printed materials, newsletters, utility bill inserts, door hangers and posters are some ways through which environmental education could be carried out (Levlin et al., 2010).

The discussion points to intrinsic behaviour lasting longer than extrinsically-motivated behaviour in waste recycling and for the fact that individuals are more likely to recycle if they have knowledge in it. The literature cited confirms that it is very prudent and necessary to make individuals aware of the need for them to recycle fabric, paper and plastics and to teach individuals practical ways of waste recycling which is the aim of this thesis.

2.2.6 Safety Measures to Take in Waste Recycling

Health and Safety Executive (2007) discusses some safety measures to ensure in waste recycling. According to this source, employers in the waste recycling business can do a number of things to manage the risk of ill health in their workplaces. These include: a) providing appropriate equipment and necessary facilities for the waste recycling task; b) providing and ensuring the use of appropriate protective clothing such as gloves, safety boots, protective

covering for the nose and cut-resistant trousers; c) making sure workers understand the risks involved in their work through proper information, instruction, training and supervision. Health and Safety Executive (2007) also indicate that workers in waste recycling companies must be made to know what to do if there is any problem at the workplace concerning safety issues. First aid kits must be made available within reasonable reach of the work place and promotion of good personal hygiene at the workplace must be paramount because it can significantly reduce the risk of ill health (Klemmer et al., 2007).

Waste recycling authorities must always make sure to prevent or eliminate exposure to all kinds of hazardous substances. Where this is not reasonably practical, exposure should be adequately controlled. The environment of the waste recycling workplace should be altered as required to ensure that objects are located in an area without slipping or tripping hazards and that the area is well ventilated (Worksafe Victoria, 2003). Health and Safety Executive (2007) explains that although vaccination and immunization for waste recycling workers may be a useful additional measure, it does not guarantee that infection will not occur. This is because some people may not gain any protection as the vaccine may not trigger an immune response for them. Vaccination and immunization must be the last line of protection for all waste recycling workers. Some workers in recycling companies may need regular health checkups. Here the occupational health professional should be able to advise when checkups are needed for workers to help protect the lives of waste recycling workers (Health and Safety Executive, 2007).

Worksafe Victoria (2003) also adds that operators, who are in control of areas where waste and recyclable materials are collected, processed or disposed off have a duty of care to their own employees, employees of other operators, and to the general public. Where workers are required to work at landfills, transfer stations and waste recycling facilities, they need to

receive training and instruction in relation to the use of personal protective equipment or apparel such as protective clothing, protective eyewear, hearing protection, protective footwear, suitable headgear and face masks where appropriate or necessary (Klemmer et al., 2007). It should be noted that personal protective equipment in itself sometimes poses a secondary risk (for example, protective clothing might restrict free movement). These risks should be assessed and an evaluation made to ensure that the personal protective equipment is providing the desired protection and not creating a secondary risk. Personal protective equipment must be checked to ensure that it fits properly and is worn correctly. To ensure its use, it must be comfortable for the wearer (Worksafe Victoria, 2003).

2.2.7 Instructional Resources

What are Instructional Resources?

Instructional resources are information carriers that cover whatever the teacher uses to vividly involve all the five senses of sight, hearing, touch, smell and taste while presenting his or her lessons for clearer and better understanding of the lesson (Saglam, 2011; Azikiwe, 2007 as cited in Aloba, 2010). They state further that instructional resources are things which are intended to help the teacher to teach more effectively with ease and enable the students to learn more readily. Ruis, Muhyidin and Waluyo (2005) also opine that an instructional resource is anything used to send message(s) from the sender(s) to the receiver(s) so it can arouse the learners' thought, feeling, and interest to gear them to learn. They provide the needed atmosphere to engage learners effectively in the learning process and they greatly enhance the effectiveness of communication (Naz & Akbar, n.d). Instructional resources are generally designed to provide realistic situations that the teacher uses in presenting his or her lesson so that the students can easily understand what is being taught. They are the objects and devices used in learning

situations to aid the written or spoken words in the transmission of knowledge, concepts and ideas. If they are properly designed, skilfully produced and effectively used, have great influence on teaching and learning (Saglam, 2011; Naz & Akbar, n.d). Instructional resources are considered the most efficient facilitators in the education set up as they bridge the gap between theory and practice (Benson & Odera, 2013). Their use however, calls for an imaginative approach by the teacher who needs to constantly be on the alert for new ideas and techniques, to make the lessons presented with instructional resources achieve effective outcomes (Benson & Odera, 2013; Molwantwa, 1997).

Why use Instructional Resources in Teaching and Learning

According to Yildirim (2008), education technologists announced in 1974, that sufficient evidence was available to show that when instructional resources are included in education programmes, learning improves; when a variety of instructional resources are used during education, learning occurs more rapidly; and students prefer teaching methods that are supported with instructional resources to traditional methods of teaching. These statements show that the use of instructional resources in teaching contributes to a more meaningful understanding of information by the students. There are several inherent advantages in the use of instructional resources in teaching and learning. The following points explain the advantages of instructional resources:

a. Clarification and Illustration of Concepts

One major reason for poor performance among students or learners might not be separated from the abstract nature of the courses taught them. Aina (2013) and Adeyemo (2010) are of the view that the absence of instructional resources such as pictures, models or real objects makes it

difficult for learners to understand communicated information. This is because young learners usually lack the ability to assimilate concepts abstractly making it imperative to adopt the use of interactive instructional resources. Instructional resources are very useful because they enable the teacher to clarify concepts to make learning more practical (Wathore, 2012). In many instances, the teacher may be faced with the problem of explaining some difficult ideas with which students are not familiar with, if this happens and the teacher does not have instructional resources to use, he or she may resort to various unhelpful means to explain the concept (Wathore, 2012). Educational activities carried out by using instructional resources will display several subjects, cases, works and operations in line with their real-life versions where students will observe them by themselves to enrich the teaching process and increase the amount of learning (Yildirim, 2008). For example, a resource on one point perspective will help clarify the concept of perspective in terms of the appearance of close and distant objects to an observer, the vanishing point and the horizon which will help learners understand the concept easily. A good visual aid is better and more effective in explaining or illustrating a concept or point than several words of verbal communication. The idea is that visual aids help to illustrate and bring a sense of reality to what is taught therefore they produce simulating interest by creating correct impressions and bringing lessons to life (Yildirim, 2008). Instructional resources provide a great deal of convenience in teachers' ability to convey a message to students in an accurate, proper, clear and understandable manner, making abstract knowledge concrete and enabling students to comprehend complex ideas through simplification (Saglam, 2011).

b. Arousal of Interest

Instructional resource usage in teaching enables the teacher to arouse interest among students to enjoy an instruction (Onasanya, 2004). Students may not be interested because the learning experience is too abstract and vague, so they find it difficult to understand, grasp or create a mental picture of it. Once the teacher uses instructional resources such as models and specimens students' interests are aroused. Such an interest propels students to learn and enjoy the lesson (Wathore, 2012). Instructional resources are used in teaching and learning to focus attention of students, to reduce boredom in the classroom, and to make the teaching learning process more systematic, exciting and lively (Wathore, 2012). Igbo and Omeje (2014) adds that the use of instructional resources attract the attention of pupils and enable them to participate in the topic being taught by using the resources as reference to illustrate their thoughts and ideas. Utilisation of instructional resources really has the ability to provide a high degree of interest for students to involve themselves in an instruction (Ruis, Muhyidin & Waluyo, 2009).

c. Assimilation of Ideas and Knowledge

Since students get to observe instructional resources than mere words, they are effective in helping learners assimilate ideas and knowledge in the teaching and learning context. Teaching resources reinforce the processes of learning by stimulating, motivating and arresting the attention of learners (Okobia, 2011). Well-designed instructional resources enrich the teaching process, facilitates learning and yield to a multi-learning setting (Yildirim, 2008), the reason being that the number of sense organs stimulated through teaching with instructional resources increases, paving the way for efficiency and persistency in students' learning. In totality, when students are given the chance to learn through more senses than one, they can learn faster and

easier (Okobia, 2011; Saglam, 2011). Until concepts are presented in the form of visual aids, students may not readily grasp the meaning of concepts and ideas (Olawale, 2013).

d. Extension of Imagination and Experiences

Instructional resources help the teacher to extend students' imagination and experience far beyond the classroom. One of the biggest advantages of instructional resources is to bring the world into the classroom when it is not possible to take the student into the world (Florida State University Handbook, 2011). Places like markets, railway stations and airports cannot be brought to the classroom for teaching and learning but through the use of instructional resources a teacher can use pictures and models to depict everything that cannot be brought to the classroom to teach a lesson. That is a teacher is assisted in overcoming physical difficulties that could have hindered effective presentation on a given topic with the use of instructional resources (Wathore, 2012; Okobia, 2011; Ruis, Muhyidin & Waluyo, 2009).

e. Retention of Knowledge

Using instructional resources in teaching and learning assist learning by helping students visualise lessons and transfer abstract concepts into concrete, easier to remember objects which allow students to learn more and retain better what they have been taught and store the information acquired in their long-term memory for further application. Appropriate instructional resources in teaching and learning enrich learners' knowledge of an instruction and reinforce verbal instruction for easy retention of knowledge (Igbo & Omeje, 2014; Florida State University Handbook, 2011).

f. Improvement of Quality of Instruction

An instructional resource helps a teacher in presenting a lesson effectively before students. This is because before the teacher goes to class, he or she would have to carefully organise and know how to use the instructional resource to present the lesson to students, this preparation can allow for the teacher to confidently and effectively use the resource to present a well-organised, consistent, specific, and clearly defined lesson for students to understand (Owusu-Koranteng, 2009). Making use of teaching resources can also make delivery of instruction to be much more standardized as learners with varying abilities can receive the same message from an instruction and their individual differences catered for. The quality of teaching and learning can be improved through careful integration of instructional resources and words (Onasanya, 2004).

g. Promotes and Widens Communication

Using instructional resources in teaching widens the channel of communication between teachers and their learners. Classroom interaction can be interactive when instructional resources are used. Thus using instructional resources can promote and stimulate student-student interaction, student-teacher interaction, and teacher-student interaction. The use of instructional resources results in more cooperative learning activities between teachers and students. On the whole, teaching resources ensure the application of classroom-oriented communication techniques and allow the growth of specific learning abilities, and enhance intellectual skills and motor skills of students (Florida State University Handbook, 2011; Onasanya, 2004).

Saves Teaching Time

The systematic utilisation of instructional resources in the classroom significantly saves teaching time as their use requires short time to explain concepts and present large information. This benefit can be made manifest in the time spent on tasks by both the teacher and the students (Olawale, 2013; Wathore, 2012; Abdelraheem & Al-Rabane, 2005; Onasanya, 2004).

Types of Instructional Resources

Onasanya (2004) has categorised instructional resources as print, non-print, audio, audiovisual electronics and non-electronics. The following are some of the instructional resources described under the various categories.

Chalks and Chalkboard

Chalks and Chalkboard are used to present instructional content as immediate sketchbook. They are essentially temporary for delineating ideas. When integrated with other media, they can give full explanation (Onasanya, 2004).

Print Media

According to Onasanya (2004), print media used in education include textbooks, periodicals, encyclopaedia, newspapers, magazines, file records and minutes. They provide good sources for lesson planning and note taking. They carry the main responsibility of organising instruction and they can be used as basic instructional guide. Print media are to supplement other media with maximum effect; they can also incorporate several other media, like pictures and graphic materials, thus serving as multi-media (Blythe-lord, 1991 as cited in Onasanya, 2004; Kemp & Smellie, 1989 as cited in Onasanya, 2004).

Graphic Materials

Graphic materials are two-dimensional materials designed to communicate a message to learners. They could incorporate symbolic visual and verbal cues. Graphic media include drawings, charts, graphs and posters. All these materials should be designed in a way, to ensure that they are large and short in content (Onasanya, 2004).

Realia

These are real things as they are without alteration. They include coins, tools, artefacts, plants and animals among others. Realia eliminate distortion in student's knowledge on the topics being taught. Using realia provides students with opportunities for „hand-on“ interactions and experience (Onasanya, 2004).

Still Pictures

Still pictures are photography representation of people, places or things, and can be used to present information in all subject areas. They are readily available for resourceful teachers, in magazine, calendars, illustrations from textbooks and newspapers (Onasanya, 2004).

Models and Mock-Ups

Models and mock-ups are three-dimensional representation of a real thing. Like actual objects, a model or mock-up can be looked at from all sides as it has breadth, length and depth. Models are representations of real things that are infinitely large for instance earth or solar system or real things that are small. It could be animate or inanimate. They may be complete in every

detail or more simplified than the original. Generally mock-ups are differentiated from models by their usually larger size and by their moving and operating parts (Onasanya, 2004).

Audio Media

Audio media are used to deliver instruction involving verbal information, and also for guiding the learning of intellectual and motor skills. With the availability of a compact disc, audio medium can be produced by teachers. It can be a supplement to other media like filmstrips and slides. Audio medium is equally good for all types of instructions, from the precision of speech to the mental imagery formed by music and sound effect (Onasanya, 2004).

Overhead Projectors

Using the overhead projector, transparent materials are projected so that a group can see. It is simple to operate, and it is a versatile media for teachers to use. Transparency can face the audience from the front of a room and maintain eye-to-eye contact with students while projecting transparencies in a lighted room (Onasanya, 2004).

Slide Projectors and Filmstrip Projector

Slide projectors are used for transmitting photographic and other images in an enlarged form onto a viewing screen (projector board) in colour or black and white. They employ a light source and a lens system to transmit instructional content. Teachers can use filmstrips and slides to enrich their instruction. They are adaptable for use in every subject area, and the rate of presentation for classroom use can be controlled by teachers using remote and advance mechanisms. Slide presentations can be accompanied with audio and video recordings (Onasanya, 2004).

The Web

The internet offers seemingly unlimited potential to encourage learning. However, unless the teacher plan carefully how to use the web in teaching, students do little more than surf the internet when an instruction is ongoing. The Web can be a valuable research tool, helping students“ access resources in other universities or nations, allowing them to learn about their fields. Teachers who have had the opportunity to use a multimedia system in the classroom, with online access to globally-available media and the hardware and software to create something new with this media, have recognized what an empowering tool computer-based resource is, as much for themselves and for their students (Poole & Sky-McIlvain, 2009).

Multimedia Presentation

This involves combinations of visual materials. It is a learning resource package, which can be effective when several teaching resources are used concurrently for specific instructional purposes. With multimedia, different instructional resources can be tailored towards different objectives outlined for a lesson and large amount of information can be passed across to students (Onasanya, 2004).

Selecting Instructional Resources for Teaching and Learning

According to Fiahin (2005) as cited in Yildirim (2008) factors that must guide the selection of instructional resources include the following:

- a) Resource materials should be in accordance with the developmental features of learners;
- b) Resources should be appropriate for classroom use;
- c) Resources should pave the way for presenting the topic more efficiently;

- d) Resources should be clear about their methods and conditions of use;
- e) Resources should be handy, economical and easy to transport from one place to another;
- f) Resources must be acceptable in other places for same lessons (Fiahin, 2005).

With regards to selection of instructional resources Onasanya (2004) cautions teachers to select resources for instructional purposes based on specific criteria which are directly related to the instructional plan. The objectives of the instruction should guide the use of the resource (Onasanya, 2004). Thus, when designing any instructional resource, the teacher should consider things that will ensure learners' participation, through discussions, projects, dramatization, and the kind. Instructional resources when carefully selected and integrated in an instruction, can ensure that students develop the right attitude toward-instructional content as well as classroom interaction between the teacher and students can be enhanced (Onasanya, 2004).

Although instructional resources facilitate teaching and learning activities, and consequently, the attainment of the lesson objectives, selection depends on the adequacy and appropriateness of materials selected (Alobo, 2010). This, in effect, means that instructional resources are not selected haphazardly. Indeed, resource materials to be used should be carefully selected by all teachers. Another important factor in selecting and using resource materials is the availability of the needed materials. In other words, before the teacher decides on materials to use, he or she must be certain that the resources are available as well as accessible to him or her and the learners. Most of the time the best materials to be used are not available to teachers due to financial constraints. When faced with this situation there will be the need for every teacher to avail themselves to learn and acquire the skills for improvisation of instructional resources using available local materials (Alobo, 2010).

However, Balogun (2002) as cited in Oladejo et al. (2011) cite two main obstacles that hamper the successful improvisation of instructional resources. These constraints are mainly

technical and human factors. The technical factor has to do with the degree of accuracy and precision that is possible with the improvised equipment while the human factor relates to a teacher's skill for developing appropriate resources in order to provide the appropriate learning experience for learners. Another problem with improvisation is the lack of adequate professional training of teachers in the effective use of local resources for teaching (Maduabunmi, 2003 as cited in Oladejo et al., 2011). Consequently Isola (2010) as cited in Oladejo et al. (2011) stress the need for definite well-planned training programmes in teaching and learning resources improvisation for teachers. Such in-service programmes should include regular meaningful workshops on improvisation techniques for teachers to improve and update their competencies in instructional resource development.

As Aloba (2010) emphasises improvisation where non availability of instructional resources is as a result of financial constraints gives good grounds for research of this nature which turns attention to improvisation of instructional resources using recycling of waste materials which cost little or nothing at all except the effort to collect throwaways for the purpose of meeting the needs of teachers and pupils in schools. As Aloba (2010), Isola (2010) and Maduabunmi (2003) have pointed out, lack of skills to improvise instructional resources by teachers hinder regular and appropriate use of a variety of resources for effective teaching and learning. This problem can be resolved if teachers would be trained to identify waste materials that could be used to create the right resources that could meet their curriculum needs. In the same way, training students and teachers the skill of improvising instructional resources from waste recycling could instil in them the desire to recycle waste to satisfy teaching and learning needs, which they could carry to their schools for teaching.

Furthermore in the selection of instructional resources, Aloba (2010) cautions that because of cultural differences between communities, the curriculum might be the same, but

instructional resources that have been found effective in one cultural context may not be necessarily suitable and effective in another community. Alobo therefore calls on teachers to select appropriate materials from their local community for teaching their learners instead of simply using materials that have been used and found effective in other areas. This emphasises the cultural appropriateness of the instructional resources developed for this research, because the materials used were locally generated waste materials. The physical features of learning resources are also a very important factor in their selection and use. Physical features here means attractiveness, durability, size, weight, clarity of the resources and easy handling and storage of resources. All these factors must be considered as factors necessary to the selection of instructional resources (Alobo, 2010).

In view of this, Çilenti (1998) as cited in Yildirim (2008) indicates that teachers and educators must know how and when to use which materials at which level and with which kind of students, based on what principles and under what circumstances. In the view of Özmen (2005) as stated in Yildirim (2008), in order to make the best use of instructional resources, teachers should select the appropriate resources that correspond to the relevant subject and educational level as well as use the right method of teaching at the right time in a right setting. This means that teachers must have a good idea of the range of instructional resources that could boost the teaching-learning process and make it possible for students to understand the lessons being taught.

Instructional Planning

An instructional plan is a plan of teaching and learning activities based on which learning is organised (Reigeluth & Carr-Chellman, 2009). According to Duncan and Met (2010), instructional planning guides the teacher to know what to do next when carrying out the lesson.

This helps to ensure that classroom instruction line up with curriculum goals and objectives. An instruction planned well in advance of the actual class meeting allows for the comfort of time for a teacher to really ensure a successful execution of the instruction. Instructional planning can help teachers to pre-consider the logical progression of the lesson before it unfolds to enable the teacher to ensure students will acquire the needed set objectives. The instructional plan, if done properly, can help motivate students to learn (İşman, 2011).

In the instructional design process, there are a lot of factors that should be taken into consideration. These factors are closely related to each other and affect each other to a certain degree. All factors and steps in the instructional design or the lesson planning process should be thought through and chosen carefully and should be ordered in a meaningful way because every detail can play an important role during the implementation (İşman, 2011). The following are some basic instructional design processes:

The ADDIE Model of Instructional Design

According to Bandhana (2010), ADDIE is an instructional design process that stands for (Analysis, Design, Development, Implementation and Evaluation). These five steps explain the various activities that must be considered in each step of the instructional design cycle. The output of each step becomes the input for the next step. The ADDIE design (Thomas, 2010) operates as follows:

Analysis - analyse learner environment, learner characteristics and tasks to be learnt;

Design - identify learning objectives (competences to be achieved, skills, knowledge and attitudes), identify a sequence to meet these objectives, identify the kinds of learning materials and tools needed;

Development - do it (create instructional plan and materials);

Implementation - use it (use the developed instructional plan and materials)

Evaluation - find out if the instructional plan and materials achieved the desired goals.

The Dick and Carey Model of Instructional Design

This model provides a sequential assistance that helps to deliver educational content. The model provide one of the ways of organizing learning which gives preference to the learner, including feedbacks at various stages of the design to aid in making teaching better. It is made up of ten interrelated parts that rely on each other and offer feedbacks for every part for successful achievement of its goals (Thomas, 2010). The ten interrelated parts of this model are to Assess needs to help identify learning goals, Conduct instructional analysis, Analyse learners and contents, Write performance objectives, Develop assessment instruments, Develop instructional strategies, Develop and select instructional material, Design and conduct formative evaluations, Revise instruction based on formative evaluations, Design and conduct summative evaluation (Thomas, 2010). Figure 2.1 shows the graphical illustration of the model.

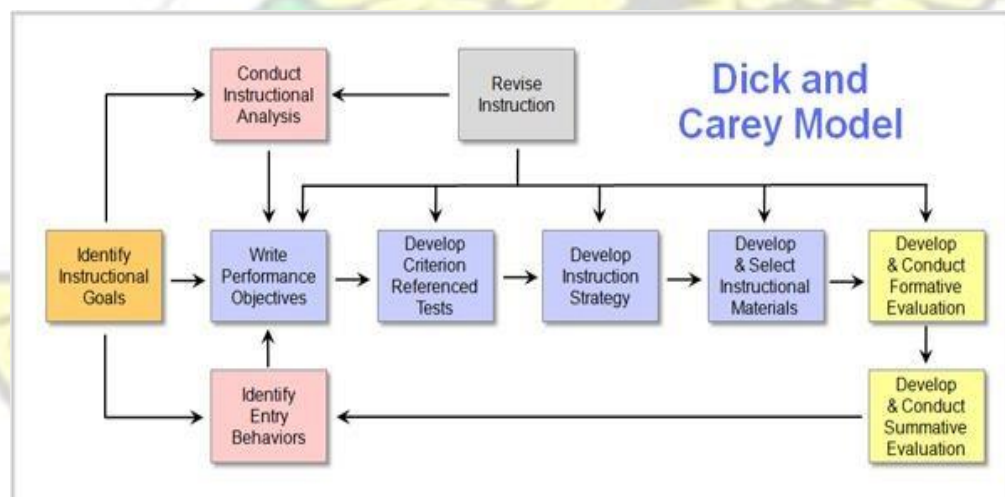


Figure 2.1: The Dick and Carey Model of Instructional Design

Source: www.knewton.com

The Morrison, Ross and Kemp Model of Instructional Design

This model thrives on the idea of flexibility. The oval shape of the model acts as a reminder for the designer that the process of instructional design is cyclical. The essential concept of this model is that any of the elements can be addressed at any time in the process, giving freedom to the designer to modify their instruction as necessary. One of the major draws to this model is that revision is extremely encouraged throughout the process. The goal is to have the flexibility to correct problems as they arise, thus making the end result or product more efficient and free of errors (Thomas, 2010). Figure 2.2 illustrates the Morrison, Ross and Kemp model.

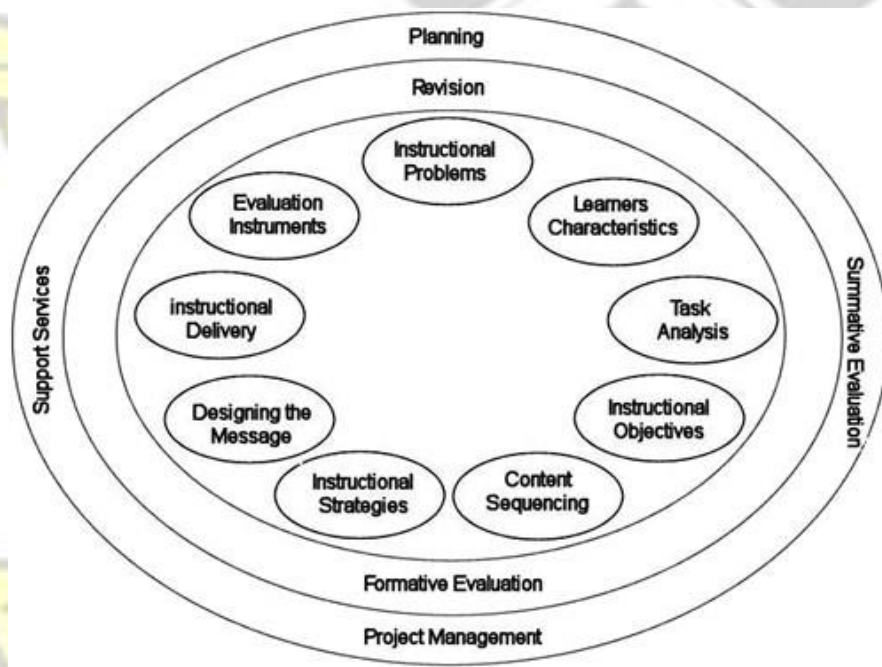


Figure 2.2: The Morrison, Ross and Kemp Model of Instructional Design

Source: www.instructionaldesigncentral.com

2.3 Theoretical Review

2.3.1 Dale's Cone of Experience

Anderson (n.d), explains that during the 1960s, Edgar Dale propounded the theory that learners retain more information by what they “do” as opposed to what is “heard”, “read” or “observed”. This theory brought about the development of the Cone of Experience. Molenda (2003) describes the Cone of Experience as a visual device which summarizes Dale’s classification system for the varied types of mediated learning experiences. The organising principle of the Cone is the progression from the most concrete experiences (at the bottom of the cone) to the most abstract (at the top). Dale’s Cone of Experience suggests that after two weeks of learning encounters, people generally remember 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they say and write, and 90% of what they do as they perform a task (See Figure 2.3 for the Cone of Experience). The implication is that people learn best when they use perceptual learning styles, which are sensory based. In other words, the more learners are made to use their senses such as sight, hearing, touch, smell and movement in learning activities, the easier for them to retain more of what they learn but when less of the senses are used, learners retain little of what was learnt (Anderson, n.d). This suggests that retention rates of students are enhanced when they are directly involved in an activity and think about what they are doing which may be termed as demonstration or active learning methods. Ramadhan (2012) adds that when teachers design teaching activity in such a way that they are more concrete and also involve activities that make the students learn by engaging in practical activities, maximum retention of what is learnt is achieved. According to Dale, instructors should design instructional activities to combine the use of both concrete and abstract experiences to enhance student’s learning (Anderson, n.d).

The information on this theory was reviewed because the theory suggests that the assimilation of instructional content is higher when teaching and learning is made more practical. This means that if Art teachers incorporate active strategies in their lessons by the use of appropriate instructional resources to make lessons practical to students, there is evidence from Dale's Cone of Experience (Figure 2.3) that such an environment will make students assimilate and retain more of what they are taught than just hearing a lecture.

Knowledge of Dale's Cone of Experience was also factored into the designing of the instruction plans that guided the training of the Art Education students, practising Art teachers and College of Education students on recycling to create useful instructional resources for teaching.

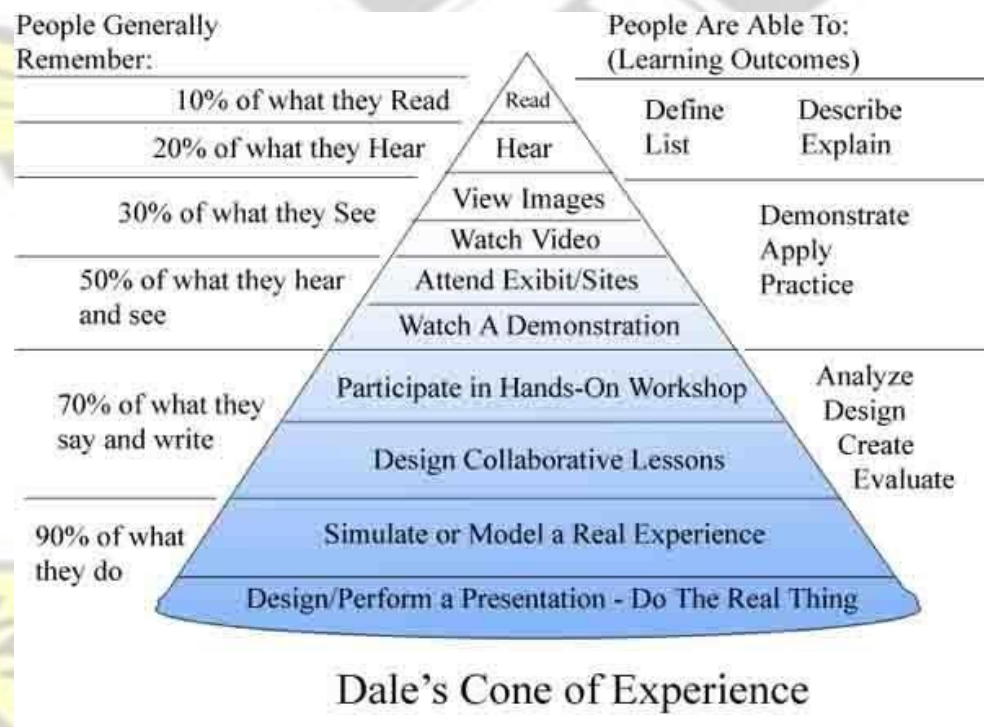


Figure 2.3: The Cone of Experience by Edgar Dale
Source: by Bilash (2011)

2.3.2 Active Learning

Active learning is an instruction method wherein students are actively engaged in building understanding of facts, ideas, and skills via learner-centred activities directed by the teacher rather than passively listening to a lecture and taking notes. Active learning is any type of activity that gets students involved or engages students in the learning process (Eison, 2010; Bell & Kahrhoff, 2006; Prince, 2004). When active learning is used, the instructor will provide opportunities for students to apply and demonstrate what they are learning and receive immediate feedback from peers and/or the instructor (Eison, 2010). This means that active learning occurs on a platform by setting up situations and experiences that allow students to be in constant engagement with the learning material individually or with their peers, while socially constructing greater understanding of the topic. Active learning requires students to do meaningful learning activities and think about what they are doing (Eison, 2010). The core elements of active learning are student activity and engagement in the learning process which is contrast to the traditional lecture method of teaching where students sit and passively receive information from the teacher (Bell & Kahrhoff, 2006; Prince, 2004).

The importance of students' engagement in instruction is widely accepted and there is considerable evidence to support the effectiveness of students' engagement on a broad range of learning outcomes (Eison, 2010). Knight and Wood (2005) report the results of a study conducted in a Biology course where students who were taught using in-class activities, collaborative work and group discussions made significant higher learning gains and better conceptual understanding of course material than students who were taught using only the lecture method. According to Eison (2010) and Prince (2004), Hake (1998) in his study examined pre- and post-test data for over 6,000 students in introductory Physics courses and found significantly improved performance for students in classes with substantial use of

interactive-engagement methods and approaches. Test scores measuring conceptual understanding were roughly twice as high in classes promoting engagement than in traditional courses in the study conducted by Hake. Similarly according to Eison (2010), Springer et al. (1998) report of studies examining active learning and lecture based instruction in Science, Math, Engineering, and Technology courses where the active learning instruction produced higher achievement test scores, more positive student attitudes, and higher levels of student persistence. Astin (1993) and Bonwell and Eison (1991) as cited in Prince (2004) express that students involvement in an instruction is one of the most important predictors of a successful instruction which helps to bring about better attitudes and improvements in students' thinking and writing.

Incorporating Active Learning in the Classroom

The modification of traditional lectures is one way to incorporate active learning in the classroom (Felder & Brent, 2009). According to Eison (2010), active learning instructional strategies can be created and used to engage students in (a) thinking critically or creatively, (b) speaking with a partner, in a small group, or with the entire class, (c) expressing ideas through writing, (d) exploring personal attitudes and values, (e) giving and receiving feedback, and (f) reflecting upon the learning process. Felder and Brent (2009) and Prince (2004) indicate that one simple yet effective way to involve students in a lesson is to insert brief demonstrations followed by class discussion. Discussion in class is one of the most common strategies that promote active learning with good reason. If the objectives of a course are to promote long-term retention of information, to motivate students toward further learning, to allow students to apply information in new settings, or to develop students' thinking skills, then discussion is preferable to lecture (Felder & Brent, 2009). Instructors who switch to active learning almost

always say that their classes are much more lively and enjoyable and the quality of learning goes up dramatically (Felder & Brent, 2009). What this means is that the learning environment in which all students are relegated to passive roles, listening to and observing the instructor and taking notes, do little to promote learning for either active or reflective learners. This could mean that the more opportunities students have to participate and reflect in class, the better they will learn new material and the longer they are likely to retain it. It is therefore necessary for a teacher to provide actual experiences through the use of instructional resources in an active learning atmosphere that will make conceptualisation and interpretation possible for students (Felder & Brent, 2009). Here since concepts (big ideas, issues or concerns), contexts (information and perspectives that inform the meaning) and techniques (approaches and methods) are all essential areas of content in Art education, the use of appropriate instructional resources in an active learning atmosphere will help Art teachers to be able to demonstrate and explain easily the concepts, contexts and the techniques involved in Art lessons for students understanding. This theory was reviewed because the use of instructional resources in teaching and learning can provide an avenue for Art teachers to involve their students actively in lessons. Also active learning was used in developing the instruction plans for the training sessions.

2.3.3 Multiple Intelligences

Fierros (2004) purports that instead of Gardner (1999) defining intelligence in terms of IQ scores, Gardner offered an alternative view. Gardner described intelligence to combine psychological and biological characteristics that enable individuals to solve problems or create products that are valued in one or more cultures. The Multiple Intelligence theory explains that there are multiple ways to learn and that every individual possess multiple types of intellectual

strengths and life skills. Multiple Intelligences unveil academic strengths of individuals and honours alternative ways of learning. Fierros (2004) discusses the Multiple Intelligences identified by Gardner as follows:

- **Linguistic intelligence:** this allows individuals to communicate and make sense of the world through language. Those who have a keen sensitivity to language in its spoken or written forms might demonstrate this strength, such as poets, writers, lawyers, and public speakers. Linguistic intelligence is highly valued and rewarded in schools (Fierros, 2004).
- **Logical-mathematical intelligence:** this enables individuals to use, appreciate, and analyse abstract relationships. This intelligence is often seen in mathematical reasoning and scientific investigations. Mathematicians, scientists, and engineers deploy this intelligence at high levels. Like linguistic intelligence, logical-mathematical intelligence is also highly emphasized in schools (Fierros, 2004).
- **Spatial intelligence:** this enables individuals to perceive visual or spatial information, and to create this information. This intelligence is commonly seen operating at high levels in architects, artists, surgeons, and pilots (Fierros, 2004).
- **Musical intelligence:** allows people to create, communicate, and understand meanings made out of sound. It is manifested to high degrees among composers, musicians, and acoustic engineers (Fierros, 2004).
- **Bodily-kinesthetic intelligence:** this intelligence involves using all or part of the body to solve problems or to create products. Advanced forms of problem solving and creativity through the use of the body are evident in the activities of choreographers, rock climbers, and skilled artisans (Fierros, 2004).

- **Interpersonal intelligence:** this intelligence is the ability to recognize and make distinctions among others' feelings and intentions, and to draw on these in solving problems. Successful teachers, actors, therapists, political leaders, and salespeople rely on highly developed interpersonal intelligence (Fierros, 2004).
- **Intrapersonal intelligence:** this is the ability to self-reflect, to recognise and change one's own behaviour, build upon strengths and improve upon weaknesses, resulting in very rapid development and goal orientated achievements. This makes manifest in a strong awareness of one's own strengths, weaknesses and needs in order to plan effectively to achieve personal goals (Fierros, 2004).
- **Naturalist intelligence:** this intelligence is made manifest when individuals are able to solve problems by distinguishing between, classifying, and using features of the natural world. This intelligence is commonly seen in people's ability to categorize different kinds of plants and animals. Naturalistic intelligence is common in landscape architects, hunters, archaeologists, environmental scientists, and farmers (Fierros, 2004).

What the Multiple Intelligences theory shows is that every learner has the capacity to exhibit all of these intelligences, but some intelligence are more highly developed than others in certain individuals. The key issue with regards to Multiple Intelligences and education is that it allows teachers to think differently about how students learn. Teachers who integrate Multiple Intelligences theory into their teaching consciously expand their curricular offerings to address students' different intelligences and to provide all students with learning experiences that can lead to better learning opportunities (Kornhaber & Krechevsky 1995 as cited in Fierros, 2004). Fierros (2004) expresses that, the use of Multiple Intelligences in schools helps educators move instruction beyond linguistic and logical-mathematical intelligences to include every student in the learning process. Multiple Intelligences helps educators understand cognitive abilities and

frame decisions about curriculum. To use Multiple Intelligences well, educators need to consider the appropriate tool to use for developing the curriculum that engages learners who have different intelligences. Without using Multiple Intelligences as a framework for designing learning opportunities, students' strengths embedded in other intelligences could be ignored and their opportunities to learn could be lost as well (Fierros, 2004).

The challenge for teachers therefore is their ability to create learning environments that foster the development of all eight intelligences, by balancing instructional presentations that address all learners and strengthen their under-utilised intelligences. Teachers seeking to utilise Multiple Intelligences theory in their classrooms must determine their students' strengths, weaknesses, and their combination of intelligences in order to provide meaningful learning experiences for them (Phillips, 2010). By approaching students with a model that targets their successful learning in a particular intelligence instead of a standard approach that limits learning, students get an opportunity to experience success in school. The use of Multiple Intelligences promotes diversity and inclusiveness, rather than the „one size fits all“ approach to teaching and learning (Fierros, 2004).

The information on this theory was reviewed because Multiple Intelligences teaches that there are different learning styles in every classroom so teaching and learning must be varied to include everybody. Multiple Intelligences theory guided the planning of instructions that were used in training the Art Education students, practising Art teachers and College of Education students how to recycle to create useful instructional resources. Figure 2.4 shows a graphical illustration of the Multiple Intelligences theory.

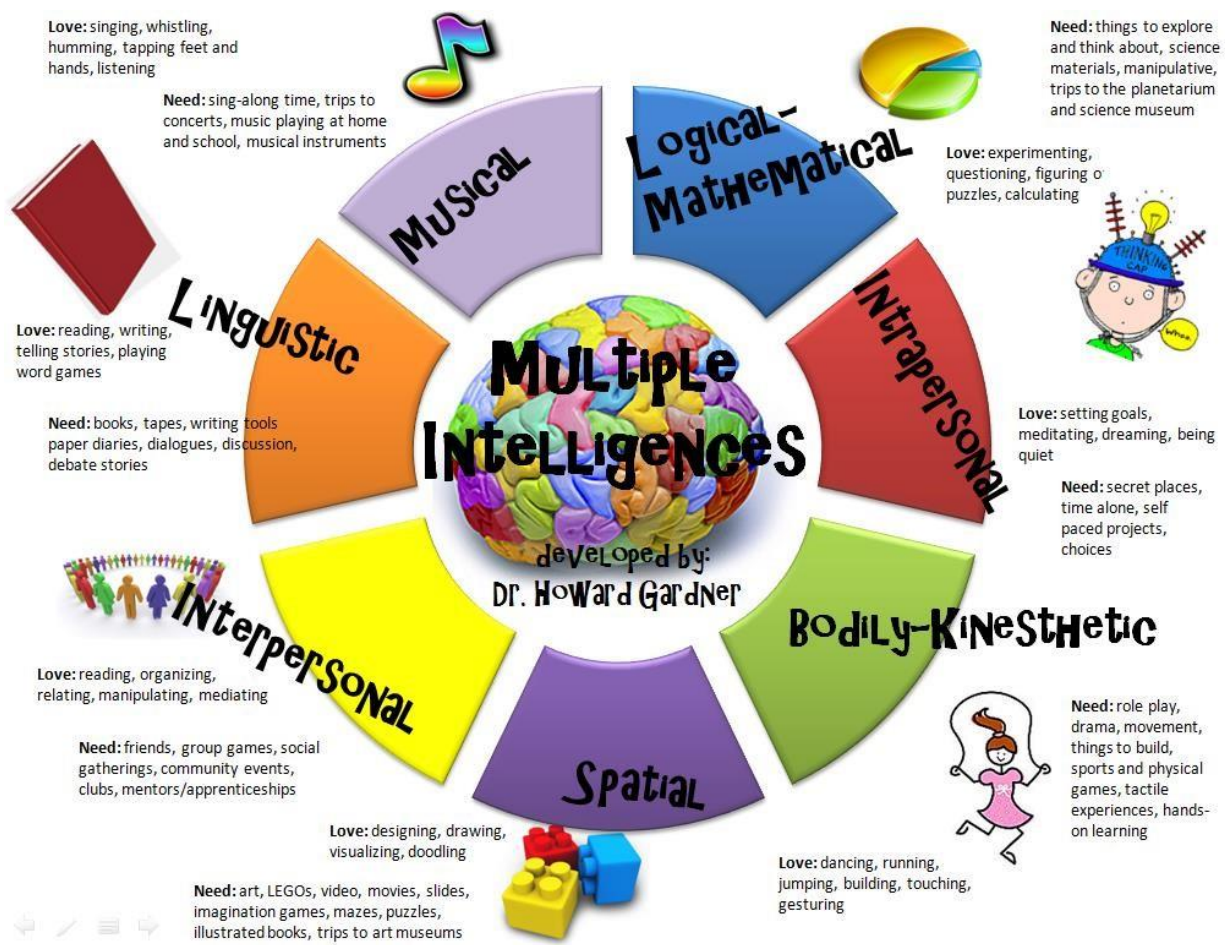


Figure 2.4: An illustration of the Multiple Intelligences Theory by Howard Gardner
Source: by onlinelearningtips.com

2.3.4 Relevance of the Research Work Based on the Literature Review

The reports on the negative implications involved with the entry of waste into the environment give meaning to the call for waste recycling which is the agenda for this research work. Concerning what has been done already with plastic, paper and fabric scraps, there is no mentioning of them being used to create instructional resources for Art education, which means that this research work is original and contributes to existing knowledge. Touching on educating individuals on how to recycle, Levlin et al. (2010) make it clear that is a very relevant activity

in that, when individuals are aware of how to recycle their waste they are willing to recycle. Again, because intrinsic behaviour last longer than extrinsically-motivated behaviour in waste recycling and for the fact that individuals are more likely to recycle if they have knowledge in it, is then very necessary to make individuals aware about the positive impact that recycling brings to the environment and also show individuals practical ways of waste recycling, which is the aim of this research work. Alobo (2010), Isola (2010), Maduabunmi (2003) and Balogun (2002) discussion on instructional resources also give grounding to the focus of this work in improvising with waste materials to create useful resources for teaching. These authors make it clear that the lack of materials and skill to create resources by teachers hinder the use of appropriate instructional resources which is the exact situation why Creative Art, Basic Design and Technology and General Knowledge in Art teachers“ do not use practical and interactive instructional resources to teach. Hence the objective of this research work to train selected Art Education students, practicing Art teachers and College of Education students on how to improvise instructional resources through waste recycling is very important.

On the other hand, Dale’s Cone of Experience suggests that the assimilation of instructional content is higher when teaching and learning is made more practical, the theory of Multiple Intelligences teaches that there are different learning styles in every classroom so teaching and learning must be varied to include everybody. And from Prince (2004) we understand that student centred activities make students perform better. Therefore, if teaching and learning can be made practical, active and include everybody, relevant teaching and learning resources must be present in the classroom. The Cone of Experience, Multiple Intelligences and Active Learning theories were used in developing the instructional plans for the training sessions.

In conclusion, the arguments from the literature prove that giving another life to waste materials instead of waste disposal or burning is very appropriate for the environment while it also provides useful instructional resources that ensure high assimilation in the classroom.



CHAPTER THREE

METHODOLOGY

3.1 Overview of Chapter Three

The chapter outlines the methods and procedures that were used in the collection of data for the study to achieve its objectives. This includes detailed information on the research approach and design, population for the study, data collection instruments, procedures that were followed in the design and execution of the project and the actions that the population undertook.

3.2 Research Design

The qualitative research approach was used for the study. Qualitative research is concerned with developing explanations of social phenomena and aims to help us understand the world in which one lives and why things are the way they are. It is concerned with the social aspects of the world (Hancock, Ockleford & Windridge, 2009). Instead of generating numerical data supporting or refuting clear cut hypotheses, qualitative research aims to produce factual descriptions based on face-to-face knowledge of individuals and social groups in their natural settings. It is primarily concerned with meaning rather than measuring. Qualitative research explores questions such as what, why and how, rather than how many or how much. This method is commonly used for providing in-depth description of procedures, beliefs and knowledge for exploring the reasons for certain behaviours including the opinions of respondents about particular issues. Understanding why individuals and groups think and behave as they do lies at the heart of qualitative research (Keegan, 2009; Johnson & Onwuegbuzie, 2004; LeCompte & Preissel, 1994).

Under qualitative research, exploratory, quasi experimental, participatory action and descriptive methods were employed to carry out the study. The exploratory approach to qualitative research was found appropriate for the study because the topic focuses on exploration of materials and production processes for instructional resources development from waste materials and their use in teaching and learning of Art in the classroom.

3.2.1 Exploratory Research

Exploratory research is a methodological approach that is primarily concerned with discovery and with generating or building theory (Davies, 2006). In the social sciences, exploratory research is wedded to the notion of exploration and the researcher as explorer (Davies, 2006). The goal of exploratory research is to discover ideas and insights to test specific hypotheses and examine relationships (Nofie Iman Management Consult, 2012).

Exploratory research was used to explore the step-by-step processes for developing the instructional resources from paper, plastic and fabric wastes. Exploratory research was used because of the following reasons:

- a) The exploration process enabled the researcher gain insights about the qualities of the waste materials for developing the instructional resources.
- b) It helped to identify and discover new ideas and ways of safely recycling waste materials to create the instructional resources.

3.2.2 Quasi-Experimental Research

The quasi-experimental design, sometimes called the pre-post-intervention design, is often used to evaluate the benefits of specific interventions. For example, if a hospital has an increasing rate of malaria, the hospital personnel may design an educational intervention aimed at decreasing the rate of malaria and compare rates before and after the intervention (Harris, Bradham, Baumgarten, Zuckerman, Fink & Perencevich, 2004). Quasi-experimental designs identify a comparison group that is as similar as possible to the treatment or experimental group in terms of baseline (pre-intervention) characteristics (White & Sabarwal 2014; Dimsdale &

Kutner 2004). Researchers would employ a quasi-experimental design in two circumstances: when naturally existing groups are being studied and when random assignment is restricted by external factors, this situation occurs frequently in education research (Dimsdale & Kutner 2004).

The quasi-experimental research method was used to test the developed instructional resources by using them for teaching and comparing learning situations with and without the use of those instructional resources. The quasi-experimental design was employed because:

- a) It made it possible for the researcher to compare the pupils and students learning situations with and without the use of the developed teaching resources.

3.2.3 Action Research

Action research is known by many other names, including participatory research, collaborative inquiry, emancipatory research and action learning, but all are variations on a theme (O'Brien, 2001). Action research seeks to understand and improve the world. At its heart is collective, self-reflective inquiry that researchers and participants undertake so they can understand and improve upon the practices in which they participate and the situations in which they find themselves. The reflective process is directly linked to action that is influenced by understanding of history, culture, local context and situations embedded in social relationships. The purpose is to develop new skills or approaches and to solve problems through active participation with direct application to the classroom or other applied setting. That is action research seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities (Reason & Bradbury, 2008; Waters-Adams, 2006; Baum, MacDougall & Smith, 2006). There is a dual commitment

in action research which is, to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction (O'Brien, 2001). The process of action research is empowering and leads to people having increased control over their lives (Baum, MacDougall & Smith, 2006).

In this study, the participatory action research method was used to teach the processes that were explored to create sample instructional resources to Art Education students of the Department of General Art Studies, KNUST; practising Art teachers in Kumasi and College of Education students at Offinso College of Education. This was done to introduce the participants to the idea of using waste materials to create instructional resources and to give them the technical skills they need to create samples of the resources from waste materials to enhance their teaching. Participatory action research was used because:

- a) It offered the opportunity to bring Art Education students, practising Art teachers and College of Education students on board to address the issue of waste recycling to create instructional resources for teaching Art.

3.2.4 Descriptive Research

According to Leedy and Ormrod (2005), descriptive research design examines a situation as it is. It does not aim to change or modify the situation under investigation; it enables intense description of the phenomenon under investigation in words other than figures. Descriptive research provides an accurate portrayal of characteristics of a particular individual, situation, or group. This design is a means of describing how the reality is (Jong & Voordt, 2002; The Association for Educational Communications and Technology, 2001).

The descriptive method was used to explain the step-by-step procedures followed in creating the sample instructional resources from waste papers, plastics and fabrics. The descriptive method was used in analysing the qualities of the resources that were produced and

the feedback obtained from testing the instructional resources at the different levels of education in Ghana. In addition, what was observed during the teaching sessions and the interviews were described. The descriptive research method was employed because:

- a) It helps to identify the attributes of a situation or process based on observation.
- b) It assists researchers in observing the natural relationship that exists in events, behaviours and situations.
- c) It creates an avenue for researchers to give a step-by-step account of procedures followed in projects.

3.3 Library Research

The following libraries were consulted for the study:

- a) Art Education Library, Faculty of Art, KNUST, Kumasi.
- b) Faculty of Art Library, KNUST, Kumasi.
- c) Main KNUST Library, Kumasi.

3.4 Population for the Study

A population consists of all the subjects a researcher wants to study that comprises all the possible cases (persons, objects, events) that constitute a known whole (Yount, 2006; Mugo, 2002). The two main types of population in research are the target and the accessible population. The target population refers to the entire group of individuals or objects to which researchers are interested in generalizing the conclusions of a research work. The target population usually has varying characteristics. The accessible population is the population in research to which the researcher can apply their conclusions. This population is a subset of the target population and

is also known as the study population. It is from the accessible population that the sample for a study is drawn (Explorable.com, 2009). The target population for this study comprised three categories of respondents: all Art Education students in Ashanti Region, all practising Art teachers in Ashanti Region, and all Art students in Colleges of Education in the Ashanti Region. Time and resource constraints however, limited the accessible population to the 17 postgraduate Art Education students in the Department of General Art Studies in Kwame Nkrumah University of Science and Technology (KNUST) who were admitted to the Master of Philosophy in Art Education programme in the 2013/2014 academic year, 25 practising Art teachers in Primary, Junior High Schools and Senior High Schools in the Kumasi metropolis, as well as 100 Art students in Offinso College of Education.

3.4.1 Sample and Sampling

A sample is a subgroup of a larger group called population and sampling is the process of selecting a group of subjects for a study in such a way that the individuals represent the larger group from which they were selected (Latham, 2007; Yount, 2006; Mugo, 2002; TaylorPowell, 1998). Both purposive and convenience sampling techniques were used to select the sample for the study. Purposive sampling involves selecting members from a population to comprise a sample because they possess specific attributes of interest that address the purpose of a particular research problem under investigation. The selection of a purposive sample is often accomplished by applying expert knowledge of the population to select a sample of elements that represents a cross-section of the population (Battaglia, 2011; Teddlie & Yu, 2004; Ross, 2002). Researchers who use this technique carefully select subjects based on study purpose with the expectation that each participant will provide unique and rich information of value to the study (Suen, Huang & Lee, 2014). A sample of convenience is the terminology used to describe

a sample in which elements have been selected from the population on the basis of their accessibility or convenience to the researcher. This means that convenience sampling involves the selection of the most accessible subjects (Garson, 2012; Battaglia, 2011; Latham, 2007; Teddlie & Yu 2004; UNESCO International Institute for Educational Planning, n.d.).

With respect to this study, purposive sampling was used to select the 17 Art Education students in the Department of General Art Studies in KNUST (where the researcher served as a Graduate Assistant) since they were being trained as Art teachers for secondary and tertiary education, 25 practising Art teachers of Creative Art, the Visual Arts option of Basic Design and Technology and General Knowledge in Art (6 from Primary Schools, 14 from JHS, 5 from SHS) and 100 College of Education Art students who were being trained as generalist teachers for teaching Art in basic schools when they graduate. The target was to train these participants on how they can recycle waste to create instructional resources for teaching. Convenience sampling was also used to select the Art Education students at the Department of General Art Studies, practising Art teachers in Kumasi, and College of Education students from Offinso College of Education because they were the ones who were accessible to the researcher. Convenience sampling was used to select 14 practising Art teachers from nearby schools: Emena Primary School; KNUST, Bomso, Emena and Kentinkrono Junior High Schools; and the KNUST Senior High School. These were selected for testing the sample instructional resources developed for the project.

3.5 Data Collection Instruments

Two data collection instruments were used for the study: participant observation and interview. Because observation brings the investigator into contact in one way or the other, with the phenomenon being studied, it becomes an effective means of recording what is observed more

precisely and with greater reliability (Kumekpor, 2002). Participant observation involves the idea of the researcher being both a spectator and an actor at the same time when observing and recording information. This data collection instrument connects the researcher to the most basic human experience through immersion and participation in the „hows“ and „whys“ of human behaviour in a particular context (Yang, 2013; Kumekpor, 2002). Participant observation was used for the following reasons:

- a) Participant observation was used to collect data during and after the exploration exercise.
- b) Observation made it possible for the researcher to obtain information during the testing of the developed instructional resources.
- c) Participant observation helped the researcher to assume the role of a teacher in training the Art Education students, practising Art teachers and College of Education students the processes of recycling to create instructional resources and to observe and record the responses of students during the training sessions.

Interview is a conversational practice where knowledge is produced through the interaction between an interviewer and an interviewee or a group of interviewees (Moriarty, 2009; Brinkman, 2008). The interviewer collects detailed information from individuals usually in one on one situations using oral questions. The interview is used widely to supplement and extend our knowledge about individual(s) thoughts, feelings and behaviours, meanings, and interpretations (Woods, 2011). The interview method is basically a conversation with a purpose (Woods, 2011). Interview was used because:

- b) It made it possible for the researcher to obtain information from the practising Art teachers who used the resources for teaching and also all the participants who were trained.

3.6 Types of Data

3.6.1 Primary Data

Primary data were collected through participant observation during and after the exploration process and also during the testing and training sessions with the Art Education students, practising Art teachers and College of Education students. Interview was also used to collect primary data after testing the instructional resources and also after the training sessions.

3.6.2 Secondary Information

Secondary information for the project constitute all information collected from books, journals, internet and other literary sources to help in conducting the research.

3.7 Data Collection Procedures

Observation was used to collect data during and after the exploration processes in developing the instructional resources and also from the testing of the developed resources at Emena Primary, Emena JHS, Bomso JHS, Kentinkrono JHS, KNUST JHS, and KNUST SHS. The researcher assumed the role of an active participant and a researcher at the same time to collect data on all the training sessions. See Appendix B for the observation checklists that were used during the testing of the instructional resources and the training sessions.

Interview was also used to collect data from the practising Art teachers after they had used the resources to teach. This was based on the interview guide (see Appendix C) with outlined questions that were posed one after the other to the teachers while the researcher wrote down the responses. Interview was also used to collect data from all the participants who were trained. Questions posed to the participants are listed in Appendix F. The format was the same

for teachers” interviews. All the responses given by the teachers and trained participants were later described, discussed and analysed.

3.8 Development of Sample Instructional Resources

Instructional Design is the very heart of effective teaching and learning. Unless teachers plan and design teaching activities, incidental learning will be the result, and at the end of it all, teachers will fail to do the evaluation of what they have done in class, something which thoroughly depends on clearly set and known objectives which are located in the analysis, the very first step of designing (Ngussa, 2014). “ADDIE” (Bandhana, 2010) is a common acronym for the five major steps in the instructional design process (A = Analysis, D = Design, D = Development, I = Implementation and E = Evaluation) that explains how each step and the various activities that must be considered in each step of the cycle should be carried out. The ADDIE Model of instructional design was adapted for describing the processes and activities followed at each stage of developing the instructional resources from recycling waste materials for effective teaching and learning of Art in basic and secondary education. Details of the various steps in the model are provided in the following sections:

1. Analysis Phase

The target audience for the instructional resources development project were identified to be Primary, Junior and Senior High School Art teachers and their students. The challenge being

addressed is the lack of instructional resources for effective teaching and learning of Art which the teachers have attributed to non-availability of materials and the technical skills to create what they require in their classrooms (Opoku-Asare, 2004). Discussions that were held with Creative Art, Basic Design and Technology (BDT), and General Knowledge in Art (GKA) teachers on their teaching tasks and students' learning needs in these subjects revealed the dire need for appropriate instructional resources. A study of the scope and content of the syllabus for each subject, which revealed the relevant knowledge and skills the students were required to achieve in the three subject areas confirmed the need for basic instructional resources to enable the teachers achieve the curricula objectives. These ideas formed the basis of this intervention project.

2. Designing Stage

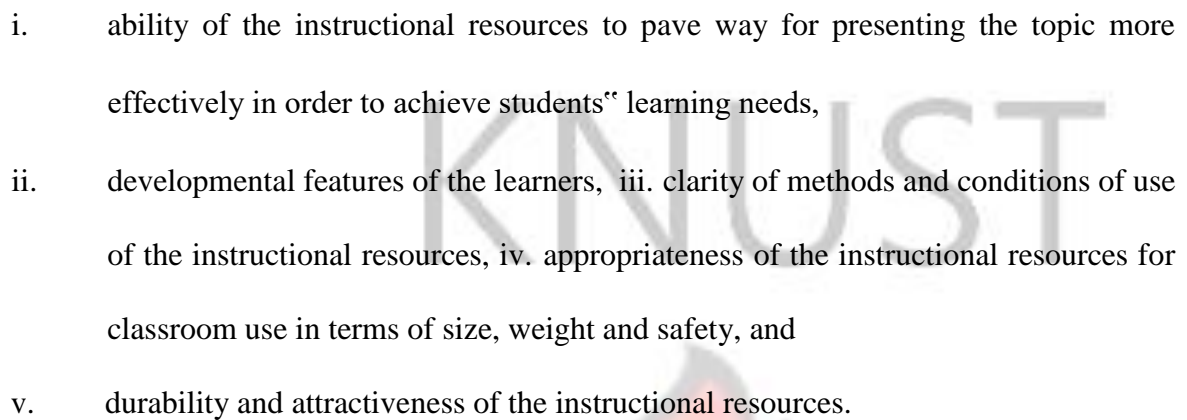
The topics were identified from the syllabi for the three subjects. Designs were done to guide the production of the sample instructional resources described in this project, with a focus on the following topics.

Creative Art: Colour, Elements and Principles of Design, Perspective, Weaving and Stitching, Printmaking, and Construction and Assemblage.

Basic Design and Technology (Visual Art option): Hand papermaking, Colour, Principles of Design, Perspective, Weaving and Stitching, Visual Communication, Printmaking, Construction and Assemblage.

General Knowledge in Art: Colour, Principles of Design, Perspective, Printmaking, and Figure Drawing.

The factors that guided the design of the instructional resources (see Appendix A) include:

- 
- i. ability of the instructional resources to pave way for presenting the topic more effectively in order to achieve students' learning needs,
 - ii. developmental features of the learners, iii. clarity of methods and conditions of use of the instructional resources, iv. appropriateness of the instructional resources for classroom use in terms of size, weight and safety, and
 - v. durability and attractiveness of the instructional resources.

3. Development Phase

The designs created (see Appendix A) were converted into instructional resources using the identified waste materials; mainly fabrics, papers, plastic bottles, cups, bowls, foam and polythene bags. The plastic bottles, cups and bowls collected were cleaned with hot water and soap, and thoroughly dried prior to their use.

4. Implementation Phase

Ascertaining the feasibility of the developed resources involved testing them in teaching and learning situations in the selected Primary, Junior and Senior High Schools. The test involved training the participating Art teachers to use the sample instructional resources while the researcher observed them and recorded the outcomes at the different school and class levels. After using the sample resources to teach, nearly all the Art teachers requested to keep the samples for subsequent lessons.

Knowing that the teachers did not have the technical expertise to replace any samples they would be allowed to keep, they were persuaded to agree to being trained to acquire the relevant knowledge and skills so they could create similar instructional resources to sustain the „recycling spirit“ and classroom use of instructional resources for Art teaching and learning

purposes. Consequently, workshops were organised to train the participating Art teachers in the respective schools, Art Education students in the Department of General Art Studies, and College of Education students from Offinso College of Education to create similar resources using waste materials. The aim was to build the capacity of teachers to teach more effectively from “college-to-school” using basic instructional resources developed from recycled waste materials.

5. Evaluation Phase

Instructional resources must be tested with learners to determine what works and what does not work. Evaluation of the effectiveness of the sample instructional resources that were developed from the project was done by the participating Art teachers in the selected Primary, Junior High and Senior High Schools in Kumasi. At this stage, the participating teachers were observed using the sample instructional resources to teach the outlined topics in their respective schools. The test results were derived both from the observation and reports the teachers gave about lessons they had taught using their normal strategies and the same topics which they taught with the sample instructional resources.

3.8.1 Tools and Materials Used in Developing Sample Instructional Resources 1.

Tools Used



Plate 3.1: Pencil



Plate 3.2: Ruler



Plate 3.3: Cutters

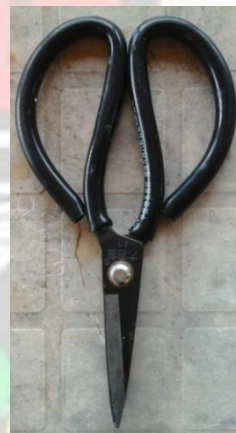


Plate 3.4: A pair of Scissors



Plate 3.5: Spoon



Plate 3.6: Painting brushes



Plate 3.7: A pair of compass

2. Materials Used



Plate 3.8: Polyvinyl alcohol (PVA) glue



Plate 3.9: Super adhesive glue



Plate 3.10: Epoxy steel



Plate 3.11: Acrylic paint



Plate 3.12: Waste fabrics



Plate 3.13: Plastic bottles



Plate 3.14: Plastic cups



Plate 3.15: Polythene bags



Plate 3.16: Sack bags



Plate 3.17: Hard insulation foam from refrigerators



Plate 3.18: Soft foam

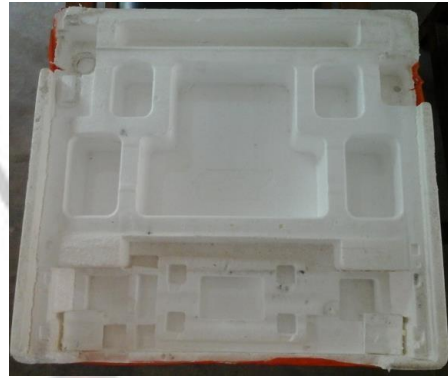


Plate 3.19: Styrofoam



Plate 3.20: Plastic disposable bowl

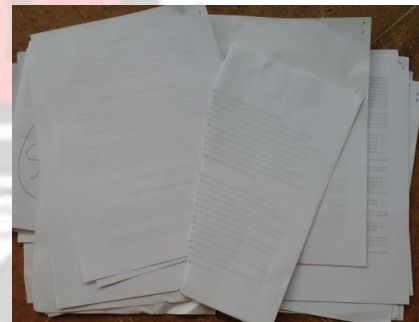


Plate 3.21: White paper



Plate 3.22: Box paper

3.8.2 Physical Properties of the Waste Paper, Plastic and Fabrics Used

1. **Paper:** Both soft and hard papers were used. The soft papers were white, soft to touch, easy to tear and work with. The hard papers were obtained from cartons and boxes. They were hard to touch and very tough to tear.
2. **Plastics:** All the plastic materials used were imperviousness to water, break-resistant, easy to handle, workable, versatile and light in weight. The properties of the different types are described as follows:
 - a. Plastic bottles, cups and bowls: they were smooth to touch and designed differently.
 - b. Hard foam and Styrofoam: they looked weighty but were very light when held and felt very soothing.
 - c. Polythene bags and soft foam: they were elastic and soft to tear.
 - d. Sacks: they were flexible, easy to bend and manipulate.
3. **Fabrics:** All the fabrics were thin, lightweight, and had different designs, textures and colours.

3.8.3 Procedures for Developing Sample Resources

This section describes the various steps taken to develop the sample instructional resources for teaching various topics using the tools and materials listed in section 3.8.1.

1. Resources for Teaching ‘Hand Papermaking’

The main materials used were old cotton fabrics collected from friends and waste papers also gathered from various offices were shredded into smaller pieces separately for processing. Already harvested stalks of the paper mulberry plant, which grows widely around Offinso in the Ashanti Region of Ghana, were processed by boiling the bark with caustic soda on open fire

to get it soft to remove the inner barks, which were cut into tiny pieces like the waste paper and fabrics for pulping. As Yeboah (2012) intimates, paper mulberry bark contains high cellulosic content which helps paper pulp to bind together easily. The pulping was done by taking about 50% of waste paper and 50% of mulberry bark and adding about 1.5litres of water to it and pulping with an electric blender until the mixture became smooth. The pulped paper and paper mulberry bark was poured into a pan with about 25 litres of water. The mixture was then shaken vigorously by the use of the hand to obtain an even consistency, after which a mould and deckle was used to scoop some of the pulp onto the mould. The pulp on the mould was then couched onto a metal plate by squeezing excess water from the sheet through the back of the mould, after which the mould was removed and the wet paper was allowed to dry. Plate 3.23 illustrates the scooping and couching process. The same process was followed with the pieces of cut fabrics and mulberry bark.



Plate 3.23: Scooping and couching processes

2. Resources for Teaching ‘Colour’

a. Resources for Primary School

Resources for teaching „primary colours” were created by painting plastic bottles with acrylic paints in the primary colours of red, yellow and blue and allowing them to dry. Resources for

teaching „secondary colours“, „tertiary colours“ and „intermediate colours“ were created by dividing plastic bottles equally into three parts vertically and applying the primary colours mixed to obtain a secondary colour at the top and bottom of the bottle and applying the secondary that will be obtained at the middle. Likewise secondary colours were painted at the top and bottom of plastic bottles and the resulting tertiary colour in the middle. Also secondary colours were painted at the bottom of plastic bottles with a primary colour at the top and the resulting intermediate applied at the middle. The bottles were painted with a spoon and a brush and dried in the sun. See pictures on some of the production processes at Plate 3.24.



Plate 3.24: Applying paint on bottles and drying them

b. Resources for Teaching ‘Colour’ in Junior and Senior High School

Resources for teaching lessons on primary, secondary, tertiary and the intermediate colours were created by applying the primary, secondary, tertiary and intermediate colours on plastic bottles with acrylic paints using a spoon. Instead of applying three colours on one bottle, one colour was applied to one plastic bottle. Here, the tops of the plastic bottles were removed and glued to a small round plastic tyre, so that the coloured bottles could be screwed into the tops on the tyre to form a colour wheel, which can be removed and screw back in different arrangements for teaching. See Plate 3.25 for some of the production processes.



Plate 3.25: Applying paint on bottles and drying them

3. Resources for Teaching ‘Perspective’

a. Resources for Primary School

Resources for teaching one and aerial or colour perspective were created with same designed plastic bottles glued onto box paper. For both one and colour perspective the bottles were used to create two parallel lines with one vanishing point. With eight bottles on each side, the bottles were measured and cut to make each bottle taller than the one that came before it by 2cm. For the colour perspective, the bottles were painted with acrylic paint by reducing the intensity of the colour from the second bottle to the vanishing point. See Plate 3.26 for some pictures on the production.



Plate 3.26: Gluing the plastic bottles on the box paper
b. Resources for Teaching ‘Perspective’ in Junior and Senior High School

The instructional resource for teaching colour perspective described above was also used for this category of students. For two point perspective, plastic bottles were glued on a box paper in a “V” like shape with seven bottles on each side showing two vanishing points with one bottle in the middle. The seven sets of bottles were measured and cut to make each bottle 2.5cm taller than the one that came before it. The resource for teaching three point perspective was also designed with a „V“ turned upside-down „^“ like shape. This was designed with one middle bottle with seven bottles on each side. This time, the bottles were measured and cut in a slanted mode to make each bottle taller than the one that came before it by 2cm. The cut bottles were glued on a box paper to obtain three vanishing points, one at the top and two on the sides. Plate 3.27 show some pictures on the production.



Plate 3.27: Gluing the bottles on the box paper

4. Resources for Teaching ‘Figure Drawing’

The male and female figures were carved out of the pieces of hard insulation foam that were removed from old refrigerators. The pieces of foam were glued together to get the desired

thickness and sizes of the foam to carve the parts of the male and female human figures. The head length for both figures measured 6.5 inches, and so from the shoulder to the waist were two head lengths, the upper legs and lower legs also had two head lengths each; the upper and lower hands had one and half head lengths, with the feet and palms also having one head lengths each for both the male and female figures. The figures were modelled after the human figures. Plate 3.28 shows some of the carving process.



Plate: 3.28: Carving the bust and lower leg of the female figure using the hard foam

5. Resources for Teaching ‘Elements and Principles of Design’

a. Resources for Primary School

Resource for Teaching ‘Dots’: different fabrics with which dots have been used to create designs in them were collected, cut into different shapes and glued on a piece of box paper for teaching. Plate 3.29 shows a picture on the production.



Plate 3.29: Gluing the dotted fabrics on the box paper

Resource for Teaching ‘Lines’: different types of lines were drawn on pieces of fabrics by cutting out the drawn lines from the fabrics and gluing them on a box paper for teaching. Plate 3.30 shows a picture on the production.



Plate 3.30: Gluing the cut lines on a box paper

Resource for Teaching ‘Shape and Form’: geometric forms with shapes embedded in them were carved out of the hard foam found in old refrigerators, together with collected objects with forms and shapes embedded in them were glued onto a box paper. Pieces of irregular cut fabrics were also pasted on the forms for teaching. Plate 3.31 shows a picture on the production.



Plate 3.31: Gluing forms on box paper

Resource for Teaching ‘Value’: acrylic paint was used to paint a butterfly in three tones on a box paper for teaching value.

Resource for Teaching ‘Texture’: two resources were created for teaching texture. For the first one, plastic bottles were cut into pieces and glued onto a box paper, likewise a piece of box paper was cut out and the first layer removed and this piece was also pasted onto the box paper with white glue. Again, three different pieces of waste fabrics that looked textured, but in actual fact were smooth, were also pasted onto the box paper. For the second resource for teaching on texture, actual and visual textures were depicted in the form of a butterfly, with pieces of fabrics, three strands plaiting with polythene bags and cut pieces from plastic bottles on a paper box. Plate 3.32 show pictures on the two processes.



Plate 3.32: Production process of the resources on texture

Resource for Teaching ‘Space and Proportion’: plastic bowl and polythene bag were used to create a big question mark as against a small question mark on a box paper for teaching proper space utilisation and proportion.

Resource for Teaching ‘Repetition’: red and blue plastic bottle tops were arranged in threes repeatedly on a box paper which had the first layer removed and white glue applied on the surface. Plate 3.33 illustrates the processes described.



Plate 3.33: Gluing the bottle tops on the box paper

Resource for Teaching ‘Variety’: this was created with waste plastic cups, by cutting some of the cups to reduce the cups to various lengths and sizes. Fabrics with different colours and patterns were then used to cover some of the cups and glued on a box paper. Plate 3.34 shows a picture on the production.



Plate 3.34: Covered and uncovered plastic cups glued on a box paper

Resource for Teaching ‘Contrast’: contrast in terms of patterns, shapes, textures and colours were created with fabrics by cutting and gluing them onto a box paper. Plate 3.35 illustrates the processes described.



Plate 3.35: Gluing the cut fabrics on the box paper

Resource for Teaching ‘Balance’: the paper roll inside toilet rolls were arranged and glued onto a box paper to communicate symmetrical and asymmetrical balance. Plate 3.36 shows a picture on the production.



Plate 3.36: Glued paper roll on box paper

b. Resources for Teaching ‘Principles of Design’ in Junior and Senior High School

Resource for Teaching ‘Balance’: cut out fabrics with soft foam glued beneath them were arranged and glued on a box paper to communicate symmetrical and asymmetrical balance.

Plate 3.37 shows a picture on the process.



Plate 3.37: Cut fabrics and soft foam

Resource for Teaching ‘Movement, Rhythm and Repetition’: two resources were created. With the first one two different plastic bottles with blue and red colour bottle tops were cut into two, with the blue coloured bottle tops made taller than the red coloured bottle tops. The top part of the cut pieces were then arranged in the order of one short bottle and one tall bottle in five rolls and glued onto a box paper. To place more emphasis on movement, one line of the blue top bottles were covered with green fabrics. The second work was made with strands of black polythene bags and white fabrics by arranging them in a circle and gluing them on a box paper with one long strand of black polythene and two short strands of white fabrics in that order. Plate 3.38 illustrates the processes described above.



Plate 3.38: Production process of resource on movement, rhythm and repetition

Resource for Teaching ‘Unity’: flower patterns from pieces of fabrics were cut and used to create a design to communicate unity by gluing them on a box paper. Plate 3.39 shows pictures on the production.



Plate 3.39: Production process of resource on unity

Resource for Teaching ‘Harmony’: yellow, green and yellow green fabric pieces were combined to create a design to communicate colour harmony on a box paper. Plate 3.40 shows a picture on the production.



Plate 3.40: Cut fabrics to be glued

Resource for Teaching ‘Emphasis’: seven plain waste plastic cups with same height were glued on a box paper in a circle. Then a longer cup than the seven was covered with an orange fabric and placed in the middle of the seven cups for it to stand out. Plate 3.41 illustrates the production process.



Plate 3.41: Gluing plastic cups on a box paper

Resource for Teaching ‘contrast’: acrylic paint was used to paint a sphere, in three shades on a box paper and contrasting coloured fabrics were used to make designs on the box paper for teaching.

Resource for Teaching ‘Dominance’: red and blue plastic bottle tops were glued in six vertical lines on a box paper with the red tops making four of the lines in the middle and the blue tops making the two remaining lines on the sides.

Resource for Teaching ‘Variety’: a waste fabric with different colours, shapes, patterns and designs was glued on a box paper for teaching.

6. Creating Instructional Resources for Teaching ‘Weaving and Stitching’

a. Resources for Primary and Junior High School

Weaving: plain, check, twill and satin off-loom weaves were made with rice sack. The rice sack was used as both warp and weft yarns. The rice sack was used as warp yarns by measuring and cutting the sack into joined strands which acted as the foundation which another set of cut individual sack strands (weft yarns) were used to interlace the warp yarns to develop the plain, check, twill and satin weaves for teaching. Plate: 3.42 shows pictures on the process described.



Plate 3.42: Production process on weaving

Stitching: a piece of fabric was fringed and different kinds of stitches were made on other pieces of fabrics and stitched onto the fringed fabric. Some stitches were also done straight onto the fringed fabric using strands from a sack bag as thread.

Plaiting: fabrics and polythene bags were cut into strands and used to do two, three, four, five, six and seven strands plaiting.

Two strands plaiting: black and white polythene bags were twisted together to form the two strands plaiting.

Three strands plaiting: three strands of black and white polythene bags were plaited by repeatedly placing the left and right strands under the middle strand.

Four strands plaiting: four strands of three strands plaiting were plaited by dividing the strands into two with two strands on the left and two on the right. The last strand on the left was placed under the next strand and then added to the two strands on the right for it to be three strands on the right with one on the left. The last strand on the right was placed under and over the next two and then added to the left strand for it to be two. With this there would be two strands on the left and two strands on the right and the process was repeated to get the four strands plaited teaching resource.

Five strands plaiting: five strands of three strands plaiting were plaited by dividing the strands into two with three strands on the left and two on the right. The third strand on the left was placed over and under the next two and joined with the two on the right to make it three. With this the third strand on the right was also placed over and under the next two and joined to the two strands on the left, making it three strands on the left and two on the right. The process was repeated to develop the resource.

Six strands plaiting: six strands of three strands plaiting were plaited by dividing the strands into two with four strands on the left and two on the right. Then the fourth strand on the left was placed over and under the next three and joined to the two on the right for it to be three strands on each side. Afterwards the third strand on the right was placed under and over the next two and joined to the three strands on the left to make four strands on the left and two on the right. The process was repeated to create the six strands plaiting.

Seven strands plaiting: seven strands of three strands plaiting were plaited by dividing the strands into two with four strands on the left and three on the right. The fourth strand on the left was placed over and under the next three and joined to the three strands on the right to make it four. The fourth (last) strand from the right was placed over and under the next three and joined to the three strands on the left to make four strands on the left and three on the right. The process was repeated to form the seven strands plaiting resource.

The 3-strands plaiting technique using fabrics and polythene bags were also stitched to form a coil for teaching plaiting and stitching to form a coil.

Knotting: polythene bags were cut into strands and used to create two and three strands knotting.

Two strands knotting: two of three strands plaiting were knotted by placing the right one around the left one and knotting and placing the left one around the right one and knotting. The process was repeated to develop the resource.

Three strands knotting: three of three strands plaiting were knotted by placing the left strand over the middle one and placing the right strand under the middle one, and knotting the left and right strands. Then the left strand was placed under the middle one and the right strand over the middle one after which the left and right strands were also knotted. The process was repeated to create the three strand knotting resource.

Lacing: holes measuring 2inches apart were created on a cut out box paper and three strands plaited fabric was used to do different lacing styles through the holes for teaching lacing.

Plate: 3.43 show a picture on the process.



Plate 3.43: Lacing with 3-strands plaited fabric on box paper

7. Creating Instructional Resources for Teaching ‘Visual Communication’

Instructional resources that were developed focused on the teaching of spacing, arrangement, readability, appropriate use of working surface, emphasis of important points with colour (colour theory), images and symbols for communicating visually. The resources were created by working on themes such as recycling, child abuse and corruption. Drawings based on these themes were made on box paper after which pieces of fabric, paper and plastic scraps were glued on the drawings to bring out the various concepts. Plate 3.44 shows some pictures on the production.



Plate 3.44: Gluing cut fabrics and polythene bags on drawings on a box paper

8. Creating Instructional Resources for Teaching 'Printmaking'

Block or Relief printing: hard insulation foam removed from old refrigerators and Styrofoam were carved in relief blocks for teaching these topics. Plate 3.45 shows some pictures of these.



Plate 3.45: Carving relief blocks from Styrofoam and hard insulation foam

Intaglio printing: like the block printing, hard insulation foam and Styrofoam were used for teaching intaglio designs by carving out the positive parts of the designs so the designs show as negative spaces below the surface of the Styrofoam and hard insulation foam as seen in Plate 3.46.



Plate 3.46: Carving out intaglio designs from Styrofoam

Stencil printing: disposable plastic bowls were used to create stencils by drawing on and then cutting out the designs from the bowls. Plate 3.47 illustrates the process.



Plate 3.47: Cutting out stencil design from plastic bowl

Screen printing: this was created by drawing a design on a lining fabric and gluing a black polythene bag to cover the negative parts, for the positive parts to stand out. See Plate 3.48 for illustration.



Plate: 3.48: Gluing polythene bags on lining fabric to cover the negative parts

9. Creating Instructional Resources for Teaching ‘Construction and Assemblage’

a. Resources for Primary School

Construction of ‘Forms’: this was done by creating different forms out of box papers using drawing, folding and gluing.

Construction of ‘Desk Organiser’: this was done by cutting off the upper part of three plastic bottles, wrapping the edges with fabrics and then gluing the three bottles together.

Plate 3.49 shows the process.



Plate 3.49: Gluing fabrics on plastic bottles and bottles together

Construction of ‘Flower Vase’: this was created with plastic bottles in two different ways. With the first one, the upper part of the bottle was cut off and a zigzag design made on the cut edge. For the second one, the upper part of the bottle was cut off but the cut edge was cut up

into smaller strips. The strips were coiled using scissors after which acrylic paint was applied to the coiled strips as shown in Plate 3.50.



Plate 3.50: Painting plastic strips

Construction of ‘Artificial Flowers’: for this, plastic bottles were cut out into bigger strips about two inches wide while the edges were cut into smaller strips. The smaller strips were coiled using scissors and acrylic paint was applied on them as shown in Plate 3.51.



Plate 3.51: Painting coiled plastic strips

Construction of ‘Suggestion House’: this was done with a plastic bottle. After cutting the upper part of the bottle, a cone shaped box paper was used to cover the bottle to create a „house“. An opening was cut on the bottle as a door through which suggestions could be dropped into the bottle while a small hole was also created to enable the user to hang the

„suggestion house“.

Construction of ‘Picture Frame’: the picture frame was created with box paper. Plastic bottles were cut into smaller pieces to decorate the edges of the frame while a piece of box paper provided a stand at the back. Plate 3.52 shows this.



Plate 3.52: Gluing the box paper and cut plastics to form the frame

Construction of ‘Paper File’: a box paper was cut out and glued together to create a file as shown in Plate 3.53.



Plate: 3.53: Making file out of box paper

Construction of ‘Wall Clock’: waste plastic bottle, plastic bottle tops, waste papers and fabrics were used to create a wall clock that had a plastic bottle as the base of the clock and bottle tops, paper and fabrics to represent the numbers on the clock (see Plate 3.54).



Plate 3.54: Developing the clock

Construction of ‘Artificial Buildings’: cut plastic bottles and waste paper cones were used to create artificial buildings. The buildings were arranged and glued on box paper to depict northern Ghana settlements as seen in Plate 3.55.



Plate 3.55: Cut plastic buildings glued on box paper

Construction of ‘Model Bag’: box paper was cut out and glued together to create a model bag for holding teaching materials as shown in Plate 3.56.



Plate 3.56: Developing the Model bag

b. Resources for Junior High School

Construction of ‘Decorative Piece’: Styrofoam, paper box and fabrics were used to create a late afternoon scene for decorative purposes as seen in Plate 3.57.



Plate 3.57: Creating decorative piece resource

Construction of ‘Jewellery Shelf’: ten (10) cut plastic bottles with fabrics fixed on the edges were glued together to form a shelf. Plate 3.58 shows its production.

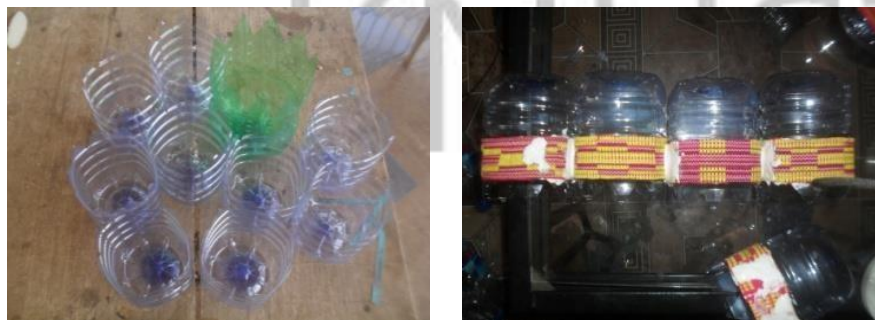


Plate 3.58: Producing jewellery shelf

Construction of an item useful for Community or School: cut plastic bottle tops, fabrics and box paper were glued together to create a visual communicative piece with the message written on the box paper. Plate 3.59 shows the production process.



Plate 3.59: Gluing plastic bottle tops on the written alphabets

3.9 Testing the Developed Instructional Resources

The developed resources meant for Primary School were tested in at least one Lower Primary and / or one Upper Primary classes. The resources meant for Junior and Senior High Schools were also tested in the Forms One or Two classes respectively.

1. **‘Hand Papermaking’**: the sample handmade papers were tested with Form Two pupils of Bomso and KNUST Junior High Schools. The topic for both lessons was „hand papermaking“. Testing started with both sets of pupils being shown sample handmade papers produced from waste fabrics to enable them examine them to know how they look like. The teachers then informed the pupils about the materials and the processes used in making those papers. The teachers then demonstrated the production process to the pupils and asked them to make their own samples as shown at Plate 3.60.



Plate 3.60: Bomso and KNUST teachers coaching their pupils

2. **‘Colour’**: the sample „Colour“ resources were tested at Emena Primary School in a lesson on „colour mixing“ in Primary Four. The sample resource was shown in class to help the pupils to identify „primary colours“ as individuals were called to the front of the class to pick bottles that represented the primary colours. Afterwards the resources were used by the teacher

to teach the pupils how primary colours are mixed to obtain secondary colours as seen from Plate 3.61.



Plate 3.61: Teacher using sample resources to teach 'colour'

The testing of the sample „Colour“ resources also took place at KNUST JHS for lessons on „principles of colour“ in six Form One classes. The teacher first showed the resources to the pupils and explained how to obtain the six and twelve point colour wheel as well as obtain tertiary colours from mixing two secondary colours. Plate 3.62 illustrates some test lessons.



Plate 3.62: Teacher and pupils using ‘colour’ resources in KNUST JHS lesson

„Colour” resources were also used in teaching a lesson on „colour theory” to Form One students at KNUST SHS. The sample 12-point colour resource was used to explain how to create and how to use the colour wheel to explain colour terminologies like intermediate, analogous, complimentary and triad colours. Plate 3.63 show pictures on the lesson.



Plate 3.63: Teacher using ‘colour’ resources in KNUST SHS

3. **‘Perspective’:** the „one point” and „colour perspective” resources were used to explain the two concepts to class Six pupils at Emena Primary School. This involved the teacher calling the pupils to examine the resources in order to answer questions while she explained the concept of „one point” and „colour perspective” to make sure the pupils had understood what they were being taught. Plate 3.64 show pictures on the lesson.



Plate 3.64: Teacher using ‘perspective’ resources for lesson

Another testing of the „Perspective“ resources occurred at KNUST JHS where they were used to teach the concept of „one-, two-, three-point and colour perspective“ to six Form One classes. The sample resources were used by the teacher as examples to explain the concepts to the pupils. See Plate 3.65 for some lessons.



Plate 3.65: Teacher using ‘perspective’ resources at KNUST JHS

Another testing of the sample „Perspective“ resources occurred at KNUST SHS where the teacher used them to explain the concepts of „one-, two- and aerial perspective“ to the students as shown in Plate 3.66.



Plate 3.66: Teacher using the resources on ‘perspective’ at KNUST SHS

4. **‘Figure Drawing’:** testing of the sample „Figure Drawing“ resources occurred at KNUST SHS where the teacher used them to teach Form Two students to draw the human figure. Testing involved the teacher picking the respective parts of the carved human figure and showing them to the students while telling them how the human parts are supposed to look like. The various parts of the model were used by the teacher to help the students identify each part and to also demonstrate how the parts fitted together to create the human form. The teacher also had the students draw the parts of the human figure. After drawing the parts, the teacher showed the students how to use the head length to measure the length of the human figure and to also fix the parts together so they would get a good idea of how to represent the figure proportionately when drawing. The resource was also used for the students to recognise the difference between parts of the male and female figures. See Plate 3.67 for pictures on the lesson.



Plate 3.67: Teacher using ‘figure drawing’ resources at KNUST SHS

5. **‘Elements and Principles of Design’:** testing of the sample resources on „Elements and Principles of Design“ occurred at Emena Primary School where they were used to teach Primary Five pupils how to use the elements of design according to the principles to design patterns to develop a piece of cloth. The teacher used the resources to explain the various elements and principles of design to the pupils as they were shown how to use the principles to organise the elements to create patterns. Plate 3.68 shows parts of the lesson.



Plate 3.68: Teacher using ‘elements and principles of design’ resources

Another testing occurred at KNUST JHS where the resources on „Principles of Design“ were used to explain the various principles of design to Form One pupils in six classes. Plate 3.69 show pictures on the lessons.



Plate 3.69: Teacher using ‘principles of design’ resources at KNUST JHS

Another lesson in principles of design occurred at KNUST SHS where the sample resources were used to explain the principles of design to Form One students. Plate 3.70 show aspects of the lesson.



Plate 3.70: Teacher using the ‘principles’ resources at KNUST SHS

6. **‘Weaving and Stitching’:** testing of the sample resources on „Weaving“ took place at Emena Primary School where the resources were used to teach plain weaving to pupils in Class One. The sample was shown and discussed with the pupils. The resources also served as

examples to guide the pupils to learn how to do the plain weaving. Plate 3.71 shows aspects of this lesson.



Plate 3.71: Teacher using sample resource on 'plain weaving'

Testing of the „Weaving“ resources was also done in Class Six at Emena Primary School where the pupils were taught the processes involved in plain weaving and how to use the woven piece to create an item. Plate 3.72 shows the resource testing.



Plate 3.72: Teacher using resource on 'plain weaving' and pupils working in twos

The sample „Weaving“ resources were also tested at Kentinkrono JHS to Form Two pupils where the teacher used them for teaching „twill weaving“ and the pupils were asked to use the technique to create a wall hanging as shown in Plate 3.73.



Plate 3.73: Teacher using ‘twill weave’ resource at Kentinkrono JHS with pupils working

‘Stitching’

Testing of the „Stitching“ resource occurred in Class Two at Emena Primary School for teaching the pupils how to do „running“ and „back stitches“. Plate 3.74 shows aspects of the lessons.



Plate 3.74: Teacher using ‘stitching’ resource at Emena Primary with the pupils working

Testing of the „Stitching“ resources also occurred in Class Four of Emena Primary School where the teacher used them to show the pupils how to create decorative designs in a fabric by stitching. After showing the sample resource to the pupils, the teacher explained how decorative stitches are made on fabrics to the pupils. She then made the pupils draw designs in pieces of

fabrics they were given before teaching the pupils the technique of stitching on their designs.

Plate 3.75 shows parts of the lesson.



Plate 3.75: Teacher showing ‘motif stitching’ resource during lesson with Emena Primary Four pupils working

The sample resources on „Stitching“ were also used to teach Class Six pupils at Emena School how to make basic and decorative stitches. The pupils were then made to practise the making of designs and items using the variety of stitches they had been taught using the sample instructional resources.

‘Plaiting’

The „three strands plaiting“ resource was used to teach „three strands plaiting“ to Class Two pupils at Emena Primary School. The teacher first showed the resource to the pupils and then explained what it was to them. Referring to the resource, the teacher demonstrated the procedure for creating the three strands plaiting to the pupils for them to see and refer to in making their plait works. Plate 3.76 shows aspects of the lesson.



Plate 3.76: Emena Primary Two teacher using ‘3-strands plaiting’ resource with pupils

Also in Class Four at Emena Primary School, the „four strands plaiting“ resource was used to teach „four strands plaiting“. The resource was shown and explained to the pupils. Afterwards the teacher taught the pupils how to do the plaiting using four strands. Plate 3.77 shows this.



Plate 3.77: Teaching and learning of ‘4-strands plaiting’ in Emena Primary Four ‘Lacing’

Test of the „Lacing“ resources occurred at Emena Primary School where the teacher used them to teach „lacing“ to Class One pupils. After explaining what „lacing“ is to the pupils, the teacher referred to the sample resources to teach the pupils how to do lacing. Plate 3.78 shows aspects of the lesson.



Plate 3.78: Teaching and learning with sample ‘lacing’ resource at Emena Primary School

7. **‘Visual Communication’:** the resources were tested at KNUST JHS Forms 2 and 3 where the teacher had already taught the Form 3 pupils on „visual communication“ at this evaluation phase of the project. The teacher however, agreed to test the sample instructional resources by teaching a revision lesson on the same topic again with the Form 3 pupils. His reason was that “With the previous lessons the teaching was done in an abstract form, the pupils did not get to see samples or anything about what they were taught”. In the revision lesson based on the sample resources, the teacher showed the Form 3 pupils the resources and allowed them to examine and pass comments on them in relation to what they had been taught already under „visual communication“. For the Form 2 lesson, the resources were used to teach „layout designing, the qualities of a good poster, and visual communication“. Plate 3.79 shows aspects of the lessons.



Plate 3.79: Teaching and learning with sample ‘visual communication’ resources at KNUST JHS

8. **‘Printmaking’:** the sample „Printmaking“ resources were tested at Emena Primary School and involved the teacher using stencils to teach Class Two pupils „colour dabbing“ printmaking via stencil. The resources were shown to the pupils and used to teach them how to make a stencil and use it for colour dabbing activity. Plate 3.80 shows parts of the lesson.



Plate 3.80: Teaching and learning with sample ‘stencil printmaking’ resource at Emena Primary School

The sample resources on printing were also tested at Emena Primary Six where they were used to explain the process involved in relief and stencil printing to the pupils. The pupils were also engaged to do practical works to practise the processes of relief and stencil printing.

Another testing of the „Printmaking“ resources occurred at KNUST JHS where the teacher taught the „types of printing“ and the processes involved to Form Two pupils. Plate 3.81 show parts of the lesson.

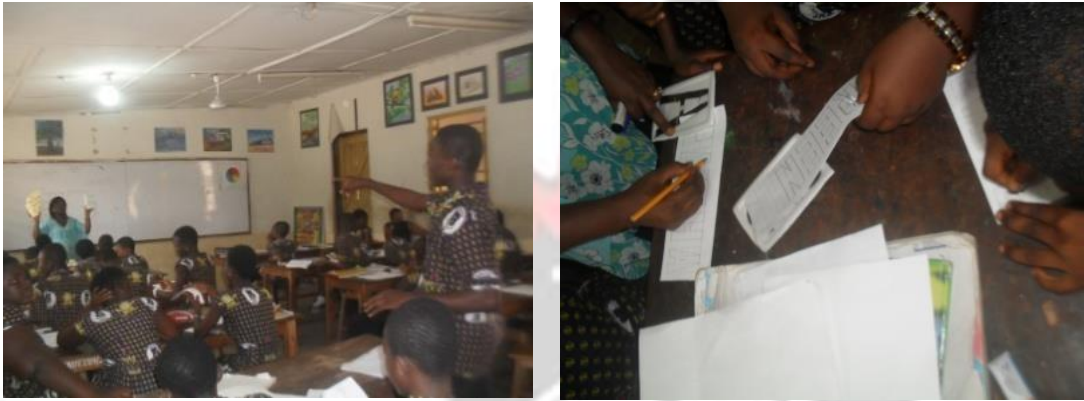


Plate 3.81: Teacher using the ‘printing’ resources in teaching at KNUST JHS

The „Printmaking“ resources were again tested at KNUST SHS where the sample printing resources were used to teach the „types of printing“ to two Form Two classes as shown in Plate 3.82.

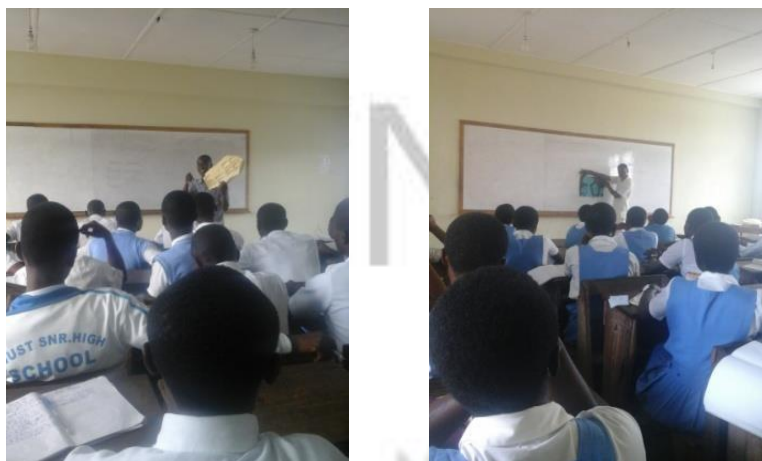


Plate 3.82: Teaching and learning with ‘printing’ resources at KNUST SHS

9. ‘Construction and Assemblage’

At Emena Primary School the sample „desk organiser“ instructional resource was used to teach Class Two pupils how to make a desk container in a lesson on „construction and assemblage“. After showing it to the pupils and explaining what it was, the teacher demonstrated the construction process to them and engaged the pupils to create samples in groups. Plate 3.83 shows some aspects of the lesson.



Plate 3.83: Teaching and learning with sample ‘desk organiser’ resource at Emena Primary School

The sample „model bag“ instructional resource was tested in Class Six at Emena Primary but before the teacher could use it for the lesson, it was realised that one of her pupils had created his version of the bag and brought it to class upon seeing the „model bag“. Instead of teaching the same thing to the pupils, the teacher rather tasked the rest of the class to explore the resource and create their own model bags.

The sample „construction and assemblage“ instructional resources were also used to teach Emena JHS pupils how to construct useful things for school and personal use. Based on the resources the teacher taught the pupils how to create a communicative wall hanging for the school library and a jewellery shelf for personal use. Plate 3.84 show scenes of the lesson.

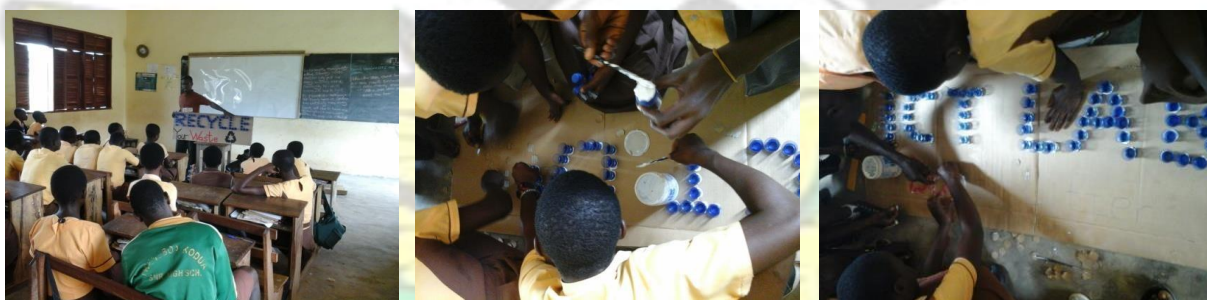


Plate 3.84: Teaching and learning with ‘construction and assemblage’ resources at Emena JHS

3.10 Phase 3: The Training Sessions

The processes followed in designing and developing the sample instructional resources were taught to Art Education students at the Department of General Art Studies in KNUST, practising Art teachers in selected Primary, Junior and Senior High schools in Kumasi, and Art students in Offinso College of Education based on planned instructions adapted from the

Teacher Educators Handbook for Instruction Planning (2011). The instructional plans were also informed by Dale's Cone of Experience, Active Learning, and Multiple Intelligences theories of learning (Ramadhan, 2012; Felder & Brent, 2009; Fierros, 2004; Prince, 2004; Anderson, n.d). Knowledge of Dale's Cone of Experience and Active Learning strategies were adapted for planning the instructions to make the training more visual and practical so the participants can easily grasp what would be taught. The premise, according to the Cone of Learning Experience, is that the more practical and activity based a lesson is, the higher probability for students to remember more of what they are taught as illustrated in Figure 3.1.



Dale's Cone of Experience

Figure 3.1: The Cone of Learning Experience

Source: by Bilash (2011)

Gardner's (1983) theory of Multiple Intelligences was also used in planning the training instructions in order to include the different intelligences of the multiple identities of

participants to be involved in the training. Figure 3.2 shows a graphical illustration of the multiple intelligences theory. See Appendix D for the planned instructions.

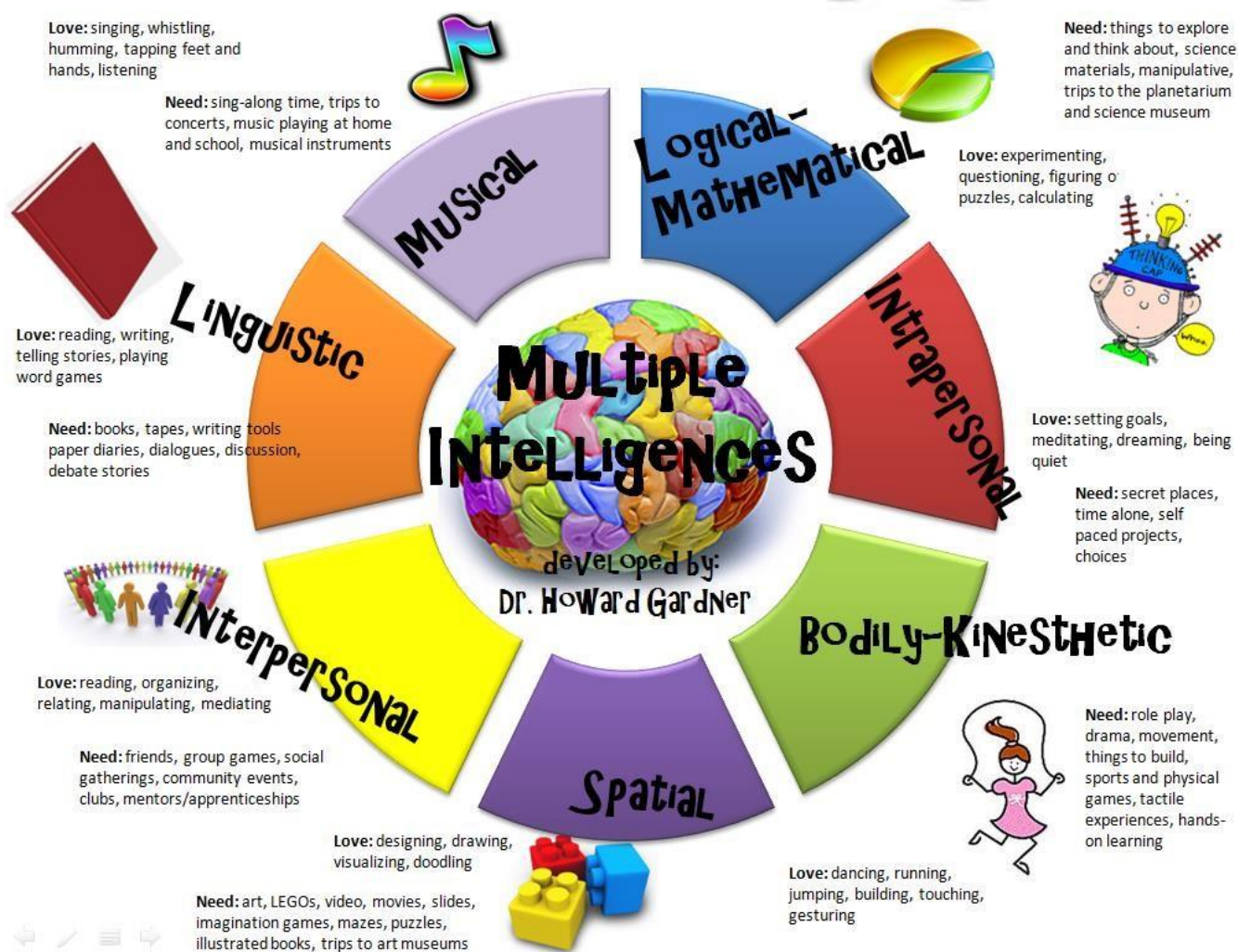


Figure 3.2: Multiple Intelligences Theory

Source: by onlinelearningtips.com

According to Levlin et al. (2010), the key to any recycling programme is participation which is influenced greatly by intrinsic rewards that fulfil a person's need to have a positive impact on their world. Consequently, the three categories of Art practitioners selected for training were

informed about the benefits of waste recycling to the environment and education prior to the start of the training sessions, which took place at different times and in different places. The training of Art Education students was held from 17th October 2013 to 27th March 2014 at the General Art Studies Department KNUST; the session for practising Art teachers' papermaking training was held on 27th November 2010 and continued from 1st November 2014 to 8th January 2015 at their various schools and homes; the session for the College of Education students followed from 21st November 2014 to 19th January 2015 at the Vocational Department in Offinso College of Education (The College students were trained together with their Art teacher). The goals of the training sessions were:

- Training participants to create resources for teaching „hand papermaking“.
- Training participants to create resources for teaching „elements and principles of design“.
- Training participants to create resources for teaching „colour“.
- Training participants to create resources for teaching „weaving and stitching“.
- Training participants to create resources for teaching „printmaking“.
- Training participants to create resources for teaching „visual communication“.
- Training participants to create resources for teaching „perspective“.
- Training participants to create resources for teaching „figure drawing“.
- Training participants to create resources for teaching „construction and assemblage“.

To avoid repetition of procedures in reporting on the three training sessions, the individual training sessions have been combined since the same instruction plans were used. The unique instances that transpired during the respective training sessions have however, been mentioned in the presentation.

1. Training on how to Create Resources for Teaching ‘Hand Papermaking’ at JHS

Objectives for the Session: 1) To teach participants how to produce useful handmade papers from waste cotton fabrics and waste papers. 2) To make the participants experiment with drawing and painting mediums of their choice on the papers produced.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Intrapersonal and Spatial

Delivery:

1. Participants were shown the researcher-made samples of handmade papers produced from paper and fabric wastes with different drawing and painting mediums tested on them. This involved receiving Verbal and Visual information.
2. Participants were taken through practical processes in processing waste cotton fabrics, waste papers and paper mulberry inner bark to produce handmade papers for teaching at Junior High School (Watch Demonstration under Dale’s Cone of Experience).
3. Participants were asked to produce samples of paper using cotton waste fabrics and waste papers (Participate in Hands-On Activity/Do the Real Thing - Dale’s Cone of Experience). This was an Active Learning strategy.
4. Participants were asked to experiment with drawing and painting mediums on the handmade papers (exercise of Intrapersonal and Spatial intelligences).

Plate 3.85 shows the training sessions with Art Education students, the practising Art teachers, and College of Education students in that order. This order of arrangement for the Plates is same for the rest of the training sessions.



Plate 3.85: Researcher training participants to make handmade papers

2. Training Participants to Create Resources for Teaching ‘Elements and Principles of Design’ (Primary to SHS)

Objectives for the Session: 1) To teach participants to produce useful instructional resources for teaching the „elements and principles of design“. 2) To guide participants to discuss and use available waste materials to produce samples of instructional resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal, Linguistic and Intrapersonal **Delivery:**

1. Researcher made samples of instructional resources for teaching „elements and principles of design“ using waste fabrics, box paper, plastic bottles, plastic bottle tops, hard foam, plastic cups and polythene bags were made available to the participants to see and have a feel of it.
2. Researcher explained how the resources were developed based on the concepts that underlie the various elements and principles of design. This exercise covered Visual and Verbal Receiving on the Cone of Experience.

3. Participants were taught how to use the identified waste materials to produce instructional resources for teaching the „elements and principles of design“ from Primary level to Senior High School (Watch a Demonstration, under Dale's Cone of Experience).
4. Participants were provided waste fabrics, box paper, plastic bottles, plastic bottle tops, hard foam, plastic cups and polythene bags to also discuss and produce samples of the resources. The Active Learning strategy involved the Art Education and College students in developing their own samples in groups while the practising Art teachers worked individually (exercise of Intrapersonal intelligence) during the training session. Making the real things that they were taught (Participate in Hands-On Activity/Do The Real Thing – Dale's Cone of Experience). The Art Education and College students utilised Interpersonal and Linguistic intelligences in producing and explaining their resources. For class assignment, the Art Education students made use of Intrapersonal intelligence to create individual resources for teaching the „elements and principles of design“ from waste materials that were available to them after the training session. Plate 3.86 illustrate the training sessions.



Plate 3.86: Researcher training participants to make resources for teaching ‘elements and principles of design’

The remaining training sessions can be found at Appendix E.



environments. The presentation has been done according to the research objectives specified for the study.

4.2 Objective 1a: To explore and recycle paper, plastic and fabric wastes to create instructional resources for teaching selected topics in Creative Art, Basic Design and Technology, and General Knowledge in Art.

It must be emphasised here that the waste paper, plastics and fabrics collected for the project were recycled in the sense of turning them into sample instructional resources to demonstrate to Art teachers at different levels of education that it is possible to turn waste in the local environment into useable products to promote creative teaching and learning of Creative Art, Basic Design and Technology (BDT) and General Knowledge in Art at little or no cost. As Opoku-Asare and Yeboah (2013) and Aggarwal (2010) have indicated, recycling implies taking materials from products that one has finished using and trying to make new products out of them. This involves processing used materials into products to prevent waste of potentially useful materials, in this case producing instructional resources to satisfy curriculum requirements in Primary, Junior High and Senior High Schools respectively. The sample instructional resources developed are presented in this section.

4.2.1 Resources for Teaching ‘Hand Papermaking’

It was observed that the dried sheets from waste papers (see Plate 4.1) were not very crisp but felt soft to the touch and could bend easily when held from one end in mid-air. Papers made from cotton fabrics produced very thin and crisp sheets. Plate 4.2 shows samples of sheets of paper produced from waste cotton fabrics.

Table 4.1: The Developed „Hand Papermaking“ Resources and the Educational Levels they

would serve

Level	Topic	Developed Resources
Junior High	Hand Papermaking	Handmade papers from cotton fabrics and paper

Table 4.2: Unit of Syllabus that the Developed „Hand Papermaking“ Resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
BDT	JHS 2	Unit 1, Section 4: Papermaking	The pupil will be able to: 4.1.1: recycle/make paper with available local materials



Plate 4.1: Dried waste paper sheets
4.2.2 Resources for Teaching ‘Colour’



Plate 4.2: Dried cotton sheets

Plates 4.3 - 4.10 show samples of instructional resources developed for teaching „Colour“. These very attractive, colourful and durable resources provide accurate visual interpretations of the various colour categorizations. The painted bottles fixed on the small tyre can be removed and rearranged to suit any concept of colour a teacher wants to teach. This easy-toconstruct and dismantle approach to the developed resources can foster and sustain the interest of all categories of students in any lesson on colour.

Table 4.3: The Developed „Colour“ Resources and the Educational Levels they would serve

Level	Topic	Developed Resources
Primary	Colour	Plastic bottles painted with primary colours
		Plastic bottles painted with primary and secondary colours
		Plastic bottles painted with secondary and tertiary colours
		Plastic bottles painted with primary, secondary and intermediate colours
Junior and Senior High	Colour	3-point colour wheel (plastic bottles)
		6-point wheel (plastic bottles) for secondary colours
		6-point wheel (plastic bottles) for tertiary colours
		12-point wheel (plastic bottles)

Table 4.4: Units of Syllabus that the Developed „Colour“ Resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
Creative Art	Primary 4, Term 3	Unit 1, Section 1 : Colour Mixing and Application	The pupil will be able to: 1.1.1 mix colours and paint pictures. Mixing primary colours to get secondary colours
BDT	SHS 1	Unit 2, Section 3: Colour work	The pupil will be able to: 3.2.4 mix the primary colours to form the six-point colour wheel 3.2.5 paint the colours to form the six-point colour wheel 3.2.6 use the colour wheel to explain colour terminologies
GKA	SHS 1	Unit 1, Section 2: iii. Exploring with Colour vi. Colour Terminology	The students will be able to: 2.1.5 mix colours and state the outcomes through exploration 2.1.8 explain colour terms

1. Sample Resources for Teaching 'Colour' in Primary School



Plate 4.3: Resource for teaching 'primary colours'



Plate 4.4: Resource for teaching 'secondary colours'



**Plate 4.5: Resource for teaching
‘tertiary colours’**



**Plate 4.6: Resource for teaching
‘intermediate colours’**



2. Resources for Teaching ‘Colour’ in Junior and Senior High School

**Plate 4.7: Resource for teaching
‘primary colours’**



**Plate 4.8: Resource for teaching the ‘six point
colour wheel’**



**Plate 4.9: Resource for teaching
‘tertiary colours’**

**Plate 4.10: Resource for teaching the ‘twelve
point colour wheel’**

4.2.3 Resources for Teaching ‘Perspective’

As shown in Plates 4.11- 4.14, the developed instructional resources on „Perspective“ have aesthetic appeal, can clearly communicate the intended information, foster and sustain interest in lessons on perspective at all educational levels.

Table 4.5: The Developed „Perspective“ Resources and the Educational Levels they would

serve

Level	Topic	Developed Resources
Primary	Perspective	1-point perspective (plastic bottles)
		Colour perspective (plastic bottles)
Junior and Senior High	Perspective	1-point and colour perspective (plastic bottles)
		2-point perspective (plastic bottles)
		3-point perspective (plastic bottles)

Table 4.6: Units of Syllabus that the Developed „Perspective“ Resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
Creative Art	Primary 6, Term 3	Unit 1, Section 1: Making Pictures, Drawing and Colour work	The pupil will be able to: 1.1.1 draw and paint a picture using basic concept of perspective.
BDT	SHS 1	Unit 1, Section 2: Pictorial Drawing in Perspective	The pupil will be able to: 2.1.9 explain the principles of perspective drawing 2.1.10 draw objects in perspective using: . Single-point . Two-point

GKA	SHS 1	Unit 4, Section 3: i. Perspective	The student will be able to: 3.4.1 explain perspective 3.4.2 compose artworks to depict the three principles of perspective: . One-point perspective . Two-point perspective . Aerial, colour or atmospheric perspective.
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1. Resources for Teaching ‘Perspective’ in Primary School



Plate 4.11: Resources for teaching ‘one point and colour perspective’

Resources

2. for Teaching 'Perspective' in Junior and Senior High School



Plate 4.12: Resource for teaching 'one point and colour perspective'



Plate 4.13: Resource for teaching 'two point perspective'



Plate 4.14: Resource for teaching 'three point perspective'

Resources

4.3.4 for Teaching 'Figure Drawing'

Carved out of lightweight insulation foam, the resources developed for teaching „Figure Drawing“ were light enough to be moved around very easily for teaching and learning purposes.

The parts of the female and male figures were not fixed permanently so parts of the resources can be removed for teaching lessons on specific parts of the human figure; the parts can also be held together with metal wire for relevant lessons. The resources communicate their intended message. Plates 4.15 - 4.16 show the resources developed for teaching „figure drawing“.

Table 4.7: The Developed „Figure Drawing“ Resources and the Educational Levels they would serve

Level	Topic	Developed Resources
Senior High	Figure Drawing	Male figure carved from hard foam
		Female figure carved from hard foam

Table 4.8: Units of Syllabus that the Developed „Figure Drawing“ Resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
GKA	SHS 2	Unit 6, Section 4: ii. Figure Drawing	The student will be able to: 3.6.2 draw the human figure proportionately

Resources

1. for Teaching 'Figure Drawing' in Senior High School



Plate 4.15: Resource for teaching the 'male figure'



Plate 4.16: Resource for teaching the ‘female figure’

4.3.5 Resources for Teaching ‘Elements and Principles of Design’

All the developed resources were simple and very practical for teaching and learning the elements and principles of design listed in Table 4.9. They looked attractive, very durable and were not bulky to move around. They also conveyed the intended „elements and principles“ very explicitly. Plates 4.17 – 4.34 shows samples of the developed instructional resources.

Table 4.9: The Developed „Elements and Principles of Design“ Resources and the Educational Levels they would serve

Level	Topic	Developed Resources
Primary	Elements and Principles of Design	Fabric collage on Dots
		Fabric collage on Lines
		Fabric collage on Texture
		Paper, foam and plastic collage on Shapes and Forms
		Painting on Value
		Collage of polythene bags for Space and proportion
		Collage of bottle tops for Repetition
		Toilet roll collage for Symmetrical Balance
		Toilet roll collage for Asymmetrical Balance
		Fabric collage for Contrast
		Collage of plastic cups and fabrics for Variety
Junior and Senior High	Principles of Design	Fabric collage for Symmetrical Balance
		Fabric collage for Asymmetrical Balance
		Plastic bottle collage for Movement, Rhythm and Repetition
		Fabric and Polythene bag collage for Movement, Rhythm and Repetition
		Fabric collage for Unity
		Fabric collage for Harmony
		Painted and fabric collage for Contrast
		Bottle top collage for Dominance
		Plastic cup and fabric collage for Emphasis
		Fabric collage for Variety

Table 4.10: Units of Syllabus that the Developed „Elements and Principles of Design“ resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
Creative Art	Primary 5, Term 1	Unit 2, Section 1: Pattern Making, Print Making, and Lettering	The pupil will be able to: 1.2.1 create a pattern using elements and principle of design.
BDT	JHS 1	Unit 1, Section 3: Principles of Design	The pupil will be able to: 3.1.4 describe the principles of design in nature and man-made environment 3.1.5 organise the elements according to principles of design
GKA	SHS 1	Unit 2, Section 2: Principles of Design	The students will be able to: 2.2.1 explain the principles of design 2.2.2 organise the elements according to principles of design.

1. Resources for Teaching ‘Elements and Principles of Design’ in Primary School



Plate 4.17: Resource on ‘dot’



Plate 4.18: Resource on ‘line’



Plate 4.19: Resources on 'texture'

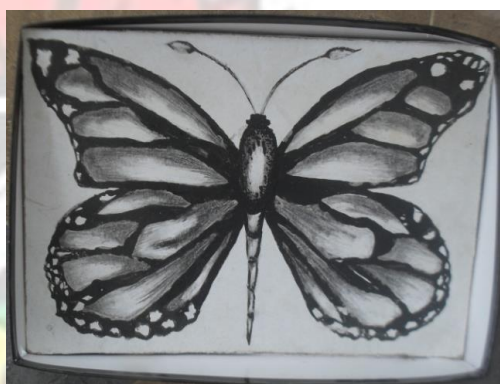


Plate 4.20: Resource on 'shapes and forms'

Plate 4.21: Resource on 'value'



Plate 4.22: Resource on 'space and proportion'

Plate 4.23: Resource on 'repetition'



Plate 4.24: Resources on ‘symmetrical and asymmetrical balance’

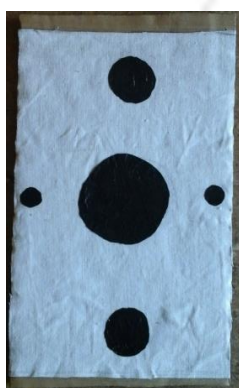


Plate 4.25: Resources on ‘contrast’



Plate 4.26: Resource on ‘variety’

2. Resources for Teaching ‘Principles of Design’ in Junior and Senior High School



Plate 4.27: Resources on ‘symmetrical and asymmetrical balance’



Plate 4.28: Resources on ‘movement, rhythm and repetition’



Plate 4.29: Resource on ‘unity’



Plate 4.30: Resource on ‘harmony’



Plate 4.31: Resource on ‘contrast’



Plate 4.32: Resource on ‘dominance’



Plate 4.33: Resource on ‘emphasis’



Plate 4.34: Resource on ‘variety’

4.3.6 Resources for Teaching ‘Weaving and Stitching’

The set of instructional resources developed for „Weaving and Stitching“ were practical and communicated the intended information well. They looked visually appealing, were durable and easy to handle for teaching and learning purposes. Plates 4.35 – 4.52 show samples of the developed instructional resources.

Table 4.11: The Developed „Weaving and Stitching“ Resources and the Educational Levels they would serve

Level	Topic	Developed Resources
Primary and Junior High	Weaving and stitching	Plain weaves from plastic sack
		Twill weaves from plastic sack
		Satin weaves from plastic sack
		Types of stitches and appliqué on fabrics
		Fabric collage on seams
		Plaiting and knotting from plastics and fabrics
		Plaiting stitching and coiling from plastics and fabrics
		Paper lacing with fabric

Table 4.12: Units of Syllabus that the Developed „Weaving and Stitching“ Resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
Creative Art	Primary 1	Unit 4, Section 2: Weaving and Stitching	The pupil will be able to:
	Term 1	Weaving and Lacing	2.4.1 make simple items by weaving and lacing
	Term 2	Check weaving with 2 strands (over 2 and under 2)	2.4.1 make an item by weaving.
		Plait/twist with 2 strands	2.4.2 demonstrating skills

			<p>in plaiting/twisting with flexible materials/strands into a rope.</p> <p>2.4.1 make a plain weave with yarns on card loom.</p>
	Term 3		
	Primary 2		
	Term 1	Plaiting three strands	<p>2.4.1 plait and finish an item using three(3) strands into a rope.</p> <p>2.4.4 measure and fringe the edges of his/her material.</p>
	Term 2	Fringing	<p>2.4.1 work tacking stitches (long, short and even).</p> <p>2.4.2 work running stitches.</p>
	Term 3	Fringing	<p>2.4.1 work simple decorative stitches</p> <p>2.4.2 make a mat from a plaited item.</p>
	Primary 3	Coiling, Plaiting and Stitching.	
	Term 1	Knotting	<p>2.4.1 make simple knots using yarns.</p>

			2.4.2 measure and fringe two short
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			ends of a flat article.
	Term 2	Coiling and Stitching	2.4.3 design and make a simple container by weaving or coiling and stitching.
	Term 3	Plaiting.	2.4.1 plait with four strands into an item.
		Embroidery Stitching	2.4.2 work embroidery stitches on their motifs or secure it by appliqué to their articles.
	Primary 4		
	Term 1		2.4.1 make a plaited item with five (5) strands.
	Term 2		2.4.1 design and make items by coiling and stitching using an appropriate technique.
	Term 3	Embroidery (Handkerchief)	2.4.3 design and work simple motifs in a handkerchief with embroidery stitches.
		Weaving and Knotting with different Techniques and Materials.	2.4.4 make an item by weaving and knotting.
	Primary 5		
	Term 2	Sewing and Finishing a	2.4.2 sew and finish a bag by using back

		Bag French Seam	stitches and a French seam.
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	Primary 6 Term I	<p>Back stitches Decorative stitches Appliqué</p> <p>Designing and Making of Items by Stitching</p>	<p>2.4.3 design and make simple decorations on his/her bag using either appliqué or embroidery stitches.</p> <p>2.4.1 design and use appropriate techniques and materials to make an item by weaving, coiling, plaiting, knotting</p> <p>2.4.2 design and make an item e.g. apron</p>
BDT	<p>JHS 1</p> <p>JHS 2</p> <p>JHS 3</p>	<p>Unit 3, Section 2: Weaving and Stitching</p> <p>Designing and Making Items</p> <p>Unit 1, Section 2: Off Loom Weaving</p> <p>Unit 1, Section 2: Combination of Techniques and Materials to Make Items</p>	<p>The pupil will be able to:</p> <p>2.3.1 design and make an item to satisfy a need by using appropriate tools, equipment and materials (off-loom/hand weaving, plaiting, coiling, stitching and knotting)</p> <p>2.1.1. design and create an item to satisfy a need in the community using appropriate skills (weaving, plaiting coiling and knotting), tools and materials</p> <p>2.1.1 design and make items with a combination of techniques (weaving, coiling, stitching, plaiting, knotting,), tools and materials.</p>



1. Resources for Teaching ‘weaving and stitching’ in Primary and Junior High

School

‘Weaving’



Plate 4.35: Resource for plain weave



Plate 4.36: Resource for double plain weave



Plate 4.37: Resource for check weave



Plate 4.38: Resource for 2:1 twill weave



Plate 4.39: Resource for 2:2 right twill weave



Plate 4.40: Resource for 3:1 left twill weave



Plate 4.41: Resource for herring bone twill weave



Plate 4.42 Resource for diamond twill weave

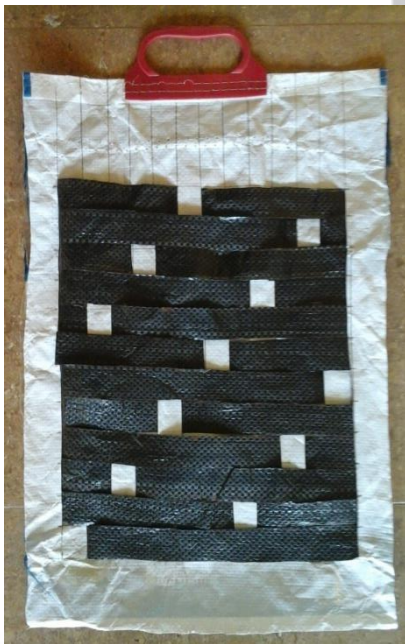


Plate 4.43: Resource for 12 end satin weave (weft faced)



Plate 4.44: Resource for 12 end satin weave (warp faced)

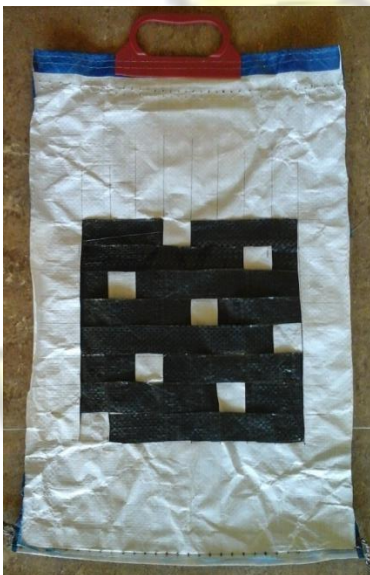


Plate 4.45: Resource for 8 end satin Weave (weft faced)

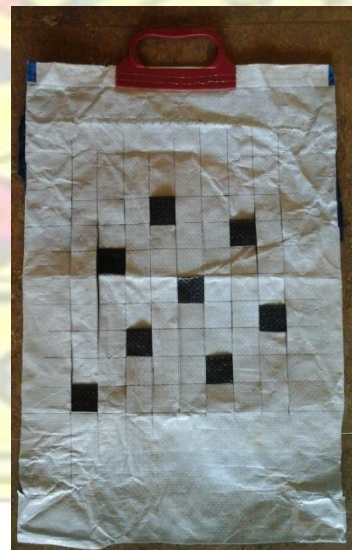


Plate 4.46: Resource for 8 end satin weave (warp faced) 'Stitching'



Plate 4.47: Resources for teaching ‘stitching and appliqué’



Plate 4.48: Resources for teaching ‘seams’

‘Plaiting, Knotting and Lacing’



Plate 4.49: Resources for teaching 2, 3, 4, 5, 6, 7 strands plaiting



Plate 4.50: Resources for teaching plaiting and stitching into a coil



Plate 4.51: Resources for teaching 2 and 3 strands knotting



Plate 4.52: Resources for teaching 'lacing'

4.3.7 Resources for Teaching 'Visual Communication'

The produced resources conveyed the intended information clearly. All the resources were aesthetically appealing and practical for teaching and learning. Since the resources were all on flat surfaces they can be conveniently packed on top of each other and moved around for teaching. Plates 4.53 – 4.56 show samples of the developed resources.

Table 4.13: The Developed „Visual Communication“ Resources and the Educational Levels they would serve

Level	Topic	Developed Resources
Junior High	Visual Communication	Collage of fabrics for teaching spacing, arrangement and readability in visual communication
		Fabric and plastic collage for teaching appropriate use of working area, emphasizing on important areas and words in visual communication
		Fabric collage on colour theory, combining symbols and text in visual communication
		Fabric collage on communicating visually without text

Table 4.14: Units of Syllabus that the Developed „Visual Communication“ Resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
BDT	JHS 1	Unit 3, Section 1: Making Items by Composing	The pupil will be able to: 1.3.1 compose and make a picture to communicate ideas and messages for a purpose 1.3.2 make an item by using knowledge and techniques in layout designing, spacing and freehand lettering
		Layout Designing, Lettering and Spacing	
	JHS 2	Unit 1, Section 1: Designing and Making Items to Communicate	
	JHS 3	Unit 1, Section 1: Designing and Making Items to Solve a National Problem	1.1.1 design and make an item to communicate an idea, message for a specific purpose in the community 1.1.1 design and make an item/picture to satisfy a national need

1. Resources for Teaching ‘Visual Communication’ in Junior High School



Plate 4.53: Resources for teaching spacing, arrangement and readability in visual communication

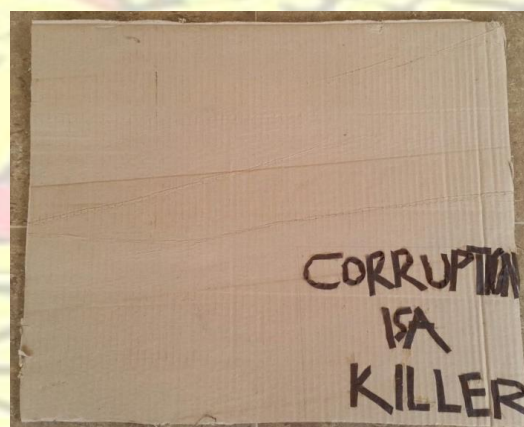


Plate 4.54: Resources for teaching appropriate utilisation of working area and emphasis on important areas and words when communicating visually



Plate 4.55: Resource for teaching colour theory and how to combine symbols and text to communicate visually



Plate 4.56: Resource for teaching how to communicate visually without text

4.3.8 Resources for Teaching ‘Printmaking’

These sets of resources vividly illustrate the types of „printing“ techniques. They were very visible, neat and easy to carry for teaching and learning. The carved designs had sharp edges and stencil cut were very sharp. Plate 4.57 - 4.62 show samples of the developed resources.

Table 4.15: The Developed „Printmaking“ Resources and the Educational Levels they would serve

Level	Topic	Developed Resources
Primary	Printmaking	Simple relief blocks from Styrofoam and hard foam
		Simple stencils from disposable bowls
Junior and Senior High	Printmaking	Relief blocks from Styrofoam and hard foam
		Intaglio carvings from Styrofoam and hard foam
		Stencils from disposable bowls
		Developed screen from polythene bags and fabric

Table 4.16: Units of Syllabus that the Developed „Printmaking“ Resources would serve

Subject	Level	Unit of Syllabus	Specific Objectives
Creative Art	Primary 2	Unit 2, Section 1: Pattern and Printmaking	The pupil will be able to:
	Term 1	Colour Dabbing	2.1.3 make patterns using the dabbing and stenciling techniques
	Primary 6 Term 3		1.2.1. design and create patterns in a fabric using appropriate techniques
BDT	JHS 2	Unit 2, Section 5: Block Printing, Motif Design and Arrangement	The pupil will be able to: 5.2.1 design and print fabric and leather using the block printing technique
		Stencil Lacquer	5.2.2 design and print fabric and leather using stenciling and lacquering techniques
GKA	SHS 2	Unit 4, Section 3: Printmaking ii. Block Printing iii. Screen Printing	The students will be able to: 3.4.3 design and print with a block. 3.4.4 describe the types of screen printing process 3.4.6 make prints using screen printing technology.

1. Resources for Teaching ‘Printmaking’ in Primary School



Plate 4.57: Resources for teaching ‘block or relief printing’



Plate 4.58: Resources for teaching ‘stencil printing’

2. Resources for Teaching ‘Printmaking’ in Junior and Senior High School



Plate 4.59: Resources for teaching ‘block or relief printing’



Plate 4.60: Resources for teaching ‘intaglio printing’



Plate 4.61: Resources for teaching ‘stencil printing’



Plate 4.62: Resource for teaching ‘screen printing’

4.3.9 Resources for Teaching ‘Construction and Assemblage’

The resources were attractive and very creative for teaching and learning purposes. Plate 4.63 - 4.75 shows samples of the developed resources.

Table 4.17: The Developed „Construction and Assemblage“ Resources and the Educational Levels they would serve

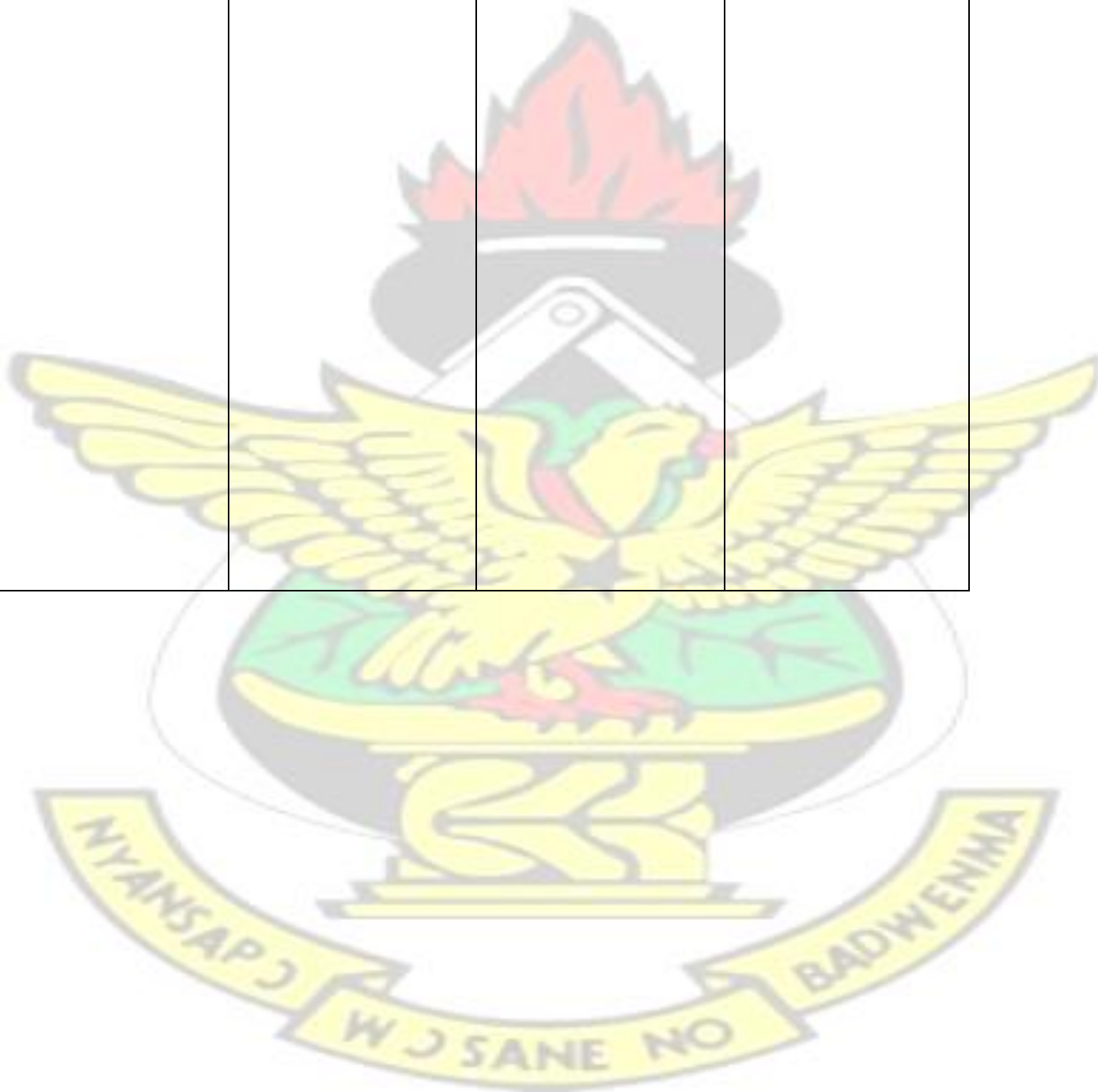
Level	Topic	Developed Resources
Primary	Construction and Assemblage	Forms
		Desk organiser from plastic bottles and fabrics
		Flower vase and artificial flowers from plastic bottles
		Suggestion house from plastic bottle and paper
		Picture frame from papers and pieces of plastic bottles

		Paper file
		Plastic bottle wall clock
		Buildings from plastic bottles and paper
		Model bag from paper and fabrics
Junior High	Construction and Assemblage	Decorative piece from Styrofoam, paper and fabric
		Jewellery shelf from plastic bottles and fabrics
		Communicative piece from plastic bottles, fabrics, and paper

Table 4.18: Units of Syllabus that the Developed „Construction and Assemblage“ Resources would serve

	Level/Section	Unit	Specific Objectives
Creative Art	Primary 1	Unit 6, Section 2:	<p>The pupil will be able to:</p> <p>2.6.1 construct simple forms/ items with different materials and techniques.</p> <p>2.6.1 construct and assemble simple items with basic skills.</p> <p>2.6.1 make a decorative toy or item by construction and assemblage.</p> <p>2.6.1 design, make and decorate items with appropriate tools materials and techniques</p> <p>2.6.1 make toy</p>
	Term 1	Cutting, Folding and Pasting/Joining, etc.	
	Term 2	Cutting, Wrapping and Gluing, etc.	
	Primary 2 Term 2	Decorative wall clocks	
	Term 3		
	Primary 3 Term 2	Toy vehicles/gadgets.	

KNUST



	Primary 4 Term 1	Designing and Modelling Items from Memory, Imagination and Experience.	vehicles or gadgets with a variety of materials. 2.6.1 design, make and decorate an item by construction and assemblage.
	Term 2	Functional and Decorative Items from Memory, Imagination and Experience.	2.6.1 use appropriate tools and materials to make decorative and functional items by construction and assemblage.
	Primary 5 Term 1	Functional and Decorative Items	2.6.1 use a variety of materials and techniques to make a functional and decorative item.
	Primary 6 Term 3		2.6.1 design and make simple models with appropriate techniques tools and materials
BDT	JHS 1	Unit 3, Section 4: Designing and Making Items	The pupil will be able to: 4.3.1 design and make a decorative and functional item for individual purpose
	JHS 2	Unit 3, Section 4: Construction and Assemblage of a System	4.3.1 design and make a system to satisfy a need in the community by construction and assemblage

1. Resources for Teaching ‘Construction and Assemblage’ in Primary School



Plate 4.63: Resource for making ‘forms’



Plate 4.64: Resource for making ‘desk organiser’



Plate 4.65: Resources for making ‘flower vase’



**Plate 4.66: Resource for making
„artificial flowers’**



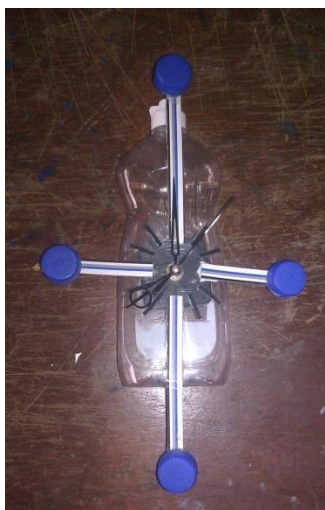
**Plate 4.67: Resource for making ‘suggestion
house’**



**Plate 4.68: Resource for making
„picture frame’**



Plate 4.69: Resource for making ‘paper file’



**Plate 4.70: Resource for making
'wall clock'**



Plate 4.71: Resource for creating 'buildings'



Plate 4.72: Resource for creating 'model bags'

2. Resources for Teaching ‘Construction and Assemblage’ in Junior High School



**Plate 4.73: Resource for making
‘decorative piece’**



**Plate 4.74: Resource for making
‘jewellery shelf’**



Plate 4.75: Resource for teaching making useful items for the community and school

4.4 Findings for Objective 1b: To evaluate the effectiveness of the developed instructional resources by testing them in schools at the Primary, Junior High School (JHS) and Senior High School (SHS) levels.

It must be noted here again that the developed resources meant for Primary School were tested in at least one Lower Primary and / or one Upper Primary classes. The resources meant for Junior and Senior High Schools were also tested in the Forms One or Two classes respectively.

4.3.1 Results of Testing Sample Resources

1. ‘Hand Papermaking’ Resources in Bomso and KNUST JHS

The Bomso JHS teacher reported that his pupils present during the hand papermaking lesson were eager to take their turn in making their papers and every pupil made sure his or her paper came out well. According to him, the pupils who had their turn first in making their papers helped their peers who were yet to make their sheets. This teacher added that some pupils confessed they never knew that paper could be made that easily. His colleague teachers also visited her classroom to witness the papermaking exercise (personal communication, February 28, 2011).

The teacher who tested the „Hand Papermaking“ resources in KNUST JHS commented that her pupils actively participated in the hand papermaking process and every pupil present made sure he or she made one sheet of paper. The pupils were very excited about the whole process and some took home already prepared pulps, with the intention of trying their hands on the papermaking process at home. Her conclusion was “In general, the papermaking process was a good exercise the pupils encountered” (personal communication, March 08, 2011).

Both teachers from Bomso and KNUST JHS made mention that they did not encounter any challenges with the process and in the use of the instructional resources. They also expressed that previously they were not teaching this topic because they did not know the processes

involved in hand papermaking and they also did not have any sample instructional resources to guide the teaching of this lesson (personal communication, February 28, 2011 and March 08, 2011). Plates 4.76 – 4.77 show samples of pupils' works.



Plate 4.76: Bomso teacher and pupils monitoring drying handmade papers



Plate 4.77: KNUST pupils appreciating their artworks on their handmade papers

2. 'Colour' Resources

At Emena Primary School, the teacher reported that the sample instructional resources on „Colour“ made it easy for her to teach a lesson on „colour mixing“. She explained that because the resource enabled her to show the real colours she was talking about to the pupils and also

allowed the pupils to see the real colours being mentioned, the resources helped the pupils to easily grasp what she taught them. “Using the instructional resources ensured higher concentration and participation by the pupils during the lesson”. According to this teacher, the resources made the pupils to understand what they were taught under „colour mixing“ because all the pupils were able to use the resources to identify the primary colours. They could also mention the primary colours that could be mixed to obtain the secondary colours and were able to mix the primary colours they were given to obtain secondary colours. According to her, “Using the resources in teaching made the pupils understand the lesson much better than previously that I taught without any resources. Previously after teaching the lesson only about half of the pupils in the class could explain the process of mixing primary colours to result in secondary colours but with the resources as examples, all the pupils were able to do so excellently; the instructional resources were appropriate for teaching the lesson” (personal communication, June 17, 2014).

According to the KNUST JHS teacher, the use of the resources on „Colour“ helped the pupils to identify colours and how other colours are derived by mixing some colours. His comments were “The resources on tertiary colours helped the pupils to know how the various colours were derived from the secondary colours, which previously I would only use words to explain verbally or by writing details on the white board. The 12-point colour wheel enabled the pupils to know the intermediate colours that fall between the primary and secondary colours. The resources made the lessons easier and interesting with the pupils experiencing the reality of colours that were explained to them. This made them understand what was taught more than when teaching was done without any resources. The pupils were able to answer the verbal questions that were asked during the lessons very well to show their understanding, which also

reflected in the practical artworks they produced as against works from previous lessons that were taught without any instructional resources. The resources on „Colour“ were suitable for teaching lessons on colour” (personal communication, February 18, 2014). Plates 4.78 and 4.79 respectively show sample artworks produced by pupils after being taught „colour“ with and without instructional resources.



Plate 4.78: Sample practical works on 12-point colour wheel by pupils who were taught with the instructional resources

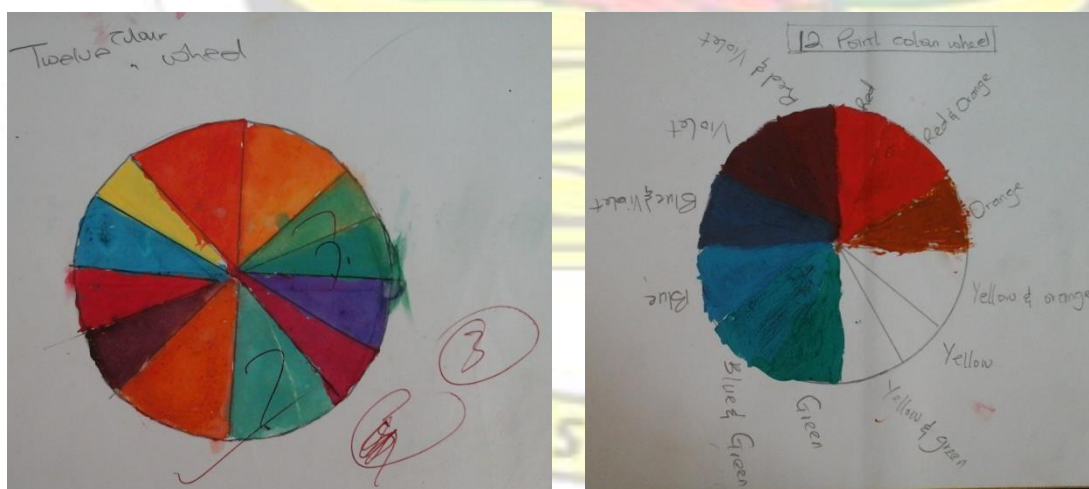


Plate 4.79: Sample practical works on the 12-point colour wheel by pupils who were taught without instructional resources

In KNUST SHS, the teacher reported that the sample resources made it very easy to teach the lesson on „colour theory“. The resources made the lesson tangible and very practical because the students had opportunity to see and have a feel of what was taught and provided the needed explanations to be done easily. This teacher indicated that “Without the resources in teaching this topic, the teaching becomes abstract and since Art is a practical subject, it has to go with realistic resources like what was provided for the lesson. Without such practical resources it is very difficult explaining concepts in a lesson for students to comprehend. Teaching without instructional resources takes 3 periods to teach the lesson, but with the resources 2 periods was used in teaching the lesson”. The teacher reported that from a test that the students took at the end of the lesson which was marked out of 20 marks, all the students scored between 16 and 19 marks out of 20 with only one person scoring 12. According to this teacher, in previous lessons taught without instructional resources, a test on the lesson saw students scoring between 10 and 15 marks, which meant the use of the sample resources improved the students’ performance. This confirmed the teacher’s response that the sample instructional resources were appropriate for the lesson (personal communication, May 13, and June 09, 2014).

3. ‘Perspective’ Resources

At Emena Primary School, the teacher reported that “The resources made me confident and bold to present a more concrete lesson. The instructional resources made it easy to explain the concepts to the pupils, which made the lesson more real. There was no need taking the pupils out of the classroom to use things like the road for further explanation on perspective. The use

of the resources made the pupils to pay attention and concentrate on the lesson, which was more interactive and very interesting as the pupils were aided to interact with the instructional resources and also to ask and answer questions. A test on the lesson which was marked over 15 showed that out of 38 pupils, 15 pupils scored 100% (15/15), 20 pupils got 12 out of 15 and 3 pupils scored 9 out of 15. Without the use of instructional resources I could not explain the concepts very well and the pupils were not able to comprehend what I taught them. This situation did not make the pupils able to answer questions that they were asked during the lessons. The resources worked perfectly and must be maintained” (personal communication, May 30, 2014). Plate 4.80 – 4.81 show sample practical works produced by pupils who were taught with and without the instructional resources respectively.



Plate 4.80: Sample practical works on one-point perspective by pupils who were taught with the instructional resources

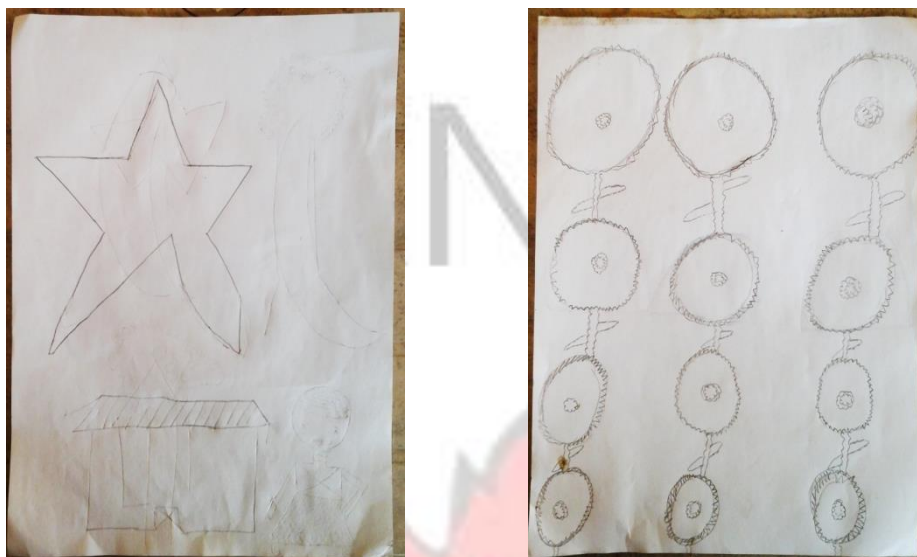


Plate 4.81: Sample practical works on one-point perspective by pupils who were taught without instructional resources

In KNUST JHS, the teacher reported that “The instructional resources aided in the pupils’ understanding of the concepts of perspective because the resources explained and addressed the reality of the concepts in perspective. Previously I taught the same lesson to the pupils using drawings made on the whiteboard but this week when I used the resources and the board drawings in teaching, the result was far better. The pupils used the instructional resources to answer verbal questions excellently during the lessons plus the pupils were able to do their practical works correctly than in the previous lessons that were taught without using any teaching resources; the resources helped a lot” (personal communication, February 03, 2014). Plates 4.82 and 4.83 show practical works produced by pupils after being taught with the sample resources and without any resources respectively.

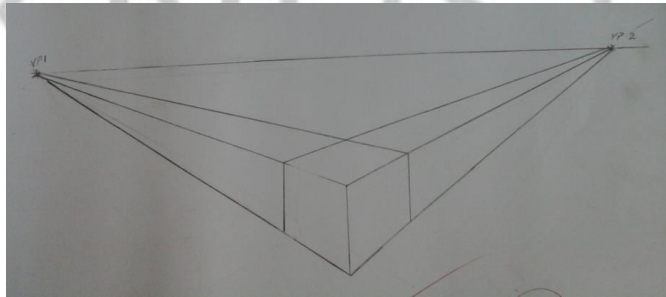
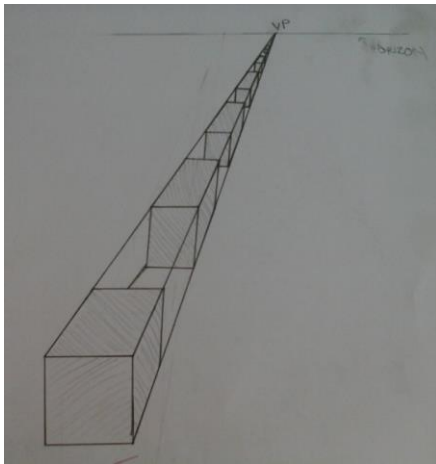


Plate 4.82: Sample practical works on one- and two-point perspective by pupils who were taught with the instructional resources

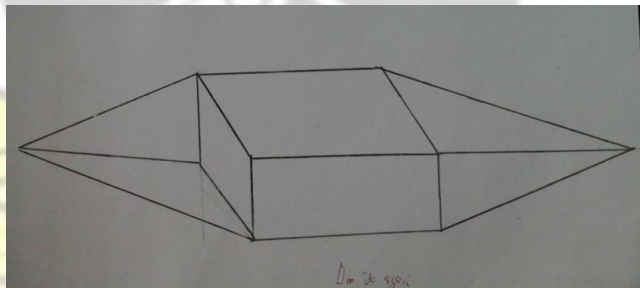
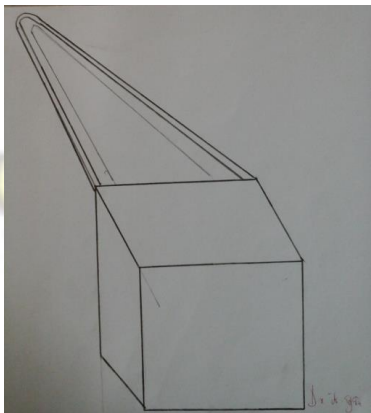


Plate 4.83: Sample practical works on one- and two-point perspective by pupils who were taught without instructional resources

In KNUST SHS, the teacher articulated that the resources made it easy to explain the concepts in perspective to the students because the resources presented them with clear pictorial explanations. This enabled the students to answer verbal questions asked during the lesson very well and also demonstrated their understanding of the lesson through the assignments they did as seen in Plate 4.84. This teacher commented that “Without the use of instructional resources, the lesson becomes abstract and boring as I do a lot of talking to explain the concepts. The resources were appropriate, but I recommend that other incorrect resources on „Perspective“ should also be made so that the students can study them to differentiate between the correct and

incorrect ones” (personal communication, May 20, 2014). Plate 4.85 show samples of practical works produced by students who were taught without instructional resources.



Plate 4.84: Sample of works on one- and two-point perspective by KNUST SHS students who were taught with the instructional resources



Plate 4.85: Sample of works on one- and two-point perspective by KNUST SHS students who were taught without instructional resources

5. 'Figure Drawing' Resources

In this KNUST SHS lesson, the teacher commented that “The resources in parts helped the students to draw the parts of the human figure easily and correctly (see Plates 4.86 – 4.87) but when they were asked to join the parts together in correct proportion, some students found it difficult to do that. After some practice the students were able to draw the human figures more proportionately and they were also able to draw posed figures” (see Plate 4.88 – 4.89). The teacher attested that the sample resources helped and made the teaching and learning easier than teaching figure drawing lesson without the resources. In comparing the students’ drawings made when taught with and without the sample instructional resources (see Plate 4.90), the teacher mentioned that anyone can tell the difference the tested instructional resources made in his class. Commenting further, the teacher said “Instead of the normal 12 periods for teaching figure drawing lesson, only 6 periods was used this time”. The resources were useful for teaching the lesson (personal communication, May 27, 2014 and July 08, 2014).



Plate 4.86: Sample of drawings on parts of the human figure by KNUST SHS students who were taught with the instructional resources

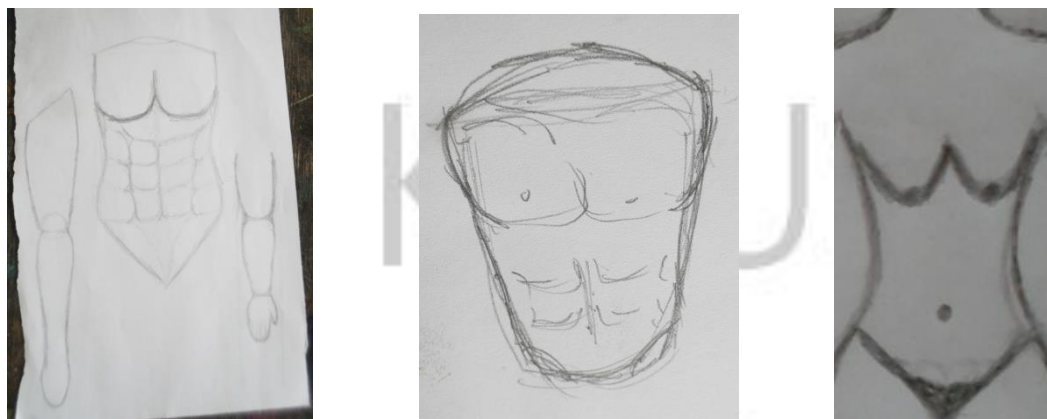


Plate 4.87: Sample of drawings on parts of the human figure by KNUST SHS students who were taught with the instructional resources

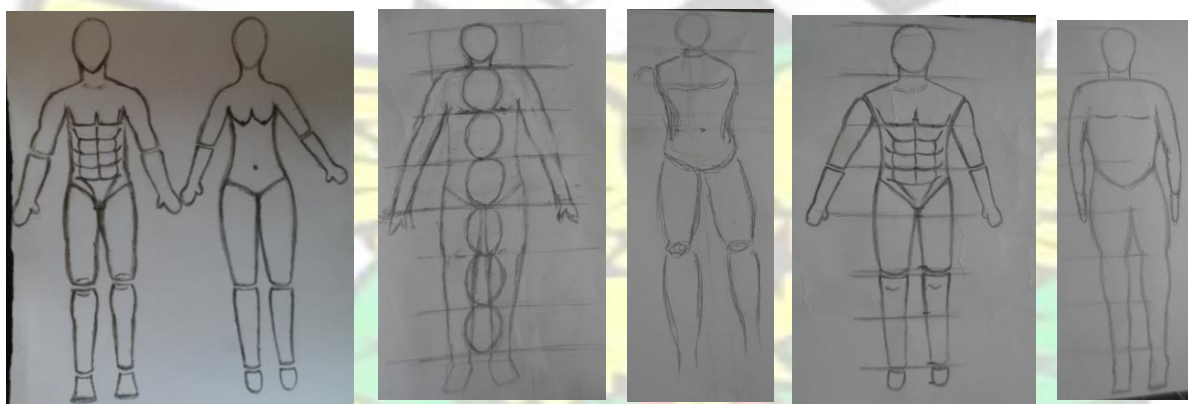


Plate 4.88: Sample drawings on ‘joining the parts of the human figure’ proportionately by KNUST SHS students taught with the instructional resources



Plate 4.89: Sample drawings of posed figures by KNUST SHS students who were taught with the instructional resources

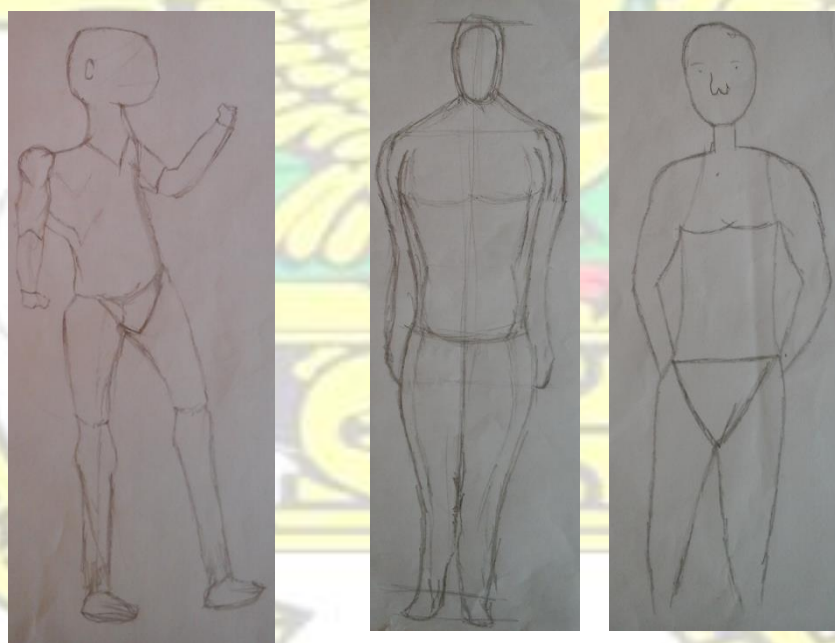


Plate 4.90: Samples of figure drawing works by KNUST SHS students who were taught without instructional resources

5. 'Elements and Principles of Design' Resources

In Emena Primary School, the teacher reported that the resources prevented her from talking too much to explain the „elements and principles of design“ to the pupils. The teacher’s comments were “The instructional resources made the pupils to think critically and participate in the lesson through discussions which helped them to get the understanding of the lesson. Teaching the lesson without the use of instructional resources makes the teaching more teacher-centred because the teacher alone would have to talk a lot to try and make the pupils to understand the concepts rather than the teacher and the pupils developing discussions out of the lesson”. According to this teacher, “The resources helped to enhance the understanding of the pupils because they were able to use the elements of design based on balance and repetition to design well planned patterns excellently than previous lessons that I taught without using instructional resource. The instructional resources really did the trick, these are the kinds of things we need for teaching such lessons; the resources achieved their purpose” (personal communication, October 15, 2014). Plates 4.91 – 4.92 show samples of pattern work based on the elements and principles of design produced by pupils who were taught with the resources and those who were taught without instructional resources.



Plate 4.91: Samples of pattern work by the pupils who were taught with the resources

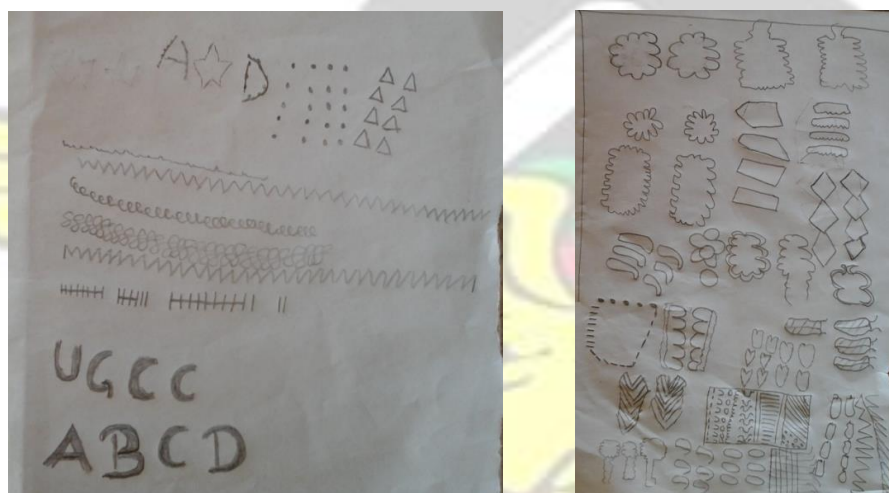


Plate 4.92: Samples of pattern work by pupils who were taught without the resources

In KNUST JHS, the teacher reported that “It was very straightforward using the resources to teach in-terms of explanations, because the resources were very practical and made the pupils to understand the principles better. The resources helped to involve the pupils in the lessons to offer their contributions. Using the resources to teach strengthens the understanding of pupils better than not using them. The Ghana Education Service must therefore provide such resources for teachers to use in the classroom to improve teaching methods and enhance the understanding of pupils on what they are taught”. This teacher also explained that the resources did the job

they were meant for excellently but recommended that resources for teaching „unity“ and „harmony“ must be made bigger (personal communication, January 27, 2014 and January 28, 2014). Plates 4.93 - 4.96 show samples of practical works made by pupils who were taught with the sample instructional resources and works of pupils who were taught without the teaching resources.

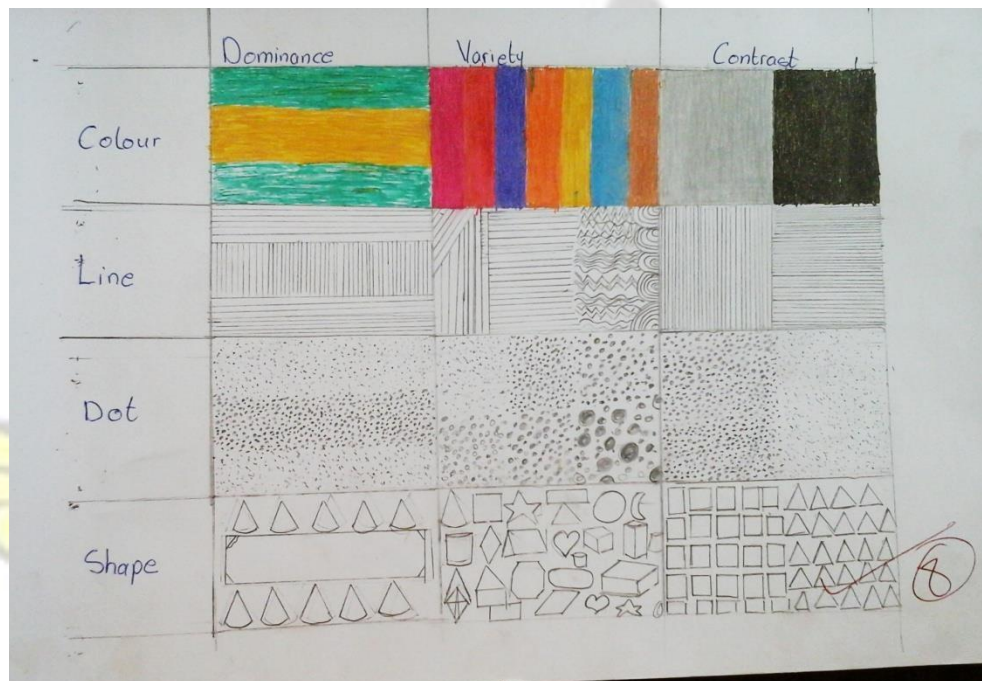


Plate 4.93: Sample practical work on ‘organising the elements of design according to the principles of design’ by a pupil from lesson taught with the instructional resources

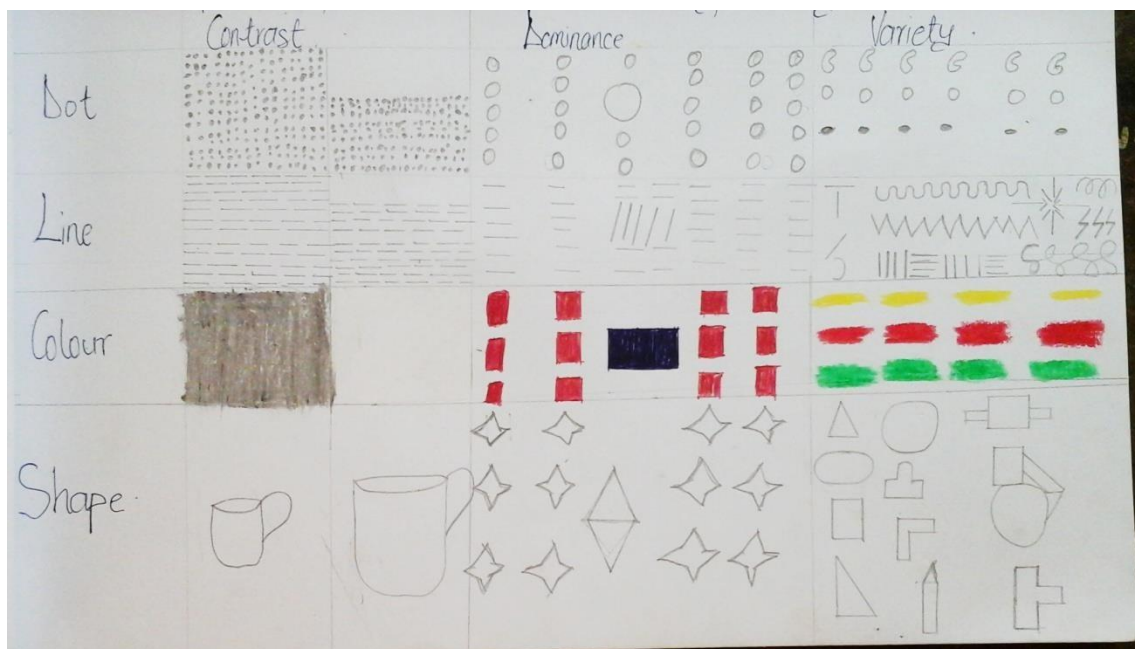


Plate 4.94: A pupil's work from lesson taught with instructional resources

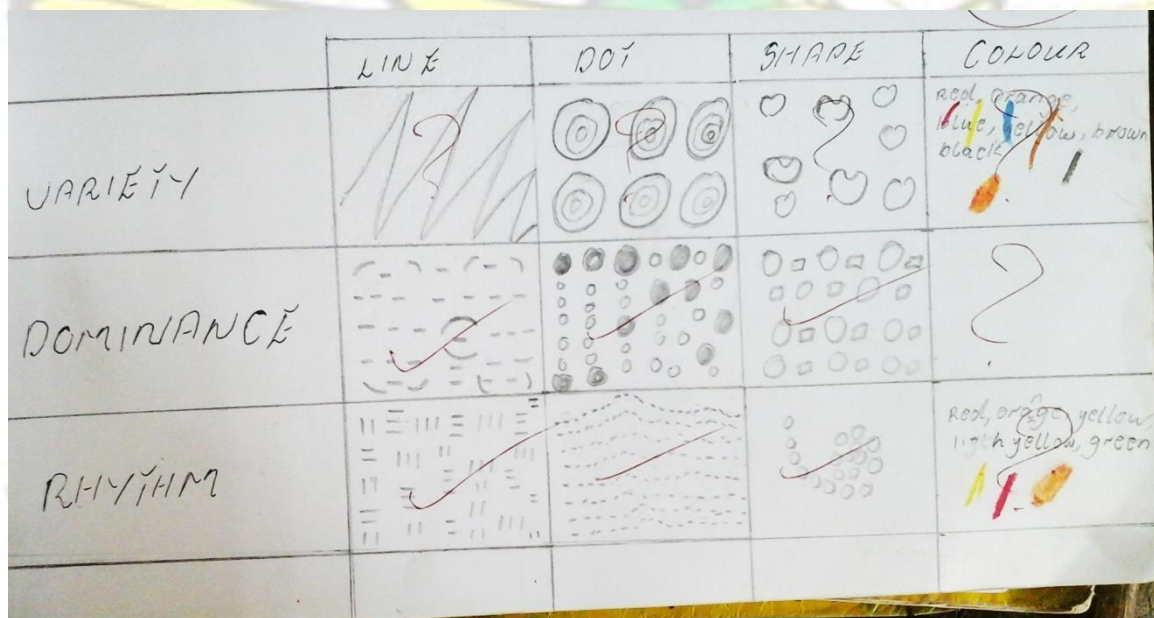


Plate 4.95: A pupil's work from lesson taught without instructional resources

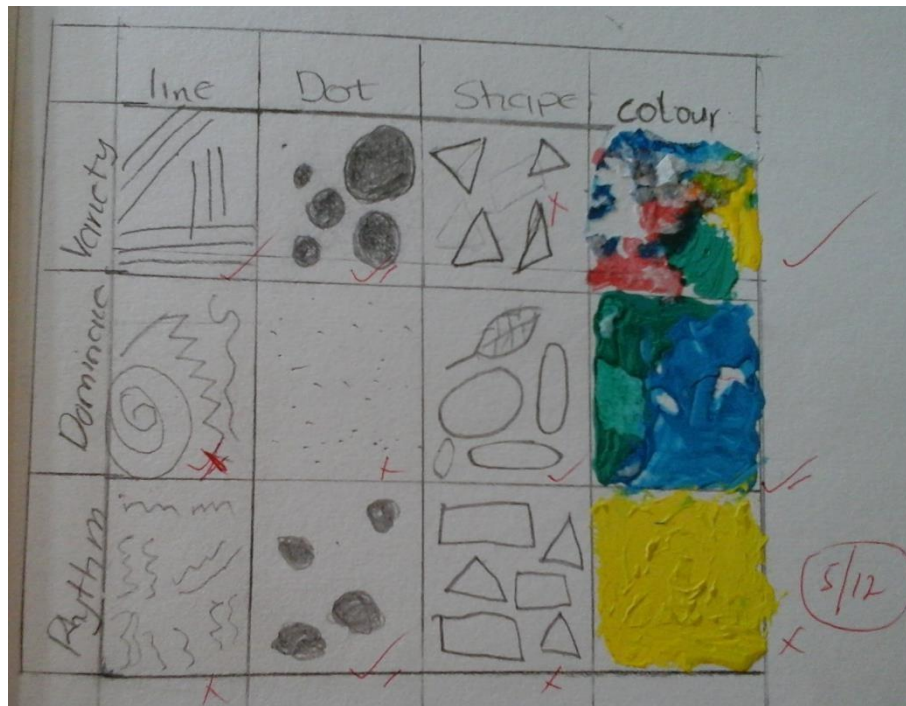


Plate 4.96: A pupil's work from lesson taught without instructional resources

In KNUST SHS, the teacher explained that the presence of the sample resources made it easy for the students to understand the explanations that he gave them on the „principles of design“. The students were able to identify the principles of design that had been demonstrated in the resources. According to the teacher, the students' understanding of the concepts "Showed in the answers they gave to questions that were asked during the lesson which made teaching the lesson very easy. The answers the students gave to the questions showed that the resources enhanced their understanding more than the students I had taught on several occasions without using any instructional resources. Teaching with the resources was better because all the students in the class got involved with the discussions and answering of questions as against teaching the lesson previously without instructional resources when just a handful of students would get involved in the lesson". No challenges were faced in using the resources to teach (personal communication, February 20, 2014).

5. 'Weaving and Stitching' Resources

'Weaving'

In the Primary One class at Emena School, the teacher's comments were "The resource made the pupils to see what they were supposed to do and after teaching them how to do the „plain weaving“, they were able to do it. Previously I was not teaching this lesson because I did not know how to do the plain weaving and I did not have any resource to use and teach with; the resource was appropriate for teaching the lesson on this topic". This teacher was able to teach the lesson for the first time after she was shown how to do plain weaving and provided with the sample instructional resource (personal communication, June 23, 2014). Plate 4.97 show samples of the pupils' works.



Plate
Samples of
Primary One pupils' work on 'plain weaving'

4.97:
Emena

In the Emena Primary Six classroom, the teacher expressed that "With the help of the resources on „Weaving“, all the pupils were able to grasp the plain weaving process easily and used it to

make their works. Some of the pupils were able to complete their works very fast and assisted their colleagues to complete theirs. Previously some of the pupils could not do their works correctly but for this lesson all the pupils were able to do their weaving works correctly”. This experience made the teacher to articulate that “Ghana education service must provide resource persons to train teachers like me on how we can produce instructional resources for teaching”. The teacher recommended that the resources must be labelled (personal communication, January 30, 2014). See Plates 4.98 and 4.99 for samples of pupils’ works.



Plate 4.98: Samples of pupils works on ‘plain weaving’ from lesson taught with the instructional resources

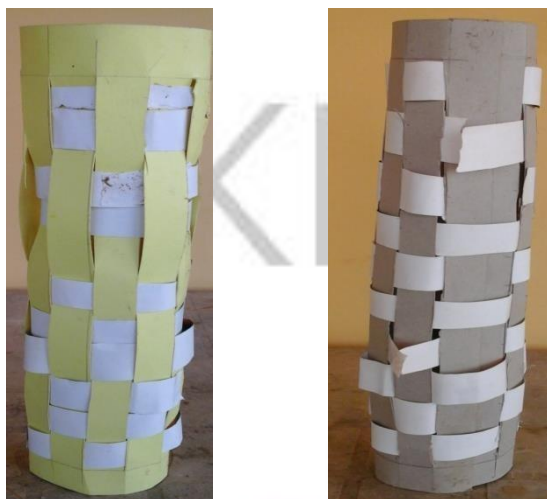


Plate 4.99: Samples of ‘plain weaving’ works by pupils who were taught without instructional resources

At Kentinkrono JHS, the teacher commented that “The resource served as a guide for me in teaching the twill weaving processes. Without the resources it would have been very difficult to teach the weaving process. With the resource on-hand the teaching process was easy because during the lesson for instance, when I said „under the warp or over the warp“ the pupils“ saw exactly what I was talking about with the help of the resource. The instructional resources served their purpose as teaching and learning materials”. The pupils were able to make wall hangings using twill weaves in the end as shown in Plate 4.100. This teacher made it known that he has not been teaching lessons on weaving because of the lack of art materials and instructional resources to use for teaching (personal communication, June 25, 2014).



Plate 4.100: Sample of ‘weaving’ works by Kentinkrono JHS pupils taught with the instructional resources

‘Stitching’

In Emena Primary Two, the teacher’s demonstrations with the sample resource helped the pupils to make running and back stitches as required. The teacher commented that “Few of the pupils found it difficult to do the back stitches even with the resource and demonstrations, so you can imagine teaching this lesson without any instructional resource. The lesson was very lively as the pupils participated eagerly in the activity; the instructional resource was very helpful for teaching the lesson on stitching” (personal communication, January 30, 2014; June 23, 2014). Plates 4.101 – 4.102 show practical work made by pupil taught with the sample resource and work from lesson taught without the resource.



Plate 4.101: Sample of practical work by Emena Primary Two pupil made during lesson taught with sample resource



Plate 4.102: Sample of practical work by Emena Primary Two pupil made during lesson taught without the resource

In the Emena Primary Four classroom, the resource helped the teacher to explain what the lesson was about and what the pupils were supposed to do. She reported that “Out of 42 pupils, 33 pupils were able to easily grasp the stitching processes to do their works. The pupils who could not do the work had to be taken through the processes using the sample instructional resource”.

Plate 4.103 shows samples of works produced by pupils who were taught with the sample teaching resource.

According to this teacher, without the use of instructional resources in teaching the lesson, the pupils struggle to understand what they are taught because they do not see samples of exactly

what they are supposed to do. According to her, “This situation mostly results in the pupils producing poor works with some being unable to do their work. The resource was suitable for teaching the lesson” (personal communication, November 19, 2014). Plate 4.104 shows samples of „stitching“ works done by pupils who were taught without instructional resources.

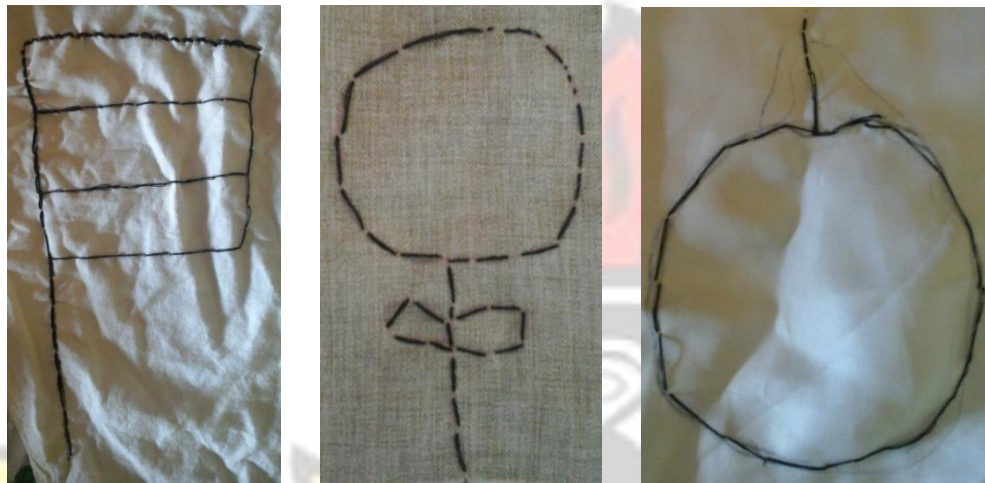


Plate 4.103: Sample of ‘stitching’ works by pupils who were taught with the resource



Plate 4.104: Sample of ‘stitching’ works by pupils taught without the resource

In Emena Primary Six classroom, the teacher expressed that “The resources did not only help the pupils in grasping what I taught them but they were a guide for me in particular to be able

to teach the lesson for the first time. The instructional resources helped me and the pupils to have successful lessons. Previously anytime I got to „stitching“ under Creative Art, I was not able to teach the pupils because I did not know how to do the stitches. With the help of the instructional resources and the training, this time I taught the lessons on „stitching“ and the pupils were able to assimilate what I taught them to do interesting works”. The teacher suggested that the stitches must be labelled (personal communication, March 13, 2014). Plate 4.105 shows samples of works done by the pupils.



Plate 4.105: Samples of ‘stitching’ works by Emena Primary Six pupils who were taught with the resources

‘Plaiting’

In Emena Primary Two classroom, the teacher reported that “The pupils were able to do their 3-strands plaiting correctly because they saw what they were supposed to do in the instructional resource and demonstrations. The practical works of pupils who were taught with the sample instructional resource were more clearly defined than works made by pupils who were taught without the instructional resource” (personal communication, February 06, 2014). Plates 4.106 and 4.107 show practical works done by pupils who were taught with the instructional resources and those who were taught without them.



Plate 4.106: Sample ‘plaiting’ works by pupils who were taught with the resource



Plate 4.107: Sample ‘plaiting’ works by pupils who were taught without the resource

In Emena Primary Four classroom, the teacher reported that “The resource boosted the morale of the pupils and enabled them to do their works because it was attractive. I think resource people must be brought in by Ghana Education Service to teach us how we can create instructional resources for teaching because is difficult to teach such lessons without any resource. There is a picture on 5-strands plaiting in the Creative Art textbook but I did not know how to do it and so previously I was not teaching the lesson. The training and the instructional resource helped me to teach the lesson the first time. The resource was suitable for teaching the

lesson” (personal communication, November 13, 2014). Plate 4.108 shows sample practical works by the pupils.



Plate 4.108: Sample ‘plaiting’ works by Emena Primary Four pupils who were taught with the resource

‘Lacing’

In Emena Primary One classroom, the teacher commented that “The resources helped the pupils to do their works without any difficulty because they saw samples of what they were taught. I was previously not teaching this topic because I did not know what to teach. The instructional resources were appropriate for teaching the lesson” (personal communication, June 06, 2014). Plates 4.109 show samples of practical works done by the pupils.



Plate 4.109: Samples of ‘lacing’ works by Emena Primary One pupils who were taught with the resources

7. ‘Visual Communication’ Resources

In KNUST JHS, the teacher explained that “The use of the instructional resources allowed the pupils to discuss the works and brought out the good and bad points. The pupils did the discussion by bringing their knowledge in „elements and principles of design“ to play. The instructional resources made the pupils able to participate in the discussions to make the class lively. As a matter of fact the resources made my work easier because this time, the lesson was not taught in an abstract manner but practical instructional resources were used to do explanations. Without the use of such resources, the understanding of pupils is very minimal which shows in their practical works”. The teacher suggested that the sketches that guided the creation of the instructional resources should be added to the sample resources for teaching (personal communication, March 20, 2014 and October 03, 2014). Plates 4.110 and 4.111 show sample practical work made by pupil taught with the instructional resources and work from lesson taught without instructional resources.



Plate 4.110: Sample ‘visual communication’ work by a pupil taught with the instructional resources



Plate 4.111: Sample ‘visual communication’ work by a pupil taught without instructional resources

8. ‘Printmaking’ Resources

In Emena Primary Two classroom, the teacher said “The use of the resources helped the pupils to see how stencils are done which assisted them to also make their stencils unlike previous lessons where most of the pupils could not make their stencils but instead, used their crayons to make coloured drawings as their stencil prints. Anytime I ask the pupils to do anything they ask for examples, so using the resources really helped them to understand what they were taught a lot better. Teaching without showing the pupils examples becomes only talking to explain procedures, which makes it very difficult at the level of the pupils to understand what they are taught. With the resources the pupils saw and got a visual idea of what was taught, they also participated very well in the lesson” (personal communication, June 05, 2014). Plates 4.112 and 4.113 show „stencil“ works of pupils who were taught with the instructional resources and those who were taught without any resource.



Plate 4.112: Sample ‘stencil’ works by Emena Primary Two pupils who were taught with the resources



Plate 4.113: Sample ‘stencil’ works by Emena Primary Two pupils who were taught without instructional resources

In Emena Primary Six, the teacher commented that “The resources made it very simple in explaining the printing techniques to the pupils. A class exercise on the lesson which was marked over 9 marks had 7 out of 9 as the lowest mark for the class whereas previous printing lessons usually showed more than half of the pupils in the class getting average marks. The resources were the right type for teaching the lesson” (personal communication, June 17, 2014).

Plate 4.114 show samples of practical works by the pupils.



Plate 4.114: Sample ‘printing’ works by Emena Primary Six pupils from lesson taught with the resources

In KNUST JHS, the teacher said “The resources were very useful. Their use made the teaching practical because as I showed the resources to the pupils and did the explanations they got the concepts easily. During the lesson the pupils made reference to the resources in answering verbal questions because the instructional resources gave them the visual picture of the printing techniques. Teaching the lesson without instructional resources makes the teaching empty and the pupils are not able to contribute to the lesson as they did when the resources were used” (personal communication, March 11, 2014). Plate 4.115 show practical works of pupils who were taught with the instructional resources.



Plate 4.115: Sample ‘printing’ works by KNUST JHS pupils taught with the resources

In KNUST SHS, the use of the sample resources enabled the students to get involved in the lesson to discuss the printing techniques. The teachers reported that “Previously it was very difficult to get students to contribute in class, but with the involvement of the resources, the students asked a lot of questions and were also able to answer questions that they were asked to make the lesson very interactive than I ever expected. The inclusion of the instructional resources made the teaching and learning very easy. This situation reflected in the practical works of the students when compared to practical works of students made during lessons in which instructional resources were not used. The resources served their purpose because all the

objectives set for the lesson were achieved” (personal communication, June 11, 2014). Plates 4.116 – 4.117 show practical works of the students who were taught with resources and practical works of students who were taught without instructional resources.



Plate 4.116: Sample ‘printing’ works by KNUST SHS students who were taught with the instructional resources



Plate 4.117: Sample ‘printing’ works by KNUST SHS students who were taught without instructional resources

9. ‘Construction and Assemblage’ Resources

In Emena Primary Two, the teacher’s comments were “The sample resource made it easy for the lesson on „construction and assemblage” to go on. It was clear the pupils enjoyed the lesson

and participated very well to create their desk containers. Some of the pupils were even able to create some of the desk containers at home which they brought to school the next day (see Plate 4.118). Without the resource I would never have thought of such a thing to teach under „construction and assemblage“ so the resource helped me to teach this lesson. The resource was appropriate for teaching the lesson” (personal communication, June 12, 2014).



Plate 4.118: Samples of ‘desk containers’ constructed by Emena Primary Two pupils

In Emena Primary Six, the pupils were able to creatively develop interesting model bags with waste materials after observing the sample instructional resource without the teacher using it to teach the lesson. According to the teacher, the model bags that were developed by the pupils were more interesting and thought provoking than the model bags the pupils developed when they were taught to do so without referring to any instructional resource (personal communication, July 11, 2014). See Plates 4.119 – 4.120 for samples of works created by the pupils who observed the sample resource and works by pupils who were taught without the instructional resource.



Plate 4.119: Samples of bags constructed by Emema Primary Six pupils after observing the instructional resource



Plate 4.120: Samples of constructed bags by pupils who were taught without any instructional resource

In Emema JHS, the teacher reported that “The resources made teaching easy because we had all the right resources to do the teaching and learning. The resources increased the attention of the pupils, which ensured that a lot of learning was done, I can say I did only twenty percent teaching and the pupils’ involvement and activities was eighty percent”. According to this

teacher, “Without the use of instructional resources in teaching such lessons, explaining ideas and techniques becomes very difficult. Although we are advised to use chalkboard illustrations when teaching, for such lessons chalkboard illustrations alone become confusing for the pupils and does not allow them to understand what they are taught very well. With the resources, the lesson was very practical” The teacher recommended the addition of other materials like coloured papers (personal communication, July 11, 2014). Plate 4.121 show a sample of „construction and assemblage“ work created by the pupils.



Plate 4.121: Sample constructed work by Emena JHS pupils taught with the instructional resources

4.4 Findings for Objective Two

As indicated in Chapter One of this thesis, Objective 2 was to train selected Art Education students, practising Art teachers and College of Education students to know the processes that were employed in the exploration and development of instructional resources from recycled waste paper, plastic and fabrics for teaching hand papermaking, elements and principles of

design, colour, weaving and stitching, printmaking, visual communication, perspective, construction and assemblage, and figure drawing. Under this session how the participants assimilated the training together with samples of instructional resources they produced have been presented. It must be emphasised that to avoid repetition in reporting on the training sessions with the Art Education students, practising Art teachers and College of Education students, the various training sessions have been combined.

4.4.1 Training on Resources for Teaching ‘Hand Papermaking’

This session focused on teaching the participants to produce handmade papers and explore their usefulness with different drawing and painting mediums.

In this session all the participants participated actively in the exercise and were amazed about the whole process, except one Art Education student who was unwilling to wet his hands with the pulp. The other participants showed much interest in the papermaking process. Although the Art Education students were tasked to make two papers each, some of them made three or four papers which showed how much they enjoyed the hand papermaking session. One of them commented that “Aside hand papermaking being a requirement to be taught to students at the JHS level, papermaking is also a requirement to be taught to students in the graphic design syllabus at the SHS level but teachers do not teach it because they do not know the process”. It was confirmed from the graphic design syllabus that papermaking is a required topic that must be taught to students.

The practising Art teachers articulated that they had learnt a new activity which they did not know of. One teacher said “At first, when I heard of papermaking, I thought of the use of machines but now I know that useful papers can also be made manually through a very smooth process with local materials”. In the case of the College of Education students, some of them

even assumed the role of „teachers“ to help their colleagues to also make their papers. Instead of making one paper each, some students did two or three papers like the Art Education students. Unfortunately, the tight schedules of the College of Education students did not allow them to experiment on the papers they produced. Plates 4.122 - 4.124 show samples of handmade papers made by the participants.



Plate 4.122: Samples of handmade papers by the Art Education students

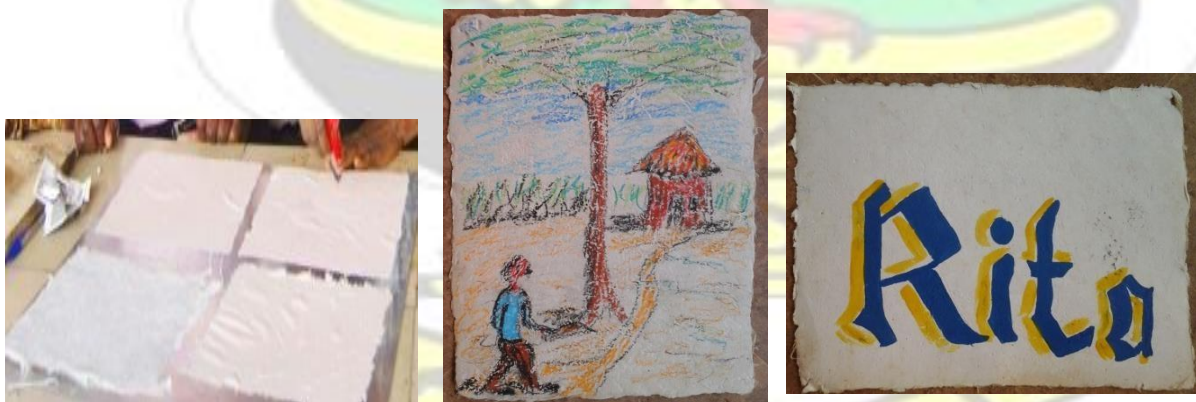


Plate 4.123: Samples of handmade papers by the practising Art teachers



Plate 4.124: Samples of handmade papers by the College of Education students

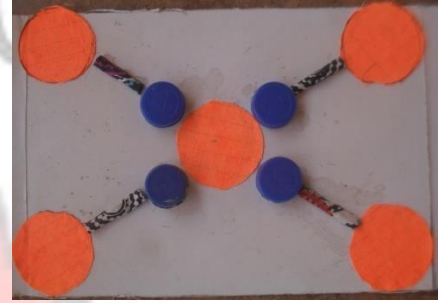
4.4.2 Training on Resources for Teaching ‘Elements and Principles of Design’

This session was aimed at teaching the participants to produce instructional resources for teaching „Elements and Principles of Design“ from waste materials.

In the group session for the Art Education students, the students actively participated in the activities and were eager to work but they found it difficult to create their own resources even though 13 out of the 17 students had been teaching Visual Arts prior to enrolling on the programme. The groups confessed they were not used to creating instructional resources, hence their difficulty. The resources these participants created in the end did not project well the „Elements and Principles of Design“ as seen from the samples shown in Plate 4.125. However, the resources these participants produced as individuals showed marked improvements on the group resources after the teaching session. Plate 4.126 show samples of individual works by the Art Education students.

The practising Art teachers were able to adopt the processes they were taught during the training sessions to create their own samples of instructional resources without much difficulty. Plate

4.127 show samples of their works. The College students were also able to produce samples of resources for teaching the „Elements and Principles of Design“ as shown in Plate 4.128.

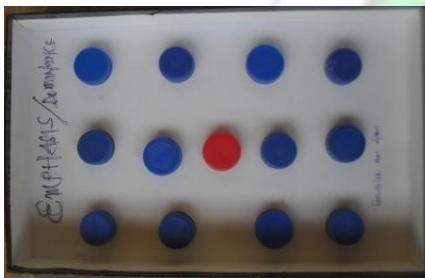


Resource on Shapes & Unity

Resource on Dot & Unity

Resource on Lines & Shapes

Plate 4.125: Samples of resources produced by the Art Education students in groups during the training session

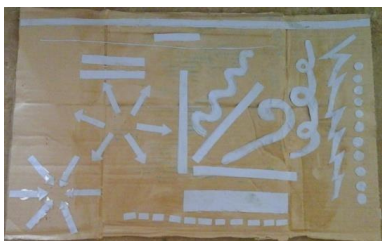


Resource on emphasis & dominance

Resource on emphasis

Resource on variety

Plate 4.126: Samples of resources produced by individual Art Education students



Resource on lines

Resource on variety

Resource on repetition and balance

Plate 4.127: Samples of resources produced by the practising Art teachers



Resource for repetition

Resource for emphasis

Resource for repetition

Plate 4.128: Samples of resources by the College students

4.4.3 Training on Resources for Teaching 'Colour'

The session focused on teaching the participants to use waste plastics and acrylic paints to produce instructional resources for teaching „Colour“ at the different levels of education. The Art Education students did this task quite easily. They engaged themselves very well in the production process during the training session and were also able to produce interesting resources for teaching „Colour“ as individuals after the training session. Plates 4.129 – 4.130 show samples of group and individual works by the Art Education students.

The practising Art teachers who were trained at the various levels were also able to easily produce samples of the „Colour“ resources as seen in Plate 4.131. The College students were

also able to use the processes they were taught to develop samples of resources for teaching „Colour“ (see Plate 4.132 for sample works).



Plate 4.129: Group work produced by the Art Education students



Plate 4.130: Samples of individual works produced by the Art Education students

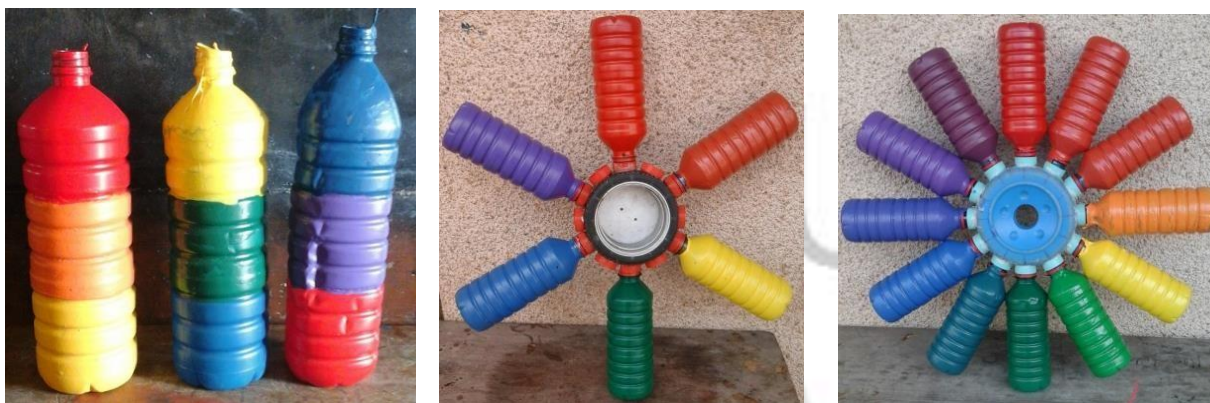


Plate 4.131: Samples of resources produced by the practising Art teachers for teaching ‘colour’



Plate 4.132: Samples of resources produced by the College students for teaching ‘colour’

4.4.4 Training on Resources for Teaching ‘Weaving and Stitching’

The objective for the session was to teach participants to produce resources for teaching „Weaving and Stitching“.

The Art Education students were able to create samples of the resources during the teaching session (Plate 4.133 show samples of their works). The Lower Primary teachers had difficulties creating samples of the resources so they were gradually taken through the processes again after which they were able to create their own samples. The Upper Primary and Junior High teachers were able to grasp the production processes easily to create samples of the resources (Plate 4.134 show samples of resources by the practising Art teachers). The College of Education students were able to produce samples of the resources with ease. The students were able to complete what they were tasked with and requested to do extra samples.

They really got involved in the exercise to produce several samples of resources for teaching „Weaving and Stitching“. Plate 4.135 show samples of resources created by the College students.



Plate 4.133: Samples of resources produced by the Art Education students



Plate 4.134 Samples of resources on ‘weaving and stitching’ produced by the practising Art teachers



Plate 4.135 Samples of resources on ‘weaving and stitching’ produced by the College students

4.4.5 Training on Resources for Teaching ‘Printmaking’

This training session aimed at teaching participants to produce resources for teaching „Printmaking“ using waste plastics and fabrics.

All the participants who went through the training session grasped the processes that they were taught easily and were able to produce sample resources for teaching „Printmaking“ as shown in Plates 4.136 – 4.138.



Plate 4.136: Samples of resources for teaching ‘printmaking’ produced by the Art Education students



Plate 4.137: Samples of resources for teaching ‘printmaking’ produced by the practising Art teachers



Plate 4.138: Samples of resources for teaching ‘printmaking’ produced by the College students

4.4.6 Training on Resources for Teaching ‘Visual Communication’

The session focused on teaching participants to produce resources for teaching „Visual Communication“ using waste plastics, paper and fabrics.

In terms of assimilation of the processes, the Art Education students demonstrated through discussions that went on during the teaching session that they had grasped what they were taught. The class was very interactive as participants shared their thoughts and contributed immensely to the discussions during the training session. Samples of their resources are shown in Plate 4.139. The practising Art teachers and College of Education students were also able to use what they were taught to create samples of the instructional resources without any difficulty. Plates 4.140 – 4.141 show samples of their works.



Plate 4.139: Sample of resources for teaching ‘visual communication’ produced by the Art Education students



Plate 4.140: Sample of resources for teaching ‘visual communication’ produced by the practising Art teachers



Plate 4.141: Sample of resources for teaching ‘visual communication’ produced by the College students

4.4.7 Training on Resources for Teaching ‘Perspective’

This session focused on teaching participants to produce useful instructional resources for teaching ‘Perspective’ from plastic and paper waste.

The Art Education students were able to create the resources based on what they were taught with ease. During the group work, two of the groups decided to use other waste materials they had collected after being introduced to the concept of recycling for the production of instructional resources. They mentioned they preferred using their own collections instead of waste materials that had been provided for the training session. This showed that they were now gradually becoming recycling conscious by saving and recycling their own waste materials.

Plate 4.142 shows samples of the instructional resources the Art Education students produced. All the practising Art teachers at the different levels were also able to create samples of the resources with ease. Samples of their works are shown in Plate 4.143. Similarly, the College students were also able to create sample instructional resources but they had to be guided much more closely than the other participants. These students appreciated the exercise so much that the groups that could not complete their works during the training session came back after the normal class sessions to complete their works. Plate 4.144 shows samples of their resources.



Plate 4.142: Sample resources for teaching ‘perspective’ produced by the Art Education students



Plate 4.143: Sample resources for teaching ‘perspective’ produced by the practising Art teachers



Plate 4.144: Sample resources for teaching ‘perspective’ produced by the College students

4.4.8 Training on Resources for Teaching ‘Construction and Assemblage’

The session aimed at teaching participants to produce instructional resources for teaching „Construction and Assemblage“ from plastic, paper and fabric waste.

In terms of assimilation, the Art Education students exhibited improved skills in creating this set of instructional resources (see Plate 4.145). The practising Art teachers who were trained during this session were able to create samples of the resources (see samples at Plate 4.146). The College students really had fun creating the set of resources as seen in Plate 4.147. They tried different ideas to create very interesting items that could be used for teaching „Construction and Assemblage“ using waste materials.



Plate 4.145: Sample resources for teaching ‘construction and assemblage’ produced by the Art Education students

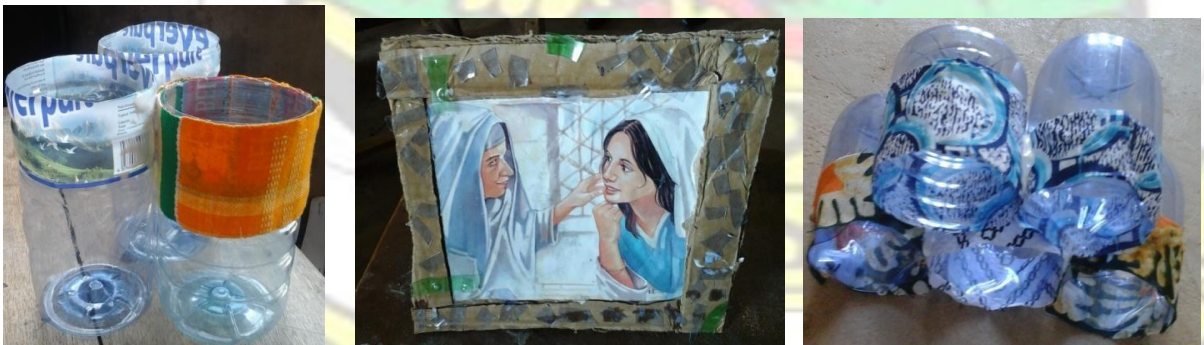


Plate 4.146: Sample resources for teaching ‘construction and assemblage’ produced by the practising Art teachers



Plate 4.147: Sample resources for teaching ‘construction and assemblage’ produced by the College students

4.4.9 Training on Resources for Teaching ‘Figure Drawing’

This session aimed at teaching participants to produce instructional resources for teaching „Figure Drawing“ from hard insulation foam.

It was realised that the Art Education students enjoyed the process of carving parts of the human figure from the insulation foam provided and all the participants with the exception of one commented that it was their first time of embarking on a carving exercise. The participants were happy at the outcome of their efforts as they worked their way round the material. In the end they were able to carve out the parts of the female figure but the final work needed more detailing to complete the figure. Plate 4.148 shows the Art Education students’ work. The practising Art teacher who was trained was a bit more skilful in carving which showed in how he comprehended the processes of carving out parts of the female figure from the insulation foam as shown in Plate 4.149.



Plate 4.148: Sample resource for teaching ‘figure drawing’ produced by the Art Education students



Plate 4.149: Sample resource for teaching ‘figure drawing’ produced by the practising Art teacher

KNUST

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1 Overview of Chapter Five

This chapter deals with the analysis and discussion of the research findings that were recorded from the exploration, testing of the sample instructional resources, the training sessions held with the Art Education students, practising Art teachers and College students, and the feedback received from the students and teachers. The analysis has been organised and presented according to the research objectives that pertain to them.

Objective 1 a): To explore and recycle paper, plastic and fabric wastes to create instructional resources for teaching selected topics in Creative Art, Basic Design and Technology, and General Knowledge in Art.

5.2 The Developed Instructional Resources from the Exploratory work

The sample instructional resources were created using very simple and easy to follow procedures. All the waste paper, plastic and fabrics explored for producing the sample

instructional resources for teaching different aspects of Visual Art were easy to manipulate and work with because of their physical properties. According to Alobo (2010) the physical features of instructional resources are a very important factor in their selection and use and for that matter physical features like attractiveness, durability, size, weight, clarity of the resources, easy handling and storage of resources must be considered when selecting instructional resources. In line with the above assertion, all the sample instructional resources were helpful in teaching practical and interactive lessons. Since the instructional resources were practical and communicated clearly, their methods and conditions of use were not complicated but very straightforward and they could all be used in the absence of electricity. This situation will help teachers to be able to easily use them for teaching and learning without any difficulty. The light-weight and non-bulky nature of the resources will ensure that they can be carried around easily by teachers for teaching and stored without using up much space. Besides, Fiahin (2005) makes it clear that instructional resources should be handy and easy to transport from one place to another. The durable nature of the sample instructional resources also suggests they can last for a long time and sustain effective curriculum delivery at the various educational levels.

The attractive nature of the instructional resources can help teachers to catch and maintain the attention of their pupils and students during lessons and also sustain their concentration when teachers use them to teach. The sizes of the sample resources being big enough will also ensure that all pupils and students in a classroom including those at the back can have a good view of the resources when they are used for teaching. Also Alobo (2010) calls on teachers to select appropriate materials from their local community for teaching their learners instead of simply using materials that have been used and found effective in other areas. Here, since the waste materials used to create the resources were all locally generated, the resources

are culturally appropriate because pupils and students in Ghana can identify with the materials easily since they are very common in their environments.

The resources are affordable because they are made of recycled waste materials that can be collected, processed and used at little or no cost to both teachers and their students.

This is an important advantage for teachers, as well as schools, who are called upon by the Ghana Education Service to improvise instructional resources from locally available materials to make their lessons effective (Osei-Sarfo, 2013; Opoku-Asare, 2000). Teachers and schools can therefore overcome the fact that materials or instructional resources are not provided for them to use in the classroom if they improvise by recycling waste materials.

5.2.1 Challenges Faced and Discoveries Made in Developing the Instructional Resources

Although there were some challenges in creating the resources, they were very minimal and did not hamper the successful production of the instructional resources. For instance, in creating the instructional resources for teaching „Colour“, some of the bottle tops that were glued to the plastic tyre got removed after the bottles were screwed in and out of them. They had to be re-fixed by first incising the surfaces of the bottle tops and the tyre before gluing them back. This procedure worked perfectly. With the instructional resources for teaching „Perspective“, some of the bottles got removed from the box paper after they were fixed on them. Here too, the bottles were re-fixed by first creating holes in the box paper before gluing the bottles on them. This procedure also worked perfectly. This situation suggests that teachers can easily re-fix the resources if they encounter such problems as they use them to teach because the resources were created using very simple procedures. In terms of safety, the waste materials used and the processes used in creating the resources did not pose any threat in the creation of the resources.

During the carving of the human figure it was discovered that apart from wood and stone, the hard insulation foam obtained from discarded refrigerators can be used for teaching sculpture students how to carve. The foam offers many advantages: it is very light in weight, easy to cut and carve, and can be collected and used for free without any cost. Using the hard foam for teaching carving is therefore a less expensive means of offering a curriculum service without using wood or stone, which are expensive and not readily available all over Ghana. Using discarded insulation foam for teaching carving will prevent them from being burnt to pollute the environment.

The outcome of the exploration for satisfying Objective One of this study suggests that paper, plastic and fabric wastes can be safely recycled to create very useful and appropriate instructional resources for teaching Art. This confirms that indeed the notion of „waste“ is relative, that which is considered waste with regard to its primary function may be useful for a secondary function. In other words, „One man“s trash is another man“s treasure“ (European Commission on Waste Prevention Handbook, 2012; Zaman & Lehmann, 2011; Garlipp, 2010; Klemmer et al., 2007; Bontoux & Leone, 1997) which implies that what somebody sees as „waste“ can be used by another person to create very useful items that can give another life to the waste material just as it has been done in this research work.

Based on the outcome of this exploratory research, it can be realised that if very practical measures are put in place to train school teachers and College of Education students how they can recycle waste materials to create instructional resources, they will not sit and wait for the Ghana Education Service to supply materials required for producing what they need in their classrooms. If the waste recycling training is done and done well, teachers will not have any excuse not to include appropriate and useful instructional resources in their instructions. As teachers all over Ghana are taught practically the ways to recycle to create instructional

resources for teaching and they practise it, they will not only enhance the quality of their teaching but it will also ensure that a great deal of waste will be prevented from having negative effects on the environment. This can go a long way to protect the environment and the inhabitants in the environment as well as enrich teaching and learning processes with the developed instructional resources that result from the recycling activities.

Furthermore, as waste materials are turned into instructional resources and used for teaching, students and pupils will become aware that waste materials can be recycled into other useful things instead of throwing them away to pollute the environment. This can help to instil the recycling attitude in Ghanaian students. For instance, one of the Art Education students who participated in the training workshops confirmed after the training session that the use of the recycled instructional resources in teaching made her students to also use waste scraps to create various interesting artefacts. This situation was also noticed during the testing of the researcher-developed instructional resources at Emena Primary School that some Class Six pupils also used waste materials to make very interesting model bags after just observing the model bag made with box paper even before the Class teacher could use it to teach her lesson on „Construction and Assemblage“. Samples of the pupils“ bags are shown in Plate 4.119.

Objective 1 b): To evaluate the effectiveness of the developed instructional resources by testing them in schools at the Primary, Junior High School (JHS) and Senior High School (SHS) levels.

5.3 Evidence from Observation of Lessons in which Sample Resources were Tested

5.3.1 Pupils and Students Response to, and Involvement with the use of Instructional Resources in Teaching Them

From the observation, one key thing the researcher noticed from all the lessons in which the developed instructional resources were utilised was that, the pupils and students concentrated on the lessons as the resources were used to teach them. The learners' attention were captured and sustained during the lessons because they saw new things in their classrooms which were attractive and made from materials that are normally seen as litter in the environment. The level of concentration noticed in the lessons can give a teacher the confidence to carry out his or her lesson very well. At the Primary Schools in particular, the pupils shouted in excitement any time they saw the researcher enter their classrooms with instructional resources, and when a lesson was over some of them inquired when the researcher would return with more resources. This shows that the use of the instructional resources increased the pupils' enthusiasm to learn. This reaction of the pupils really showed that students prefer teaching methods supported with instructional resources to traditional methods of teaching (Yildirim, 2008). In effect, Ghanaian classrooms must incorporate the use of appropriate instructional resources in lessons to make learners enthusiastic to learn. Arousing the interest of learners in lessons in any discipline through the use of instructional resources is limited only by the ability of teachers to learn to recycle waste materials to create the appropriate resources they need.

Aside from the responses from students and pupils toward the use of the resources, teachers also responded positively to the use of the instructional resources. At the Primary and Junior High Schools where the resources were tested, teachers who were not initially contacted to test some of the resources contacted the researcher and requested to also use the resources in their classrooms. Obviously, if these teachers had instructional resources available in teaching their students, they would not have requested to also use the resources to teach. This confirms the finding that Creative Art, Basic Design and Technology and General Knowledge in Art are

generally taught without the use of instructional resources (Ampeh, 2011; Agbenatoe, 2011; Boafo-Agyemang, 2010; Owusu-Koranteng, 2009).

It was also observed in the schools that with the use of the instructional resources, instead of the teachers simply presenting their lessons to the learners, they used the resources to develop discussions among their students and pupils. This situation helped the learners to express themselves by speaking out their thoughts, contributions and answers to participate in the lessons. Such a situation can motivate students and pupils who normally do not contribute in lessons to be able to also bring out their thoughts, since the discussion is based on a visual object which they can see. For example the testing of the teaching resources saw almost all pupils in some classes raising up their hands to answer questions during a lesson. Again, one senior high school teacher confirmed that previously without the use of instructional resources, it was very difficult to get students to contribute in class, but the use of the teaching resources made the students to ask a lot of questions and also contribute in the answering of questions making the lesson very interactive than he ever expected (personal communication, June 11, 2014). This confirms the assertion that the use of instructional resources enables learners to participate in the topic being taught by using the resources as reference to illustrate their thoughts and ideas (Igbo & Omeje, 2014). It was also realised that the use of the instructional resources involved the learners in the lessons in which they were used as the teachers called them to come to the front of the class to interact with the instructional resources by using them to answer questions or to explain a concept. As instructional resources are used to make learners stand in-front of their peers to express themselves, it helps to build their confidence in their ability to articulate their thoughts to an audience. This in effect can help develop and grow the linguistic intelligences (Fierros, 2004) of students to make them excellent public speakers.

Furthermore, with the use of the resources, lessons that requested the learners to do practical works in the classroom saw all individuals in the classroom enthusiastically and actively working to create their works. Onasanya (2004) explains that when instructional resources are carefully selected, they ensure learners' participation in lessons through discussions, projects, dramatization and the like. This then means that the ability of the instructional resources to engage learners in discussions and also helping them to actively engage in practical works attests to the appropriateness of the sample resources for teaching the lessons for which they were developed. This also proves that waste materials can be recycled to create appropriate instructional resources for effective teaching and learning of Art at Primary, Junior and Senior High Schools in Ghana.

5.4 Evidence from Interviews held with Teachers Who Tested the Sample Resources

5.4.1 Differences in Teaching With and Without the Instructional Resources

Feedback communicated by the 14 practising Art teachers who tested the sample instructional resources by using them to teach the target topics for which the resources were developed made it clear that the resources served their intended purpose very well. The teachers said the instructional resources made their job easier because the resources enabled them to teach their pupils and students with real items and objects that focused on the content they needed to teach in their lessons which helped the learners to grasp the concepts that they were taught with ease. The idea is that using the sample resources made lessons taught by the participating teachers concrete and not theoretical as they used to do. The fact that the use of the sample resources made their lessons meaningful corroborates Alobos' (2010) assertion that using instructional resources helps to vividly illustrate meanings of things for an instruction. Similarly according to Okobia (2011), Ikerionwu (2000) also bring to the fore that indeed instructional resources are

objects or devices which are supposed to help the teacher to make learning meaningful to learners, as these teachers are confirming. In agreement with Azikiwe (2007), Yildirim (2008) also affirm that in teaching and learning, instructional resources assume the role as supporting elements to concretize the knowledge or facts an instruction tries to put across. With the teachers attesting to the fact that the use of the sample resources made their lessons more practical and physical, and ensured effective teaching and learning situations in their classrooms reflects Edgar Dale's Cone of Learning Experience (Anderson, undated), which points out that the more practical a lesson is, the better the chance that many students can learn from it.

Furthermore, the teachers made it known that previously when they taught lessons without the sample instructional resources, their lessons turned out to be very theoretical and abstract, which made it very difficult for them to clearly explain the concepts they tried to teach in those lessons for their students and pupils to understand them. The teachers expressed that in this atmosphere they talk a lot in their effort to explain concepts, processes and techniques but sometimes, their efforts do not yield the required results, which is to make the learners comprehend what they are taught. However, with the use of the resources, it was very easy for them to explain concepts, processes and techniques for the pupils and students to understand them. As the teachers intimated, the resources made their work as teachers easy because the resources attracted and increased the attention of the pupils and students in the respective classrooms, they made the lessons lively and interesting, and motivated them to learn. This situation underlines Wathore's (2012) idea that instructional resources are used in teaching and learning to focus attention of students, to motivate learners' interest, to make learning more practical, exciting and lively. Ruis, Muhyidin and Waluyo (2009) adds that teaching resources help to increase learners' motivation to learn, reduce boredom in the classroom and make the teaching learning process more systematic. The teachers made it clear that the use of the

instructional resources in teaching made the pupils and the students to participate in the lessons but teaching without the use of resources makes it difficult to get students and pupils to contribute in class. This means that the use of the instructional resources helped to involve the learners in the lessons.

Again, as the Emena Primary Six teacher who used the instructional resources on „perspective“ commented, the resources made it unnecessary to take the pupils out of the classroom to use the road as a means of seeing „perspective“ as reality or for further explanations on the concept. Okobia (2011) attest to such a situation by asserting that instructional media can be used to depict everything outside of the classroom. The KNUST SHS teacher who tested resources on „Colour“ and „Figure Drawing“ made it clear that teaching with instructional resources takes fewer periods to teach than teaching without instructional resources (personal communication, June 09 and July 08, 2014). To Wathore (2012), instructional resources are used in teaching and learning to save teachers“ time for presentation. Also because of the attractiveness of the resources, they helped to boost the morale of the pupils in doing their practical works. In the view of Aloba (2010), the physical features of learning resources are a very important factor in their selection and use. Some of the „stitching“ works produced by the Emena Primary Six pupils were amazing. Upon inquiry on whether the pupils already knew how to do those particular stitches prior to the lesson, it was found that they had not previously learned to make those stitches until their teacher used the „Stitching“ resources to teach them. This teacher had earlier articulated that it was her first time of teaching that topic because she did not have an instructional resource to help her teach the lesson and she also did not know how to do the stitches. This experience suggests that if this teacher had not been provided a sample resource to teach with and also trained to be able to do

the stitches, the pupils were not going to be taught the lesson on „stitching“ and the abilities that the pupils exhibited would not have been uncovered.

The interviews brought to the fore that some of the Creative Art and Basic Design and Technology (BDT) teachers had never taught lessons on „weaving and stitching“, and „hand papermaking“ and were doing so for the first time. The teachers were not teaching the lessons because they lacked the skills to do the weaving and stitching, as well as hand papermaking, instructional resources were not available, and they lacked materials teachers and students could work with. Here the training, the developed instructional resources and the idea of using waste materials helped to remove the obstacles that prevented the teachers from teaching the lessons.

Over all the teachers acknowledged that the students and the pupils understood what they were taught better with the use of the sample instructional resources because during those lessons, the learners were able to answer verbal questions very well than in previous lessons they taught without the use of the resources. The teachers who made the learners do written tests and practical works also acknowledged that the learners performed better than was previously the case when they taught the same lessons without using any resources. It is clear from the teachers' communication that the resources improved their teaching outcomes in line with Yildirim's (2008) assertion that when instructional resources are included in educational programmes, learning improves. Moreover, all the conditions that the teachers cited as a result of using the developed instructional resources were all positive situations that helped to improve and enhance teaching and also reflected successful learning and academic performance of the learners in both the theory and practical lessons. On the other hand, the scenarios the teachers described as a result of teaching lessons on the same topics without using any instructional

resources were all situations that negatively affected teaching, learning and the learners' performance.

The teachers' description of teaching and learning situations with and without instructional resources attest to the fact that classroom use of appropriate instructional resources is a very important aspect of education and for that matter if such resources are not used for teaching and learning it takes away a lot of important ingredients in the educational process. The underlying principle is that the absence of instructional resources such as pictures, models or real objects makes it difficult for learners to understand communicated information. In particular, young learners usually lack the ability to assimilate concepts abstractly, making it imperative for their teachers to adopt the use of interactive instructional resources for their lessons (Aina, 2013; Adeyemo, 2010). Poor academic performance among learners might therefore be linked to the abstract nature of lessons taught in many classrooms (Recece & Walker, 2001). As Wathore (2012) and Ruis, Muhyidin and Waluyo (2009) have also emphasised, teaching and learning materials play important roles in motivating learners to develop high interest in the subject matter. They also improve the teacher's competency in lesson delivery and make it easy to achieve lesson objectives. This means teaching with instructional resources offers latitude for shaping lessons to students' interests and needs, thereby enhancing the potential of these teaching strategies to be realised in the classroom (Igbo & Omeje, 2014). Simply put, the primary purpose of instructional resources is to make teaching and learning more effective and also facilitate it (Benson & Odera, 2013; Saglam, 2011; Azikiwe, 2007 as cited in Aloba, 2010; Scanlan, 2003; Naz & Akbar, n.d). The espoused advantages of instructional resources in the classroom, vis-à-vis the environmental menace of waste materials, and unavailability of instructional resources in Ghanaian schools makes it imperative for all categories of teachers in Ghana to be trained to turn freely available waste

materials into useful resources that could be used to improve teaching and learning outcomes. The use of such „waste“ instructional resources would improve teacher professional practice in the classroom and thereby raise academic performance for all learners.

It must be emphasised here that no challenges were encountered with the use of the sample instructional resources in any of the learning environments where the testing occurred. The overall conditions under which the teachers used the resources and the feedback they articulated did not project any threat to the successful use of any of the resources. Rather, the teachers made some suggestions that they assumed should be considered when making other samples of the resources as explained in points 3, 5, 6 and 7 of Section 4.3.1 (KNUST SHS, KNUST JHS, Emena Primary, KNUST JHS respectively). This confirms that the developed instructional resources were appropriate for the purposes for which they were created.

Objective 2): To train selected Art Education students, practising Art teachers and College of Education students the process involved in the exploration and development of instructional resources from the waste materials.

5.5 Evaluation of the Training Sessions with Art Education Students, Practising Teachers and College of Education Students

5.5.1 Why the Training was Necessary

Primary and Junior High School teachers who tested the sample instructional resources requested to keep them for sustained teaching because of the positive effects the resources they

tested had on the lessons they were used to teach and their report that the samples made their work easy. Some of the teachers also requested for resource persons to come to their schools and train them to be able to create their own instructional resources. For instance, during the testing of the sample resources, one of the Junior High School teachers who was pursuing a Diploma programme in Education with the Kumasi campus of University of Education came to collect some resources for teaching practice purposes because it was compulsory for her to use instructional resources for teaching as part of her assessment requirements. According to her, because the use of the resources made her lessons very practical, her supervisors commended her for doing an excellent work as though the resources were created by her. After this exercise the teacher returned the resources and also reverted to teaching her students without instructional resources. This situation calls for training of school teachers to enable them know how they can create their own resources for teaching interactive lessons to their students.

Most of the time appropriate instructional resources to be used for teaching are not available to teachers due to financial constraints. When faced with this situation there will be the need for every teacher to acquire the skills for improvisation of instructional resources using free items that would otherwise become waste that pollute the environment (Alobo, 2010). Lack of adequate professional training is a major problem militating against the effective use of local resources for teaching (Maduabunmi, 2003 as cited in Oladejo et al., 2011). There is therefore the need for definite well-planned training programmes in teaching and learning resources improvisation for teachers. This should include regular meaningful workshops on improvisation techniques to improve and up-date teachers' competence in instructional resource improvisation (Isola, 2010 as cited in Oladejo et al., 2011). The discussion by these authors also makes it clear that, teachers must be well trained for them to be able to create appropriate resources to enhance teaching and learning in the classroom.

5.5.2 How Participants Involved Themselves in the Training and What Worked for the Training Sessions

The main purpose of the training was to equip the participants with the knowledge and skills of recycling waste materials to produce useful and appropriate instructional resources for teaching Art. This purpose was carried out successfully. All the participants who were trained got involved in the training sessions quite well. The behaviour of some of the Art Education students during the introductory session, which was on the benefits of waste as instructional resources to education and the environment, communicated the impression that they saw the training as extra course load. Some even asked to know whether their participation would count as course work. But with this initial behaviour the first training session which was on hand papermaking saw all the participants with the exception of one actively involving themselves in the process. Finally, instead of producing two sheets of hand-made paper each for the exercise, some produced three or four sheets. Getting to the end of the session when the paper pulp was getting finished, two participants were literally found struggling over one of the vats to obtain the last bits of pulp to enable them produce more papers. From this point on the Art Education students actively participated in the training sessions.

Unlike the Art Education students, the practising Art teachers and College students showed interest in the training from the very beginning to the end of the sessions. They involved themselves in the processes so they could learn to create their own samples of the resources. To encourage active participation in the training sessions, the participants were made aware of the effects waste materials have on the environment and the fact that using waste materials to produce instructional resources cost little or nothing at all. Although at some points of the sessions some participants had difficulty producing the resources, additional training and

guidance helped them to overcome their difficulties and enabled them to create samples of the resources.

The instructional plans that were designed for the training ensured that each instruction was well thought out before using them to teach the respective topics. This resulted in carrying out each instruction smoothly and very systematically. The use of Dale's Cone of Experience, Multiple Intelligences and Active Learning theories in planning and delivering the instructions also ensured the use of different teaching and learning styles in carrying out the training. This helped to make all the instructions very practical and activitybased, which enabled participants to easily assimilate what they were taught. Dale's Cone of Experience was demonstrated by first showing and explaining the researcher-produced samples of instructional resources to participants throughout the training, and via step-by-step demonstrations that helped the participants to easily grasp the production processes for creating the resources. Again based on Dale's Cone of Experience and Active Learning, the participants were made to do hands-on activities to create samples of the instructional resources. This process was acknowledged by one of the College students whose answer to the question "Will you be able to create samples of the resources on your own for teaching?" was "Yes, because you took your time to teach us the processes step-by-step so I will be able to produce them on my own for teaching" (personal communication, December 09, 2014). Incorporating the theory of Multiple Intelligences ensured the use of Interpersonal Intelligence which involved engaging the participants in discussions and sharing of ideas to produce the resources. Exercising Intrapersonal Intelligence also induced the participants to individually come up with ideas to create the resources; Spatial Intelligence ensured participants utilised their artistic abilities in creating the resources while Linguistic Intelligence was employed to make some participants talk about their developed resources.

During the training the participants were advised not to just copy and repeat what they were taught, but were encouraged to bring out their own ideas for producing the samples. This level of creativity was mostly exhibited by the Art Education students when they created resources for teaching „Colour“, „Perspective“ and „Elements and Principles of Design“. The practising Art teachers and the College students also added their ideas in creating the resources for teaching the „Elements and Principles of Design“. This process must be encouraged in subsequent training because it helped the participants to get involved in critical thinking to come up with ideas and designs to create appropriate instructional resources for teaching. The ability of the participants to create sample resources showed good assimilation of what they were taught during the training. The outcomes of the training show that if teachers are trained in recycling via practical activities to create instructional resources they would grasp the process and use it to produce instructional resources to enhance teaching and learning in the classroom.

5.5.3 Challenges Encountered During the Training and What Must be Improved or Changed in the Training

The training for the Art Education students took place in a conventional classroom full of chairs and tables which made it very difficult to move around and work freely during the training sessions. This situation forced some of the participants to work outside the classroom during the group work sessions. The Art Education students complained that the exercise should have been done in a spacious art studio. Unlike the Art Education and College students, the working schedules of the practising Art teachers did not allow for them to be grouped for the training. They had to be trained individually which was difficult and very stressful because the instructions had to be planned and carried out several times for each participant teacher. Even with the individual training some of the teachers were visited two to three times on different

days but they could not make time to be trained because of their tight schedules at school. One problem noticed when the practising Art teachers were visited in their schools was that all the teachers did not have proper storage spaces, so the resources were stored at places that were not too convenient for the storage of instructional resources. This situation can result in the damage of the resources in a very short time.

In future, such a training must be organised in a very spacious room with appropriate furniture where participants can move and work freely to allow for the comfort of participants and also the smooth running of the training. It was planned that some of the instructions would be executed in two days instead of one but the time schedules of the participants did not allow for that in this case. Although each training session was carried out in a day, it would have been better if the instruction on carving the hard foam to create resources for teaching „Figure Drawing“, the instruction on producing resources for teaching the „Elements and Principles of Design“ and the instruction on creating resources for teaching „Weaving and Stitching“ were treated using two or three days. This is necessary because these three instructions involve a lot of work so if the activities are divided within two to three days it will help participants assimilate what they would be taught better.

Also organising the participants to work in groups made them discuss and come up with different ideas to create samples of the resources, but in future training sessions, individual participants must also be assigned to create samples of the resources in addition to the group works. This will help to ensure that the individual participants can also create samples of the resources on their own. It was also planned that the participants would do presentations on some of their developed resources like resources for teaching „Elements and Principles of Design“ and „Visual Communication“. This was to allow the participants explain how their produced resources would be used in teaching the „Elements and Principles of

Design“ and „Visual Communication“. This activity could not be done properly during the training but it must be done in subsequent training.

5.5.4 How Participants Articulated the Usefulness of the Training

All the participants who were trained articulated that the training was very useful and offered a good experience. They shared that the training enlightened them to know and acquire the skills on how to create teaching and learning materials using waste materials. One Art Education student mentioned that “The training will ensure that we will be able to create resources for teaching without asking money from our heads at school for such purposes”

(personal communication, November 27, 2014). One practising Art teacher explained that “We really wanted to create resources for teaching in our department but we were not provided with the materials we requested for and we never thought of using waste materials so this exercise was very helpful” (personal communication, November 18, 2014). The College students agreed that the training was very useful to them because they would need to use such resources to teach the pupils at the different educational levels they would be posted to after they graduate. They stressed that the training would help them to teach interesting lessons, and to make their lessons real and practical to the pupils. All the participants expressed that the use of waste materials to create resources can help to reduce waste disposal in the environment. The feedback from the participants about the usefulness of the training confirms the importance of training teachers to recycle waste materials that they do not need to buy into creative resources for teaching. This is important because equipping basic and senior high school teachers with the knowledge and skills they need to recycle and create instructional resources implies ending the familiar slogan “there is no money to buy materials” that was often heard from the teachers as their expression of concern over non supply of instructional resources needed in the schools and the lack of

funding to buy the materials they could use to produce the resources for classroom use and the show of ignorance on how to collect and use waste materials for the purpose.

5.5.5 What Participants Intended to do with the Knowledge and Skills They Acquired from the Training Plus What Participants are Doing with the Knowledge and Skills They Acquired from the Training

With the exception of one College student, all the study participants reported that they would use the skill and knowledge they had acquired to create resources for teaching in their classrooms. One College student lamented that he would not get time to produce the resources for teaching. This made his course mates hoot at him saying “You will be a bad teacher” to which he expressed that he would make time to create his own resources for teaching. However, this single negative response from the College student suggests the possibility of some of the teachers who had been trained to recycle waste to create instructional resources for classroom use may still not make time to create their own resources for teaching. When this happens then the problem would move from teachers not having materials and skills to create resources for teaching to teachers not making time to create instructional resources for teaching. Such an attitude would impact negatively on teaching and learning in the basic and senior high schools. Whatever the situation, it is imperative that the teachers make time to create their own resources so they would teach effective lessons to support positive learning outcomes for their students and pupils. Just as it is standard teacher professional practice under Ghana Education Service regulations for teachers’ lesson notes to be inspected and instructional resources usage is expected of teachers (Opoku-Asare, 2006; Boafo-Agyemang, 2010; Arthur, 2011), school heads and supervisors can also enforce sustained use of appropriate instructional resources in the

classroom by putting measures in place to inspect the resources the teachers mention in their lesson plans and their use as well.

Some of the participants shared information on how they were already using the knowledge and skills they had acquired as follows: one practising Art teacher articulated that “Now apart from just writing notes during Creative Art periods, I am using the resources I have created to teach the pupils” (personal communication, November 05, 2014). This statement implies that this teacher’s pupils were also benefiting from the kind of interactive teaching that should foster development of creative abilities that every pupil in Ghana is expected to experience from Creative Art activities. One Art Education student who works at the Teachers’ Resources Centre at Nsuta in the Sekyere Central district of Ashanti Region reported that he was using the experience from the training sessions to create instructional resources to help raise the standard of teaching and learning in the district. As Levlin et al. (2010) have confirmed, the more knowledgeable people are about recycling, the more likely they are to practise it. Another Art Education participant also made it known that “As part of my Diploma in Education programme I used the knowledge from the training to create resources for my teaching practice and all my supervisors were amazed at how the use of the resources got the students involved in the lessons” (personal communication, November 27, 2014). This participant added that “My colleagues I was offering the programme with later asked me to teach them how they could also create such practical resources for teaching science, maths, and agriculture because all of them could only make cardboard illustrations for their teaching practice” (personal communication, November 27, 2014). This proves that it is not only Art teachers who need to be trained on how to create instructional resources for teaching but all teachers from other subject areas also need to be trained on how they can recycle to produce instructional resources for teaching.

Objective 3): To design a teaching guide that Art Tutors in Ghana's Colleges of Education could use to train their students, which can also be used to train practising Art teachers in waste recycling to create instructional resources for teaching Art.

5.6 Teaching Guide for Training Art Teachers to Create Instructional Resources for Teaching Art

In line with Objective 3 of this study, a teaching guide (see Appendix G) was designed as a means to help more teachers learn how to create instructional resources from recycled waste materials. As a teaching guide for in-service training of practising Art teachers and preservice training of College students in the Colleges of Education in Ghana, to recycle waste into instructional resources, users are assured of its authenticity as the design was based on the instructional plan that produced the successful outcomes that were experienced when it was used to train the Art Education students, practising Art teachers in Primary, Junior and Senior High Schools and College students as vividly described in this report. The structure and content of this guide were further informed by the results and findings of this research study. The teaching guide is in two parts; six lessons in Creative Art focus on the following topics:

- Elements and Principles of Design
- Colour
- Weaving and Stitching
- Printmaking
- Perspective
- Construction and Assemblage

Part 2, which has nine lessons in Basic Design and Technology (Visual Art option) and General Knowledge in Art, are on the following topics:

- Hand papermaking
- Principles of Design

- Colour
- Weaving and Stitching
- Printmaking
- Visual Communication
- Perspective
- Construction and Assemblage □ Figure Drawing

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CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The chapter outlines the summary of findings from the study, conclusions drawn from the findings and recommendations.

6.1 Summary of Findings from the Study

The research indicates that waste fabrics, waste papers and waste plastics can be safely recycled to create useful and appropriate instructional resources for teaching selected topics in Creative Art, Basic Design and Technology and General Knowledge in Art. Explorations conducted with the waste materials in using them to create instructional resources proved that all the waste paper, fabric and plastic materials chosen for the experiment could be used for creating resources for teaching Art. The instructional resources produced out of the waste materials made it possible for the participating Primary, Junior and Senior High School Art teachers to test the variety of resources which made the lessons they taught interactive and interesting to their students and pupils.

Considering the resources that were tested by using them to teach, the resources for teaching „Hand Papermaking“ made the pupils see samples of handmade papers, and also enabled the pupils to follow the processes that they were taught by their teachers to also produce samples of what they saw. The resources for teaching „Colour“ also made the pupils and students to be involved in the lessons because the resources made the lessons very practical which helped the pupils and students to be able to answer questions on the lessons very well. The resources on „Perspective“ also made the lessons practical and real to the pupils and students which helped to catch their attention for them to concentrate on the lessons. This atmosphere made it possible and easy for the students and pupils to do practical works on the lessons correctly plus they were able to answer questions on the lessons very well. The resources on „Figure Drawing“ helped the students to draw the parts of the human figure correctly, and although some students found it difficult to join the parts of the figure together in drawing proportionately, after a month’s practice the students were able to draw the human figure

proportionately than previously when students were taught the lesson without any instructional resources.

The resources on „Elements and Principles of Design“ made lessons interactive and involving for the pupils, students and teachers which helped the pupils to create correct and interesting practical works. With the use of the resources on „Weaving and Stitching“, the pupils were able to create their practical works excellently as they saw what they were supposed to do with the help of the instructional resources. The use of resources on „Visual Communication“ helped the teacher and pupils to discuss issues on layout designing and qualities of a good poster which helped the pupils to be able to create good visual communication works. The resources for teaching „Printmaking“ made it very easy for the students and pupils to assimilate the types of printing and the processes involved in each type and used it to do their practical works. The resources on „Construction and Assemblage“ also helped the teachers to teach the construction and assemblage lessons for the pupils to also creatively construct useful and interesting items.

An important aspect of the project was the training that was organised for selected students and teachers to train them to be able to recycle waste materials to create useful and appropriate instructional resources for their classrooms to enhance teaching and learning. Considering the training sessions with the Art Education students, the students generally saw the exercise as useful and involved themselves to learn the processes that they were taught. The students are also using the knowledge and skills they acquired from the training to enhance teaching and learning in divers situations as was indicated under section 5.5.5. The practising Art teachers also attested that the training was very useful to them which they will use to create resources for teaching in their classrooms. Again the College students also saw the training as a useful exercise for them which they intend to use to create instructional resources to enhance their lessons when they graduate as teachers. The results and findings from this research study

made it possible to develop a teaching guide for training Art teachers and College students how they can recycle and create instructional resources for teaching Art.

6.2 Conclusions

The research work confirms that paper, plastic and fabric waste materials can be recycled to create appropriate instructional resources that are very practical for teaching and learning of Creative Art, Basic Design and Technology and General Knowledge in Art in Ghana. From the testing of the instructional resources it became clear that when appropriate instructional resources are used for teaching and learning, lessons become more practical, interactive, interesting and real to pupils and students, which helps them to understand what they are taught better and enables them to achieve more in their academics (Igbo & Omeje, 2014; Nwike & Onyejegbu, 2013; Popoola, 1980 as cited in Oladejo, Olosunde, Ojebisi & Isola, 2011; Croft, 2000). It was deduced from the study that Art Education students, practising Art teachers in the schools, and College students can all acquire skills and knowledge in recycling to create instructional resources for teaching and learning purposes if they are taught the practical means of doing so. From the training it was also clear that the Art Education students, Art teachers and College students appreciated the resources training sessions as a very useful exercise as it introduced them to how they can recycle waste to create instructional resources for teaching.

The collection and use of the waste paper, plastic and fabric materials for developing the instructional resources rid the environment of pollution and helped to protect the environment. If teachers in Ghana consistently decide to recycle waste to create instructional resources for teaching and learning, it will bring about two major benefits: the pupils and students in Ghana will be taught more effective lessons from which they would perform better in their academics;

the process will also help to reduce the invasion of filth in the environment and protect it for human, plant and animal life to thrive. The attached teaching guide would also enable Art teachers, College students and other categories of teachers who are interested in recycling, to acquire the skills and knowledge involved in recycling waste to create instructional resources for teaching Art and other subjects.

6.3 Recommendations

1. Waste materials should be explored and recycled by classroom teachers for effective teaching and learning of Art and other subjects at the Primary, Junior and Senior High Schools in Ghana.
2. Head teachers at the basic and Senior High School levels should encourage the use of instructional resources in the classroom by inspecting resources the teachers mention in their lesson notes and also actively monitor their use in the designed teaching and learning activities.

3. Practising teachers already engaged in the teaching and learning of Creative Art, Basic Design and Technology, and General Knowledge in Art in the schools requested to be trained on how they can create their own resources for teaching. Therefore the researcher recommends that the Ghana Education Service should organise periodic training for classroom teachers to acquire practical skills for recycling waste to create instructional resources that are appropriate for the particular subjects they teach so they can raise the academic performance of their students and pupils.
4. The personnel's at the respective Teachers' Resources Centres across the country should use the developed teaching guide to train Art teachers at the Primary, Junior and Senior High School levels on practical ways to recycle and create instructional resources for teaching and learning in the districts. This will ensure sustainable use of basic instructional resources by teachers.
5. Art Tutors in Ghana's Colleges of Education should use the developed teaching guide from this project to train their students on the practical ways to recycle and create instructional resources for teaching and learning.
6. Ghana Education Service should incorporate a course in the College of Education curriculum which will train the College students on simple and practical processes that they can use to recycle waste materials to create instructional resources for teaching and learning of all subjects.

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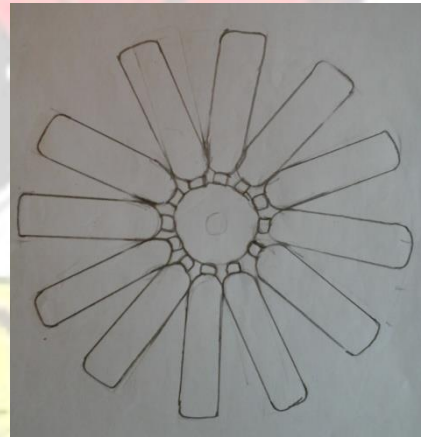
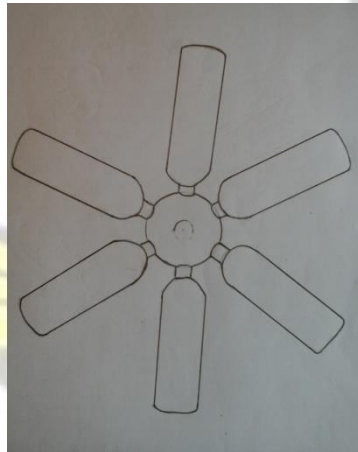
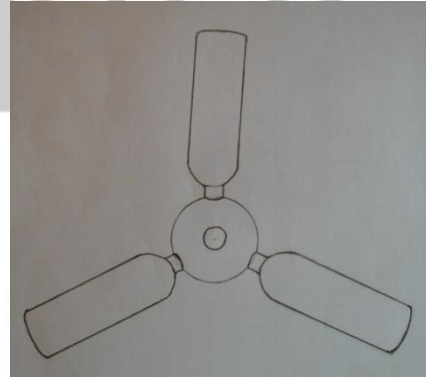
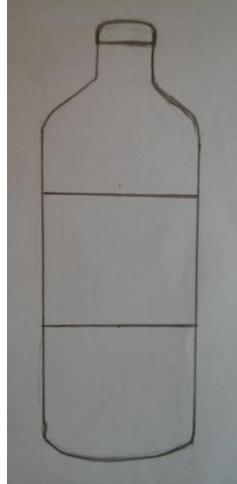
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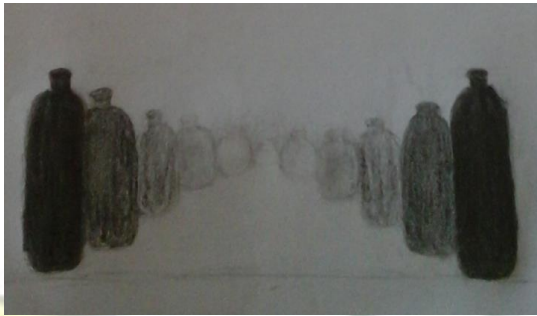
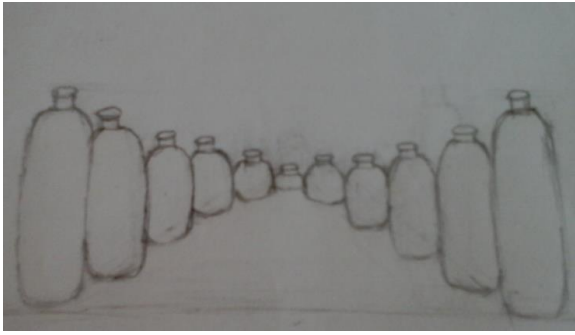


APPENDIX A: THE DESIGNS USED TO DEVELOP THE RESOURCES.

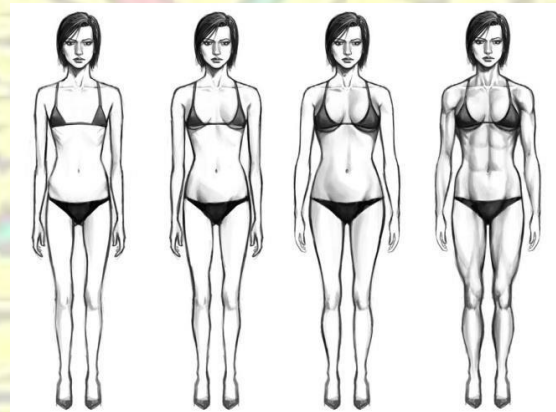
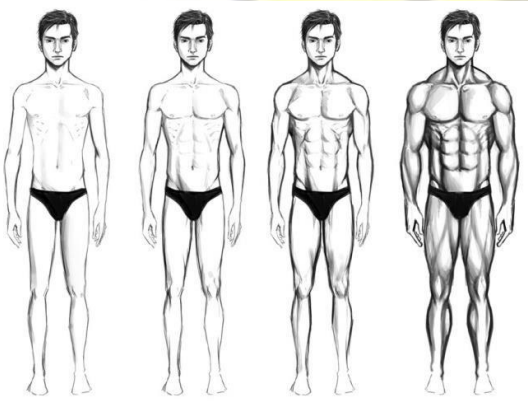
Designs for Resources on Colour



Designs for Resources on Perspective

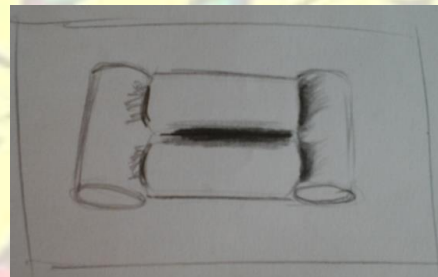
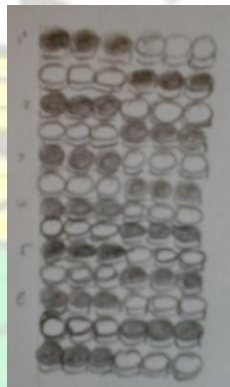
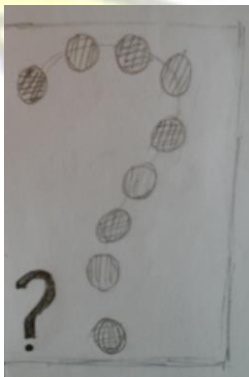
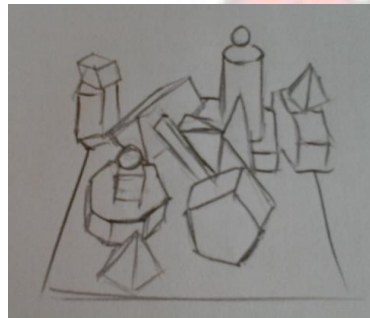
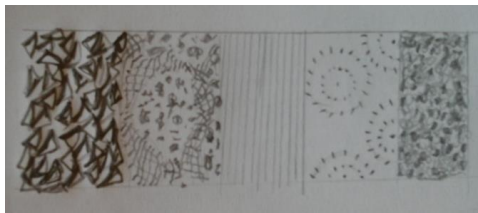
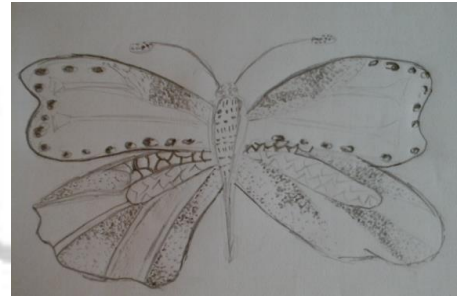
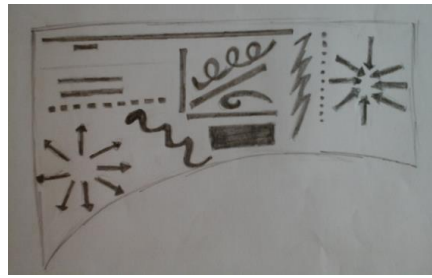
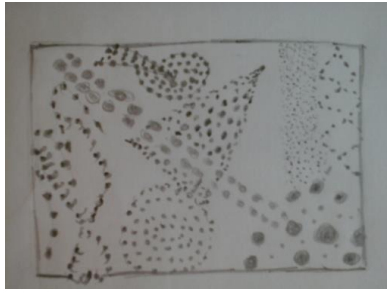


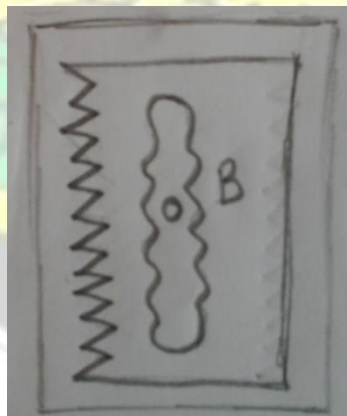
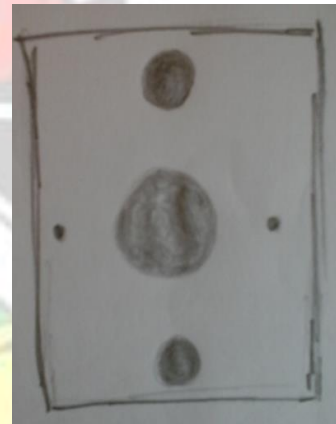
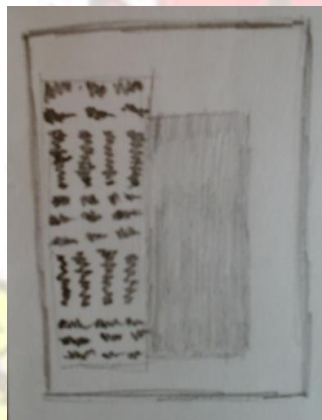
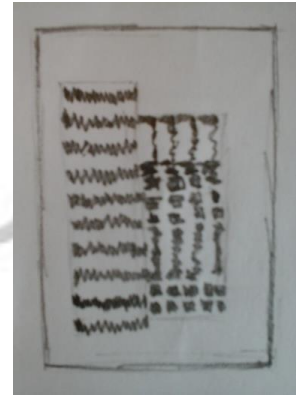
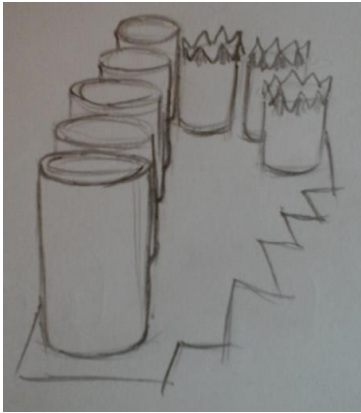
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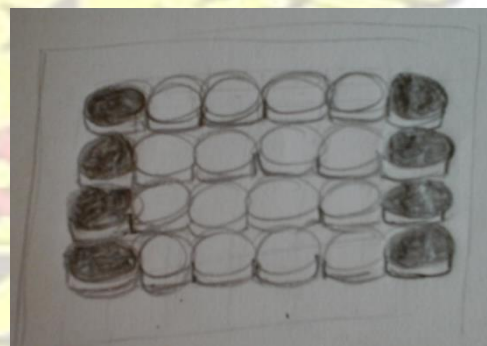
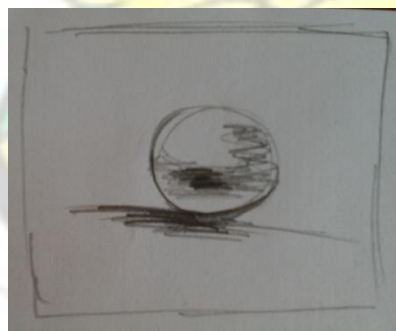
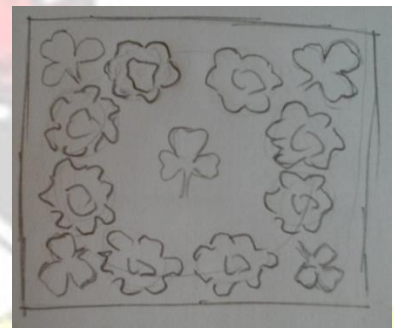
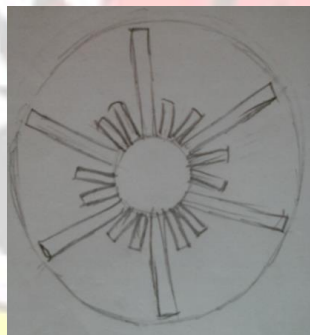
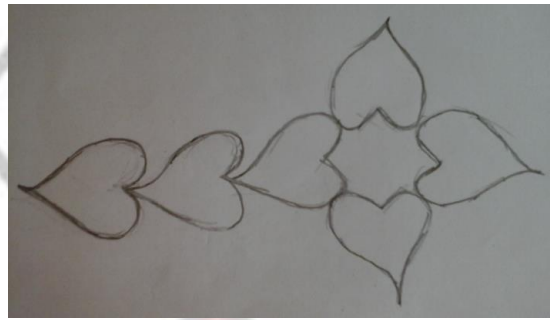
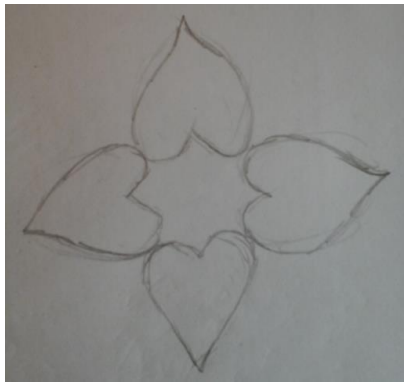


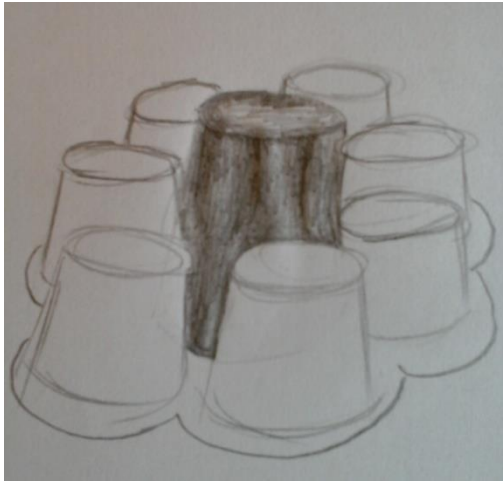
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Designs for Resources on Elements and Principles of Design



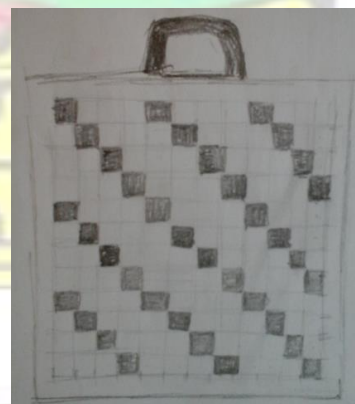
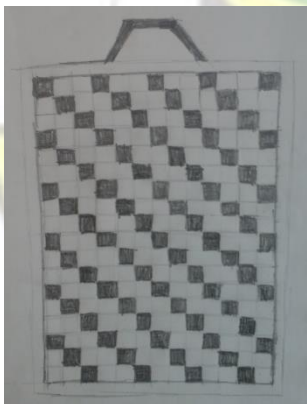
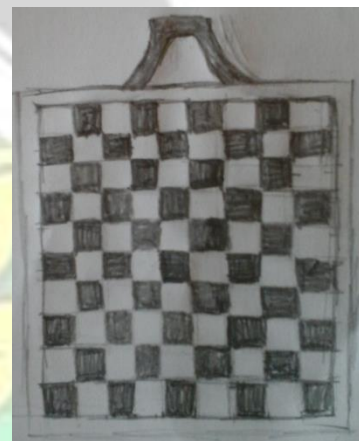
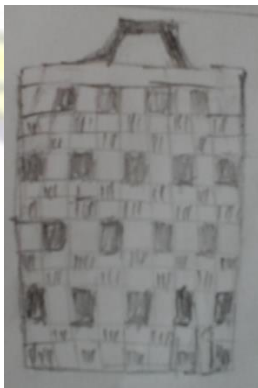


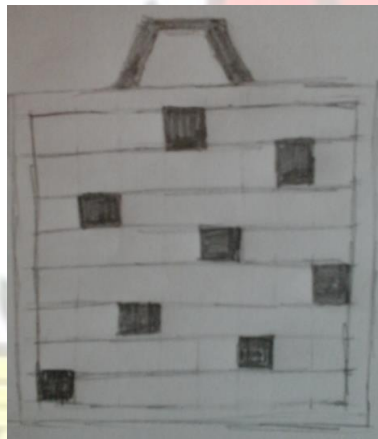
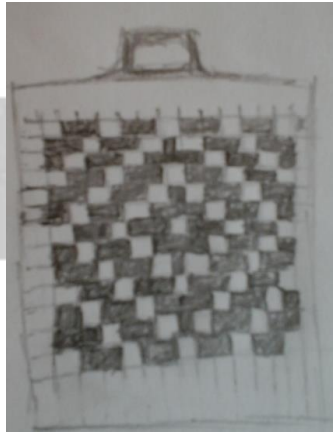
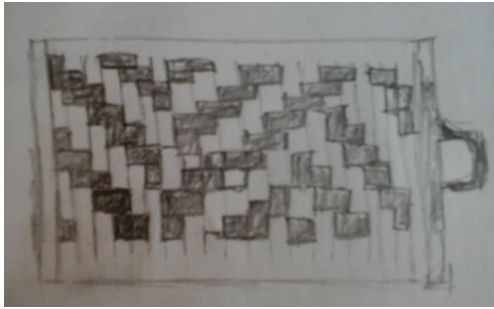




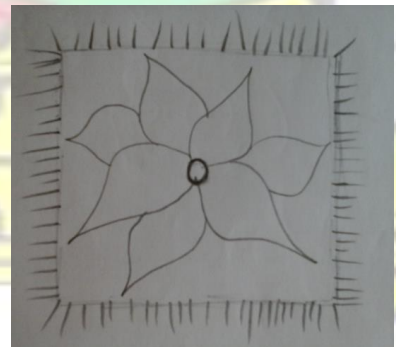
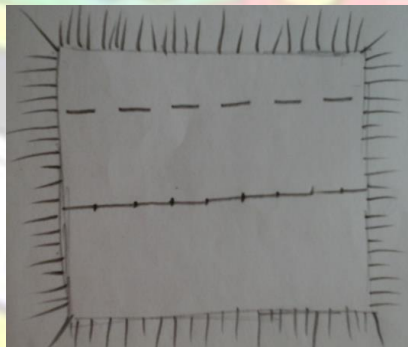
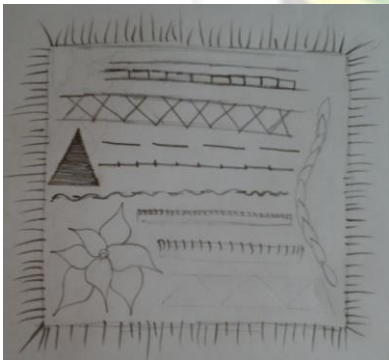
Designs for Resources on Weaving and Stitching

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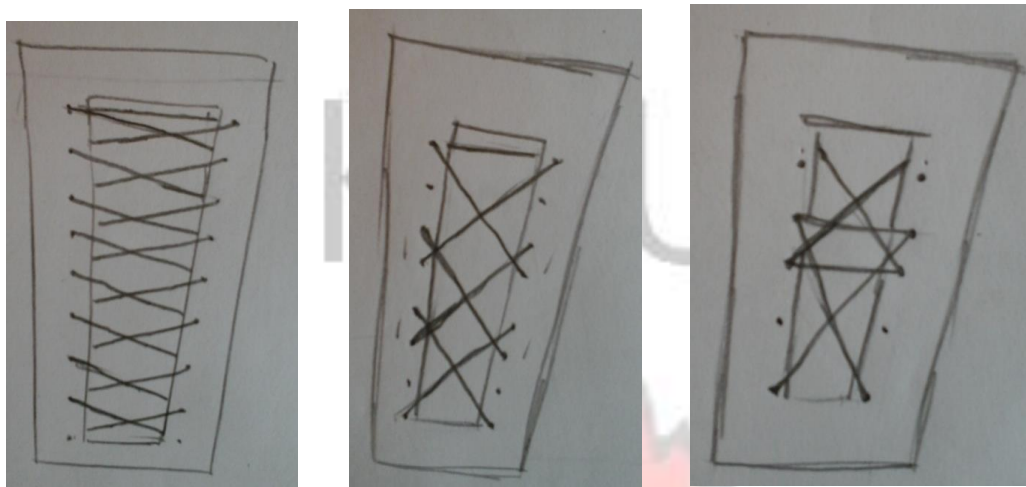




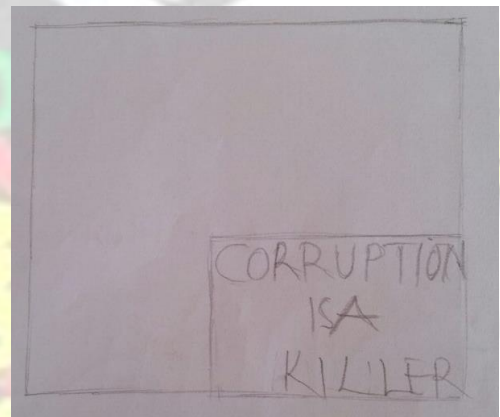
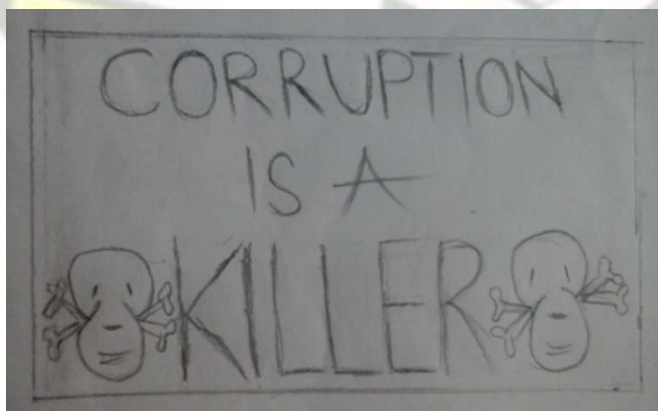
Stitching



Lacing




Designs for Resources on Visual Communication



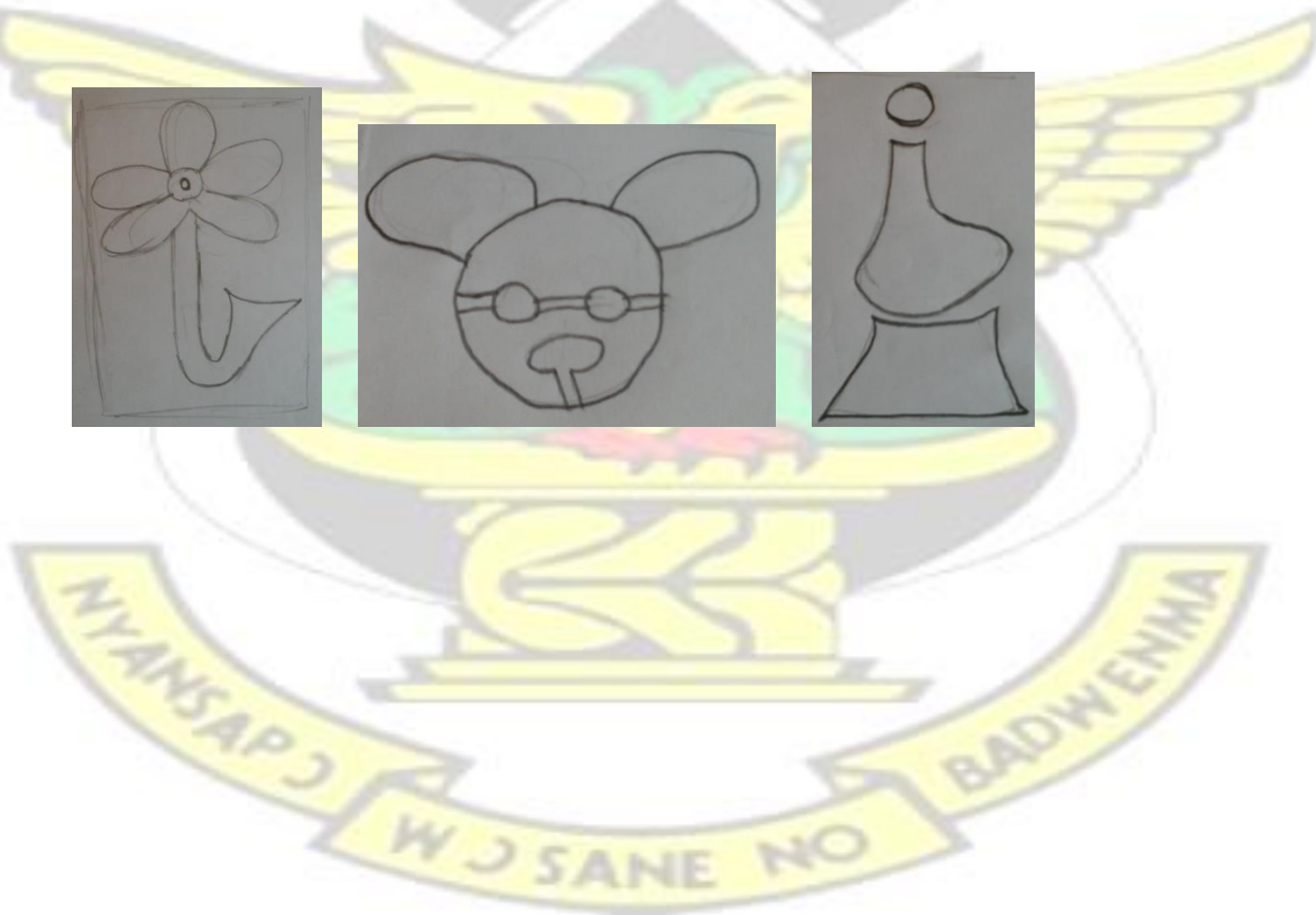
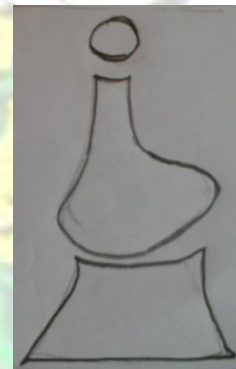
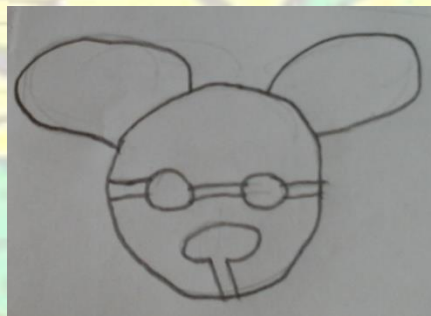
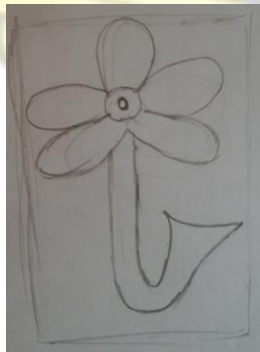
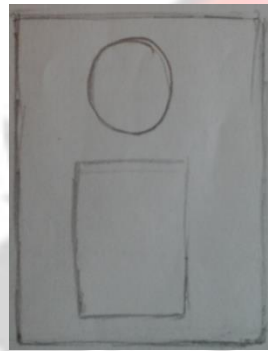
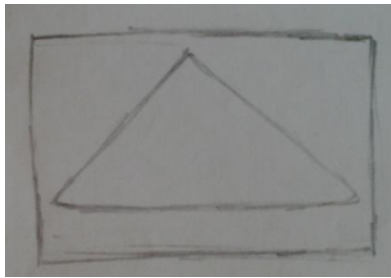
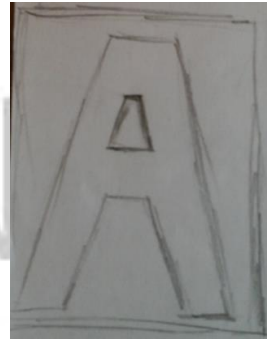
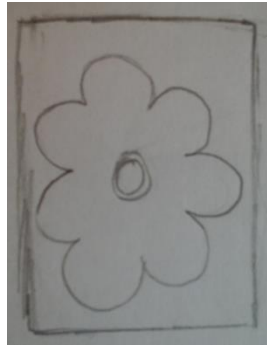
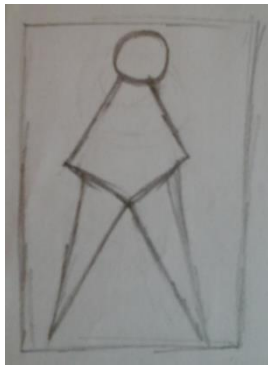
2 STOP 2
Child Abuse

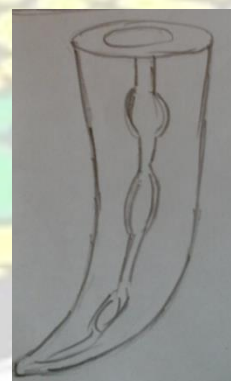
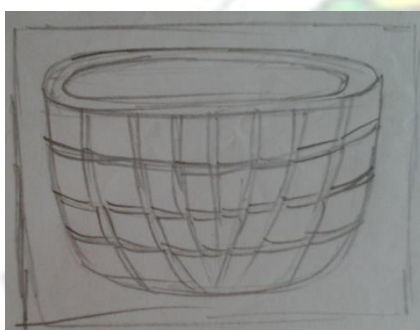
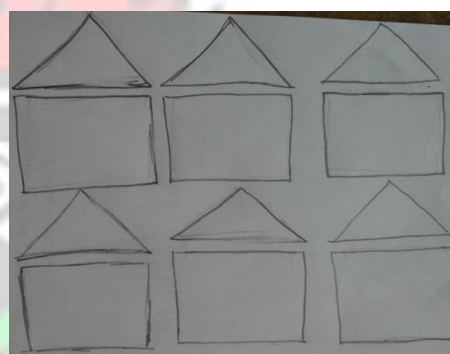
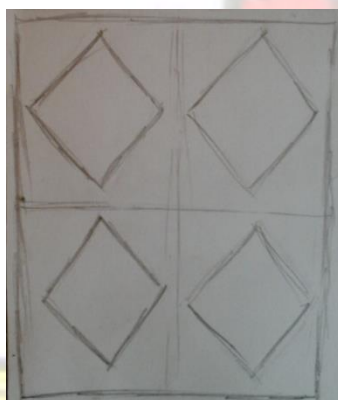
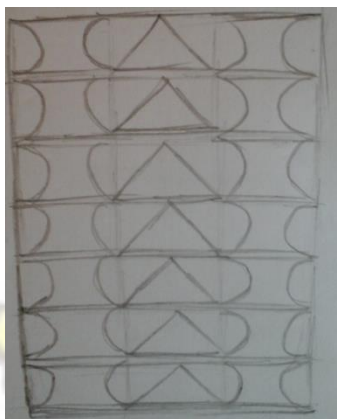
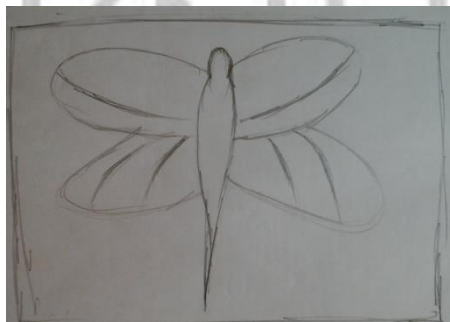
STOP CHILDAUSE
2

 Your Waste



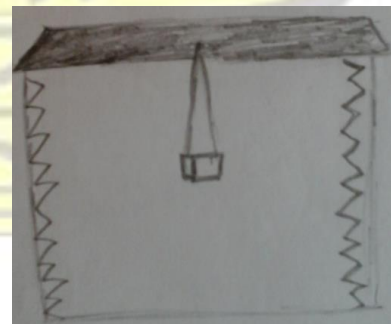
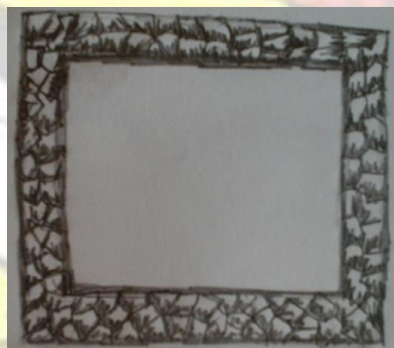
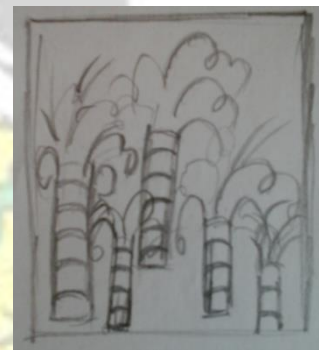
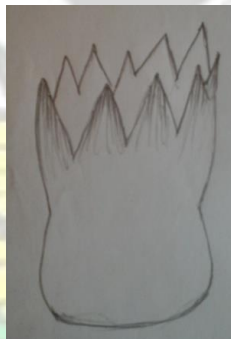
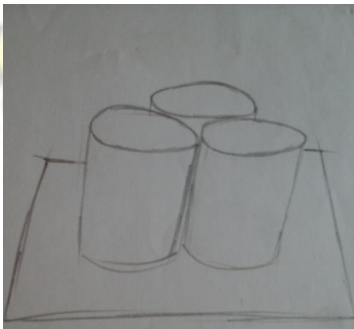
Designs for Resources on Printmaking

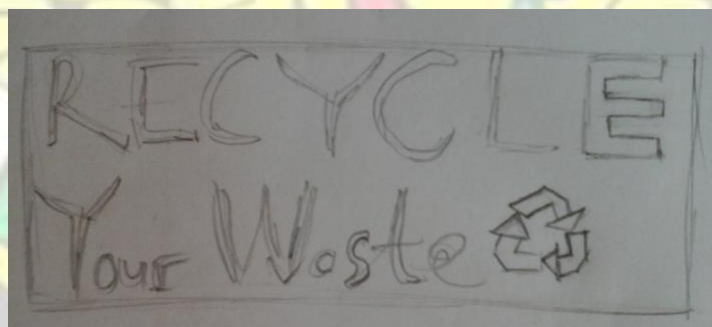
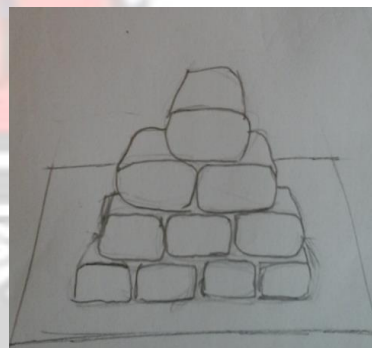
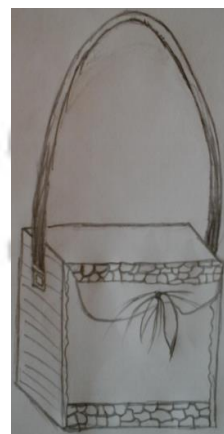
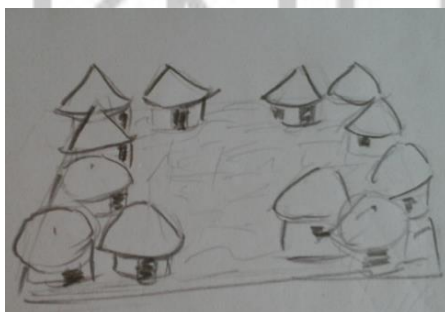
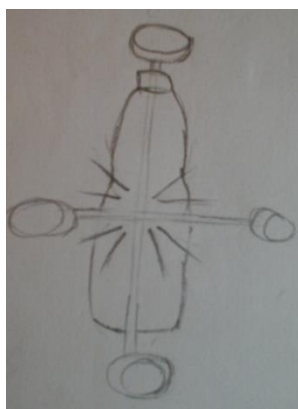






Designs for Resources on Construction and Assemblage





**APPENDIX B: OBSERVATION CHECK LISTS USED FOR TESTING THE
DEVELOPED INSTRUCTIONAL RESOURCES AND THE TRAINING SESSIONS.**

OBSERVATION CHECK LIST USED FOR TESTING THE RESOURCES.

The researcher looked out for the following:

1. How the students and the pupils responded to the use of the instructional resources in teaching them.
2. How the use of the resources involved the students and the pupils in the lessons.
3. The lesson atmosphere that the use of the resources created in the classroom.

OBSERVATION CHECK LIST USED DURING THE TRAINING SESSIONS

The researcher looked out for the following:

1. How the participants involved themselves in the training.
2. How participants created samples of the resources during the training.

APPENDIX C: INTERVIEW GUIDE USED TO COLLECT DATA FROM THE PRACTISING ART TEACHERS AFTER THEY HAD USED THE RESOURCES IN TEACHING AND LEARNING.

The following questions were asked:

1. Did the use of the instructional resources made it any easy in teaching the lesson as compared to teaching same lesson without the use of instructional resource? If yes how can you tell that the resources made it easy in teaching the lesson? If no how can you tell the resources did not make the teaching of the lesson easy?
2. Did the use of the instructional resources helped the students or pupils to understand what they were taught in the lesson better as compared to teaching same lesson without using such interactive instructional resources? If yes how can you tell that? If no how can you also tell that?
3. What were the differences in using the instructional resources to teach this lesson as against teaching same lesson previously without the use of such instructional resources?
4. What were the challenges you encountered in using the resources to teach that needs for them to be replaced entirely or that there should be some modifications to improve the instructional resource?

APPENDIX D: THE PLANNED INSTRUCTIONS USED FOR THE TRAINING.

Instruction plan 1

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Instruction Title: „Hand papermaking“ from waste paper and cotton waste fabrics that can be used to teach at Junior High School.

Rational: to equip participants with practical skills in recycling waste papers and fabrics to create resources for teaching „hand papermaking“.

The Big Idea: useful papers for art can be made from fabric and paper waste through „hand papermaking“.

Essential Questions:

- What is hand papermaking?
- What are the materials, equipment and tools needed for hand papermaking?
- Why is paper mulberry added to fabric and paper waste to make paper?
- What are the processes involved in hand papermaking?

Vocabulary Terms: paper mulberry, mould, deckle, vat, couching, inner bark,

Objectives: 1) To teach participants how to produce useful handmade papers from waste cotton fabrics and waste papers. 2) To make the participants experiment with drawing and painting mediums of their choice on the papers produced.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Intrapersonal, Spatial

Prerequisite skills and knowledge:

1. 2-D art production skills
2. Benefits of recycling to education and the environment

Materials, tools and equipment: cotton waste fabrics, paper waste, inner- bark of the paper mulberry plant, mould and deckle, water, pulp, buckets, vat (rubber pan), scissors, foam, metal plates, electric blender, caustic soda, knife, **Lesson procedure:**

Introduction

Teacher activity:

The researcher will use twenty minutes to introduce the idea of „hand papermaking“ with waste materials and paper mulberry to the participants. Samples of handmade papers from fabric and paper waste with paper mulberry will be made available to participants to have a feel of it.

Main Activity Teacher activity:

The researcher will use fifteen minutes to teach participants how to process the inner bark of the paper mulberry plant, waste fabrics and waste papers before they can be used to make papers.

The researcher will use ten minutes to charge a vat and demonstrate to participants how to use the mould and deckle to make papers and how to couch the wet paper on a drying plate for drying.

Participant activity:

Five minutes will be used to charge two vats, with one having waste cotton fabrics and paper mulberry pulp and the second one having in it waste paper and paper mulberry pulp.

Individually every participant will be required to produce a sheet of paper each during the training. This activity by participants will be allocated one hour. The participants will work on their papers with drawing or painting mediums of their choice after the training session.

Assessment for Objective 1: each participant will be required to show one successful produced handmade paper from either cotton waste fabrics or waste papers.

Assessment for Objective 2: each participant will be required to submit their experimented works on the handmade papers.

Instruction plan 2

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Lesson Title: Recycling waste scraps to create instructional resources for teaching the „elements and principles of design“ from Primary to Senior High School

Rational: to equip participants with practical skills in recycling to produce useful instructional resources for teaching the concepts involved in the „elements and principles of design“.

The Big Idea: instructional resources to communicate the concepts involved in the „elements and principles of design“ can be constructed with plastic, paper and fabric waste. **Essential Questions:**

- What are the concepts involved in the principles and elements of design?
- What are the tools and materials needed to recycle and produce resources for teaching the elements and principles of design?
- What are the processes involved in making instructional resources for teaching the elements and principles of design from paper, plastic and fabric waste materials?

Vocabulary Terms: elements, principles, emphasis, balance, texture, value, space, unity, line, rhythm, movement, form, shape, contrast, proportion/scale, harmony, variety

Objectives: 1) To teach participants to produce useful instructional resources for teaching the „elements and principles of design“. 2) To guide participants to discuss and use available waste materials to produce samples of instructional resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal, Linguistic and Intrapersonal

Prerequisite skills and knowledge:

1. 2 and 3-D art production skills
2. Benefits of recycling to education and the environment
3. The concepts involved in the elements and principles of design

Materials and Tools: waste fabrics, paper waste, plastic waste, glue, scissors, knife, **Lesson procedure:**

Introduction

Teacher activity:

Researcher will use five minutes to introduce participants to the session and show them samples of resources for teaching the „elements and principles of design“ made from waste materials.

Main Activity

Teacher activity:

Researcher will use two hours each in two days to teach participants to create instructional resources that can aid them in teaching the „elements and principles of design“ (Dot, line, shape, form, texture, value, space/proportion, emphasis, balance, unity, repetition, rhythm, movement, contrast, harmony and variety) from plastic, paper and fabric waste materials.

Participant activity:

Participants will be given 30 minutes to discuss and use paper, fabric and plastic waste to produce an instructional resource that can aid in teaching an element or a principle of design during the session in groups. Each group will be given 10 minutes to explain the element or principle they worked on. Individually participants will be asked to make samples of the instructional resources after the training session.

Assessment for Objective 1 and 2: the groups/individuals will be required to submit one successful produced resource for teaching an „element or a principle of design“.

Instruction plan 3

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Instruction Title: Creating instructional resources for teaching „colour“ from Primary to Senior High School using plastic waste

Rational: to equip participants with practical skills in recycling to produce useful instructional resources for teaching „colour“.

The Big Idea: useful instructional resources for teaching „colour“ can be made from plastic waste.

Essential Questions:

- What is colour?
- What are the materials and tools needed to recycle and produce instructional resources for teaching colour?
- What are the processes involved in producing instructional resources from plastic waste materials for teaching colour?

Vocabulary Terms:

Objectives: 1) To teach participants to produce useful instructional resources for teaching „colour“ from plastic waste. 2) To guide participants to discuss and use waste plastics and acrylic paint to produce instructional resources for teaching „colour“ at all levels of education.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning **Multiple Intelligences:** Interpersonal and Intrapersonal

Prerequisite skills and knowledge:

1. 3-D art production skills
2. Benefits of recycle to education and the environment

Materials and Tools: plastic waste, acrylic paint, water, mixing bowl, epoxy steel, knife, spoon, brush,

Lesson procedure:

Introduction

Teacher activity:

Samples of instructional resources for teaching „colour“ from Primary to Senior High School made with plastic waste will be made available to participants to see and have a feel of it.

Main Activity Teacher activity:

Researcher will use 30 minutes to teach participants to use waste plastics to create instructional resources for teaching „colour“ from Primary to Senior High School.

Participant activity:

Participants will be tasked to use 30 minutes to produce samples of the resources during the training in groups. Participants will be asked to individually produce samples of the teaching resources after the training session.

Assessment for Objective 1 and 2: the groups/individuals will be required to show their successful produced resources for teaching „colour“.

Instruction plan 4

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Instruction Title: Recycling to create instructional resources from waste scraps for teaching „weaving and stitching“ from Primary to Junior High School

Rational: to equip participants with practical skills in recycling to produce useful instructional resources for teaching „weaving and stitching“.

The Big Idea: instructional resources for teaching „weaving and stitching“ can be constructed with plastic, paper and fabric waste.

Essential Questions:

- What are the types of weaving and stitching?
- What are the materials and tools needed to recycle and produce instructional resources for teaching weaving and stitching?
- What are the processes involved in making instructional resources for teaching weaving and stitching from paper, plastics and fabric waste?

Vocabulary Terms: weaving, stitching, plaiting, knotting, lacing

Objective: 1) To teach participants to produce useful instructional resources for teaching „weaving and stitching“ from waste materials and to guide the participants to put into practice the processes and produce samples of the teaching resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal

Prerequisite skills and knowledge:

1. 2 and 3-D art production skills
2. Benefits of recycling to education and the environment

Materials and Tools: waste fabrics, paper waste, plastic waste, scissors, knife, needle, thread,

Lesson procedure:

Introduction

Teacher activity:

Researcher will use five minutes to introduce participants to the lesson and show them samples of resources for teaching „weaving and stitching“ made from waste materials.

Main Activity Teacher activity:

Researcher will use two hours each in two days to teach participants to create instructional resources that can aid them in teaching: plain weaving, twill weaving, satin weaving, different types of stitches, plaiting with two, three, four, five, six and seven strands, coiling and stitching, knotting with two and three strands and lacing from waste materials.

Participant activity:

Participants will work in groups to create samples of the instructional resources from waste materials during the training session.

Assessment for Objective 1: the groups will be required to show samples of the resources they will produce from waste materials.

Instruction plan 5

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Instruction Title: Creating instructional resources for teaching „printmaking“ from Primary to Senior High School from waste materials

Rational: to equip participants with practical skills in recycling to produce useful instructional resources for teaching „printmaking“.

The Big Idea: useful instructional resources for teaching „printmaking“ can be made from plastic and fabric waste. **Essential Questions:**

- What is printmaking?
- What are the materials and tools needed to recycle and produce instructional resources for teaching printmaking?
- What are the processes involved in producing instructional resources from plastic and fabric waste for teaching printmaking?

Vocabulary Terms: block or relief printing, intaglio printing, stencil printing, screen printing

Objectives: 1) To teach participants to produce useful instructional resources from plastic and fabric waste for teaching „printmaking“. 2) To make the participants practice to create samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal

Prerequisite skills and knowledge:

1. 2-D art production skills
2. Benefits of recycling to education and the environment

Materials and Tools: hard foam, Styrofoam, plastic bags, glue, knife, **Lesson procedure:**

Introduction

Teacher activity:

Samples of instructional resources for teaching „printmaking“ from plastic and fabric waste will be shown to the participants.

Main Activity

Teacher activity:

Researcher will use one hour to teach participants to use waste plastics and fabrics to create instructional resources for teaching „printmaking“.

Participant activity:

Participants will be tasked to create samples of instructional resources for teaching „printmaking“ in groups during the session.

Assessment for Objectives 1 and 2: participants will be required to show their successful instructional resources for teaching „printmaking“ from waste materials.

Instruction plan 6

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Instruction Title: Creating instructional resources from waste scraps for teaching „visual communication“ at Junior High School

Rational: to equip participants with practical skills in recycling to produce useful instructional resources for teaching „visual communication“.

The Big Idea: useful instructional resources for teaching „visual communication“ can be made from plastic, paper and fabric waste. **Essential Questions:**

- What is visual communication?
- What are the materials and tools needed to recycle and produce instructional resources for teaching visual communication?
- What are the processes involved in making instructional resources from plastic, paper and fabric waste for teaching visual communication?

Vocabulary Terms: visual communication,

Objectives: 1) To teach participants to produce useful instructional resources for teaching „visual communication“ from plastic, paper and fabric waste. 2) To make the participants practice to create samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal, Intrapersonal **Prerequisite**

skills and knowledge:

1. 2-D art production skills
2. Benefits of recycling to education and the environment

Materials and Tools: plastic, paper and fabric waste, glue, knife, scissors

Lesson procedure:

Introduction

Teacher activity:

Samples of instructional resources for teaching „visual communication“ from plastic, paper and fabric waste will be made available to participants to see and have a fill of it.

Main Activity

Teacher activity:

Researcher will use thirty minutes to teach participants to use waste materials to create instructional resources for teaching „visual communication“ at the Junior High level.

Participant activity:

Participants will be tasked to create samples of the instructional resources for teaching „visual communication“ from waste materials in groups or individually.

Assessment for Objectives 1 and 2: participants will be required to show samples of resources for teaching „visual communication“ from waste materials that they have produced.

Instruction plan 7

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Instruction Title: Recycling to create instructional resources for teaching „perspective“ from Primary to Senior High School

Rational: to equip participants with practical skills of recycling to produce useful instructional resources for teaching „perspective“.

The Big Idea: useful instructional resources for teaching the concept of „perspective“ can be made from plastic and paper waste.

Essential Questions:

- What is perspective?
- What are the materials and tools needed to recycle and produce resources for teaching perspective?
- What are the processes involved in making instructional resources from plastic and paper waste for teaching perspective?

Vocabulary Terms: perspective,

Objectives: 1) To teach participants to produce useful instructional resources for teaching „perspective“ from plastic and paper waste. 2) To guide the participants to produce samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal and Linguistic

Prerequisite skills and knowledge:

1. 3-D art production skills
2. Benefits of recycling to education and the environment

Materials and Tools: plastic bottles, box paper, acrylic paint, water, mixing bowl, glue, cutting knife, spoon, brush, **Lesson procedure:**

Introduction

Teacher activity:

Samples of instructional resources for teaching „perspective“ from Primary to Senior High School from plastic and paper waste will be made available to participants to see and have a feel of it.

Main Activity

Teacher activity:

Researcher will use one hour to teach participants to use waste plastics and paper to create instructional resources for teaching „one, two, three and aerial perspective“.

Participant activity:

Participants will be provided with waste plastics and papers to produce samples of resources for teaching „perspective“ in groups during the training session. Each group will be given 30 minutes to do their work and at least 5 minutes to do a presentation on their work.

Assessment for Objectives 1 and 2: the groups will be required to show and explain their successful produced instructional resources for teaching „perspective“.

Instruction plan 8

Subject: Date of Session:

Students: Male: Female: Total:

Level of group:

Instruction Title: Recycling to create instructional resources for teaching „construction and assemblage“ from Primary to Junior High School

Rational: to equip participants with practical skills in recycling to produce useful instructional resources for teaching „construction and assemblage“.

The Big Idea: useful instructional resources for teaching „construction and assemblage“ can be made from plastic, paper, and fabric waste. **Essential Questions:**

- What is construction and assemblage?
- What are the materials and tools needed to recycle and produce instructional resources for teaching construction and assemblage?
- What are the processes involved in making instructional resources from plastic, paper and fabric waste for teaching construction and assemblage?

Vocabulary Terms: construction, assemblage,

Objective: 1) To teach participants to produce useful instructional resources for teaching „construction and assemblage“ from plastic, paper and fabric waste. 2) To make the participants discuss and produce samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Spatial, Interpersonal

Prerequisite skills and knowledge:

1. 2 and 3-D art production skills
2. Benefits of recycling to education and the environment

Materials and Tools: plastic, paper and fabric waste, acrylic paint, water, mixing bowl, glue, knife, scissors, spoon,

Lesson procedure:

Introduction

Teacher activity:

Samples of instructional resources for teaching „construction and assemblage“ from waste materials will be made available for the participants to see.

Main Activity

Teacher activity:

Researcher will use one hour to teach participants how the resources were created with the waste materials.

Participant activity:

Participants will be asked to use 30 minutes to create samples of the resources in groups during the training session.

Assessment for Objectives 1 and 2: the groups will be required to show their produced resources for teaching „construction and assemblage“.

Instruction plan 9

Subject: Date of Session:
Students: Male: Female: Total: Level
of group:

Instruction Title: Recycling to create instructional resources for teaching „figure drawing“ at Senior High School

Rational: to equip participants with practical skills of recycling to produce useful instructional resources for teaching „figure drawing“.

The Big Idea: useful instructional resources for teaching „figure drawing“ can be made from plastic waste.

Essential Questions:

- What are the materials and tools needed to recycle and produce resources for teaching figure drawing?
- What are the processes involved in producing instructional resources from plastic waste for teaching figure drawing?

Vocabulary Terms:

Objectives: 1) To teach participants to produce useful instructional resources for teaching „figure drawing“ from hard foam. 2) To guide the participants to produce samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal

Prerequisite skills and knowledge:

1. 3-D art production skills
2. Benefits of recycling to education and the environment

Materials and Tools: hard foam, cutting knife, glue

Lesson procedure:

Introduction

Teacher activity:

Samples of male and female carved figures from hard foam will be shown to participants.

Main Activity

Teacher activity:

Researcher will use three hours each in two days to teach participants to produce instructional resources for teaching „figure drawing“ with hard foam.

Participant activity:

Participants in groups will be tasked to produce samples of the resources during the training session.

Assessment for Objective 1 and 2: the groups will be required to show their successful produced resources.

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APPENDIX E: CONTINUATION OF THE TRAINING SESSIONS.

3. Training Participants to Create Resources for Teaching ‘Colour’ (Primary to SHS)

Objectives for the Session: 1) To teach participants to produce useful instructional resources for teaching „colour“ from plastic waste. 2) To guide participants to discuss and use waste plastics and acrylic paint to produce instructional resources for teaching „colour“ at all levels of education.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal and Intrapersonal

Delivery:

1. Verbal and Visual Receiving under Dale's Cone of Experience was utilised to show participants researcher-made samples of resources for teaching „colour“ from Primary to Senior High School using plastic bottles, plastic tyres and acrylic paints.
2. Participants were taught how to produce the resources that were shown to them using the waste materials (Watch A Demonstration under Dale's Cone of Experience).
3. Participants were provided with plastic bottles and acrylic paints to also produce samples of the resources while the session was still in progress. The Art Education students and the College students worked in groups (utilising Interpersonal intelligence) to produce samples of the resources. The practising Art teachers worked individually (utilising Intrapersonal intelligence) to produce their resources. This Active Learning strategy made the participants to do samples of the real things that they were taught (Participate in Hands-On Activity/Do The Real Thing - Dale's Cone of Experience). The Art Education students also made use of Intrapersonal intelligence to create individual resources for teaching „colour“ from waste materials available to them after the training session as an assignment. Plate 3.87 show pictures of the training sessions.



Plate 3.87: Researcher training participants to make resources for teaching ‘colour’

4. Training Participants to Create Resources for Teaching ‘Weaving and Stitching’
(Primary to JHS)

Objective for the Session: 1) To teach participants to produce useful instructional resources for teaching „weaving and stitching“ from waste materials and to guide the participants to put into practice the processes and produce samples of the teaching resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal and Intrapersonal

Delivery:

1. Participants were shown researcher made samples of the resources for teaching „weaving and stitching“ from plastic sack bags, waste fabrics, polythene bags and box paper (Verbal and Visual information).
2. The waste materials were used to teach the participants how to produce the instructional resources that were shown to them (Watch A Demonstration under Dale’s Cone of Experience).
3. Participants were provided with plastic sack bags, waste fabrics, polythene bags and box paper to also create samples of the resources. In groups the Art Education and College students utilised Interpersonal intelligence to produce samples of the resources. The practising Art teachers also worked individually (utilising Intrapersonal intelligence) to create samples of the resources. This was an Active Learning process which made

participants to do samples of the real things that they were taught (Participate in Hands-On Activity/Do The Real Thing – Dales Cone of Experience).

Plate 3.88 show scenes from the training sessions.



Plate 3.88: Researcher training participants to make resources for teaching ‘weaving and stitching’

5. Training Participants to Create Resources for Teaching ‘Printmaking’ (Primary to SHS)

Objectives for the Session: 1) To teach participants to produce useful instructional resources from plastic and fabric waste for teaching „printmaking“. 2) To make the participants practice to create samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal and Intrapersonal

Delivery:

1. Samples of researcher made resources from hard foam, Styrofoam, plastic disposable bowls, waste fabrics and polythene bags for teaching „printmaking“ were shown to the

participants for them to see (Verbal and Visual information).

2. Participants were taught how to use hard foam, Styrofoam, polythene bags, plastic disposable bowls and fabric scraps to produce instructional resources for teaching „printmaking“ from Primary to Senior High School (Watch A Demonstration under Dales Cone of Experience).
3. Participants were tasked to practice and produce samples of the resources (Hands-On Activity/Do The Real Thing, Active Learning). The Art Education students and the practising Art teachers worked individually (utilising Intrapersonal intelligence) to practice the processes. The College students made use of Interpersonal intelligence in groups during the training session to create samples of the instructional resources.

Plate 3.89 show pictures of the training sessions.



Plate 3.89: Researcher training participants to make resources for teaching ‘printmaking’

6. Training the Participants to Create Resources for Teaching ‘Visual Communication’ at JHS

Objectives for the Session: 1) To teach participants to produce useful instructional resources for teaching „visual communication“ from plastic, paper and fabric waste. 2) To make the participants practice to create samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal and Intrapersonal

Delivery:

1. Participants were shown researcher made samples of „visual communication“ teaching resources made with box paper, waste fabrics and polythene bags (Verbal and Visual information).
2. Participants were taught how to use box paper, waste fabrics and polythene bags to produce resources for teaching „visual communication“ at Junior High School (Watch A Demonstration – Dales Cone of Experience).
3. Participants were asked to create samples of the resources for teaching „visual communication“ (Participate in Hands-On Activity/Do The Real Thing, Active Learning). The Art Education students and practising Art teachers worked individually (utilising Intrapersonal intelligence) to create their samples. The College students made use of Interpersonal intelligence in groups during the session to create samples of the resources. Plate 3.90 illustrate the training sessions.



Plate 3.90: Researcher training participants to make resources for teaching ‘visual communication’

7. Training the Participants to Create Resources for Teaching ‘Perspective’ (Primary to SHS)

Objectives for the Session: 1) To teach participants to produce useful instructional resources for teaching „perspective“ from plastic and paper waste. 2) To guide the participants to produce samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal, Linguistic and Intrapersonal

Delivery:

1. Researcher made samples of resources for teaching „perspective“ from Primary to Senior High School produced with plastic bottles, box paper and acrylic paint were made available for the participants to see and have a feel of it (Verbal and Visual Receiving information).

2. Participants were taught how to produce resources for teaching „perspective“ from Primary to Senior High School using plastic bottles, box paper and acrylic paint (Watch A Demonstration under Dales Cone of Experience).
3. Participants were provided with plastic bottles, box paper and acrylic paint to produce samples of the resources (Participate in Hands-On Activity/Do The Real Thing, Active learning). The Art Education students and the College students worked in groups during the training to create their samples (the groups made use of Interpersonal intelligence). The practising Art teachers worked individually (utilising Intrapersonal intelligence) to create samples of the resources during the training. Linguistic intelligence was also used by the Art Education students to do presentations on their works. Plate 3.91 show scenes from the training sessions.



Plate 3.91: Researcher training participants to make resources for teaching ‘perspective’

8. Training the Participants to Create Resources for Teaching ‘Construction and Assemblage’ (Primary to JHS)

Objectives for the session: 1) To teach participants to produce useful instructional resources for teaching „construction and assemblage“ from plastic, paper and fabric waste. 2) To make the participants discuss and produce samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Spatial, Interpersonal and Intrapersonal

Delivery:

1. Participants were shown researcher made samples of the resources for teaching „construction and assemblage“ made from box paper, plastic bottles, pieces of fabrics and Styrofoam (Verbal and Visual information).
2. Participants were taught how to produce samples of the resources using the waste materials for teaching from Primary to Junior High School (Watch A Demonstration under Dale's Cone of Experience).
3. Participants were provided with waste materials to discuss and produce samples of the resources in groups but the practising Art teachers worked individually. The Active Learning strategy engaged the participants Spatial, Interpersonal and Intrapersonal intelligences to participate and do (Dale's Cone of learning Experience) samples of the resources. Plate 3.92 show pictures from the training sessions.



Plate 3.92: Researcher training participants to make resources for teaching ‘construction and assemblage’

Training the Participants to Create Resources for Teaching ‘Figure Drawing’ at SHS

Objectives for the Session: 1) To teach participants to produce useful instructional resources for teaching „figure drawing“ from hard foam. 2) To guide the participants to produce samples of the resources.

Learning Experience: Verbal and Visual Receiving, Watch A Demonstration, Participate in Hands-On Activity/Do The Real Thing, Active Learning

Multiple Intelligences: Interpersonal and Intrapersonal

Delivery:

1. Researcher made samples of resources for teaching „figure drawing“ made from hard insulation foam from old refrigerators were made available for the participants to see and have a feel it (Verbal and Visual information).

2. Participants were taught to create the resources by demonstrating to them how to carve out the male and female parts using the foam (Watch A Demonstration under Dales Cone of Experience).
3. Participants were provided with hard foam to produce the parts of the female figure (Participate in Hands-On Activity/Do The Real Thing, Active Learning). The Art Education students worked in groups (utilising Interpersonal intelligence) and the practising Art teacher worked individually (utilising Intrapersonal intelligence) during the training session to produce the parts of the female figure. Plate 3.93 show pictures from the training sessions.



Plate 3.93: Researcher training participants to make resources for teaching ‘figure drawing’

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APPENDIX F: INTERVIEW GUIDE USED TO COLLECT DATA FROM THE ART EDUCATION STUDENTS, PRACTISING ART TEACHERS AND COLLEGE OF EDUCATION STUDENTS AFTER THE TRAINING.

The following questions were asked:

1. Was the training useful to you? If yes how useful was it to you? If no why was it not useful to you?

2. What are you going to do with the skills and knowledge you have acquired from the training?

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APPENDIX G: Teaching Guide for Training Art Teachers to Create Instructional Resources for Teaching Art.

It must be noted that the procedures and samples of works in this guide are not meant for teachers to just copy but rather to assist them to use their own ideas to recycle waste materials and use them for effective teaching and learning in their classrooms.

Part 1

Instruction Plans for Creative Art

Instruction plan 1

Instruction Title: Recycling to create instructional resources for teaching the „elements and principles of design“ **Objectives:**

1. To teach participants to make useful instructional resources for teaching the „elements and principles of design“.
2. To make participants use waste materials available to them in groups and individually to produce samples of the resource for teaching the „elements and principles“ of design at Primary School.

Tools and Materials: waste fabrics, waste papers, waste plastics, glue, scissors, knife, **Lesson procedure:**

Introduction

Teacher activity: the concepts involved in the ‘elements and principles of design’ must be briefly made known to participants.

Main Activity

Teacher activity: samples of resources for teaching the „elements and principles of design“ must be shown to participants. The participants must be made aware that the resources were produced based on the concepts of the „elements and the principles of design“ taking into consideration the level of pupils they are meant for. The teacher must use at least two hours to teach participants to create instructional resources that can aid them in teaching the „elements and principles of design“ (dot, line, shapes and forms, texture, value, space and proportion, repetition, variety, contrast and balance) from plastic, paper and fabric waste.

The Production Processes:

‘Dot’: participants must be taught to cut out different fabrics with dots used as designs in them and glue them onto a box paper.



‘Line’: participants must be taught to cut out the various types of lines from a fabric and glue them onto a box paper.



‘Shapes and Forms’: participants must be taught to assemble plastic and paper containers with different forms and shapes and glue them onto a box paper. Irregular shapes can be cut from fabrics and glued on the containers for teaching.



‘Texture’: participants must be taught to cut plastic bottles or plastic cups or plastic bowls into pieces and also cut out visual textured fabrics and glue them separately on a box paper to show actual and visual texture.



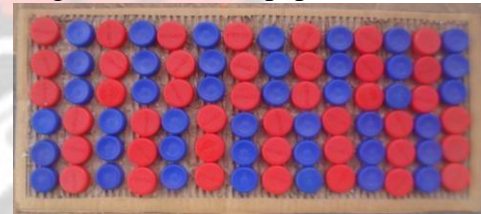
‘Value’: participants must be taught to use waste fabrics to create designs in tones for teaching value.



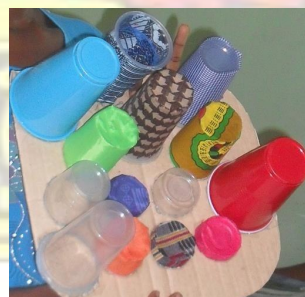
‘Space and Proportion’: participants can be taught to use a box paper and create a design on it using fabrics or plastics making the size of the design appropriate for the space of the box paper and also make another design this time very small and inappropriate for the space of the paper beside the appropriate sized design for teaching good utilisation of working space and proportion.



‘Repetition’: participants must be taught to use plastic bottle tops with different colours at least two colours and arrange them in rows of three by repeating them on a box paper.



‘Variety’: participants must be taught to cut plastic cups into different heights and cover some with different fabrics having different colours, designs, patterns and textures and glue the cups onto a box paper.



‘Contrast’: participants must be taught to use fabrics to create contrast in terms of colour, shapes, patterns and texture.



‘Balance’: participants must be taught to arrange and glue the cylindrical paper inside toilet rolls to illustrate symmetrical and asymmetrical balance on a box paper as shown below.



Participant activity: the participants in groups must be made to work during the training to create samples of the resources. Individually the participants must be given an assignment based on the instruction.

Assessment for group work: each group must be required to show and explain their resource to the class

Assessment for individual work: each participant must be required to submit one instructional resource that can aid in teaching either an element or a principle of design in Primary School.

Instruction plan 2

Instruction Title: Recycling to create instructional resources for teaching „colour“ in Primary School

Objectives:

1. To teach participants to produce useful instructional resources for teaching „colour“ from plastic and fabric waste.

2. To make participants in groups and individually experiment with waste materials and create samples of the instructional resources.

Tools and Materials: plastic bottles, plastic cups, old compact disc players, acrylic paint, waste fabrics, water, spoon, brush, mixing bowl, **Lesson procedure:**

Introduction

Teacher activity: samples of instructional resources for teaching „colour“ in Primary School made from plastic bottles, plastic cups or old compact disc players must be made available to participants to see and have a feel of it.

Main Activity

Teacher activity: the teacher must use at least one hour to teach participants how to use the waste materials to create instructional resources for teaching „colour“ in Primary School.

Production Processes:

‘Primary colours’: participants can be taught to use a spoon to paint the primary colours on the entire surface of plastic bottles.



‘Secondary colours’: participants can be taught to divide plastic bottles into three equal parts vertically and paint primary colours at the bottom of the bottles allow them to dry then apply a secondary colour in the middle then another primary colour at the top of the bottles.



‘Tertiary colours’: participants can be taught to paint secondary colours at the top and bottom of plastic bottles and the resulting tertiary colour in the middle.



‘Intermediate colours’: participants can be taught to paint secondary colours at the bottom of plastic bottles allow them to dry then apply an intermediate colour in the middle and a primary colour at the top of the bottles.



Participants can also be taught to paint plastic cups or old compact disc players individually with the primary colours, secondary colours, tertiary colours and intermediate colours for teaching „primary, secondary, tertiary and intermediate colours“.

Note: in place of using acrylic paint to paint the waste materials, coloured fabrics can be used instead and glued to the plastic bottles, plastic cups or old compact disc players for teaching „colour“.

Participant activity: the participants must be made to work in groups during the training to produce samples of the resources. The individual participants must be given an assignment based on the instruction.

Assessment for group work: the groups must be required to show their successful produced resources.

Assessment for individual work: each participant must be required to submit one instructional resource for teaching „colour“ in Primary School.

Instruction plan 3

Instruction Title: Recycling to create instructional resources for teaching „weaving and stitching“ in Primary School **Objectives:**

1. To teach participants to make useful instructional resources for „teaching weaving and stitching“.
2. To make participants in groups and individually to practice the processes.

Tools and Materials: waste fabrics, waste papers, waste plastics, scissors, knife, needle, thread

Lesson procedure:

Introduction

Teacher activity: the teacher must use five minutes to inform the participants what the lesson is about.

Main Activity

Teacher activity: samples of the resource for teaching „weaving and stitching“ at the Primary level must be shown to participants. The teacher must use at least two hours each in two days to teach participants how to create instructional resources from waste scraps that can aid them in teaching lacing, plain weaving, different types of stitches, plaiting with two, three, four, five, strands, knotting with two and three strands, coiling and stitching.

Production Processes

‘Lacing’: participants must be taught to use three strands plaited fabrics or polythene bags to lace on a box paper for teaching lacing.



‘Plain and double plain weaving’: participants must be taught to use rice sack as warp and weft yarns to make plain weaves by using the warp yarns to go over and under the weft yarns. With the double plain weaving the warp yarns will go over and under two weft yarns as shown below.



‘Stitching’: participants must be taught to make the basic stitches (temporary, permanent and decorative stitches) onto a piece of fabric and fringe the edges of the fabric for teaching.



‘Plaiting’: participants must be taught to use strands of polythene bags or fabrics to create two, three, four and five strands plaiting.

Two strands plaiting: black and white polythene bags can be twisted together to form the two strands plaiting.

Three strands plaiting: three strands of black and white polythene bags can be plaited by repeatedly placing the left and right strands under the middle strand.

Four strands plaiting: four strands of three strands plaiting can be plaited by dividing the strands into two with two strands on the left and the other two on the right. The last strand on the left must be placed under the next strand and then added to the two strands on the right for it to be three strands on the right with one on the left. The last strand on the right must be placed under and over the next two and then added to the left strand for it to be two. The process is repeated to get the four strands plaited item.

Five strands plaiting: five strands of three strands plaiting can be plaited by dividing the strands into two with three strands on the left and two on the right. The third strand on the left must be placed over and under the next two and joined with the two on the right to make it three. The third strand on the right must be placed over and under the next two and joined to the two strands on the left, making it three strands on the left and two on the right. The process is repeated to get the five strands plaited item.



‘Knotting’: participants can be taught to use strands of polythene bags to make simple knots like two strands knotting.

Two strands knotting: two of three strands plaiting can be knotted by placing the left strand around the right strand and knotting and placing the right strand around the left strand and knotting. This process must be repeated.



‘Plaiting, Coiling and Stitching’: participants can be taught to coil and stitch three strands plaiting from fabrics or polythene bags to make a bag, a mat, etc.



Participant activity: participants must be assigned in groups during the training and individually after the training to create samples of the instructional resources for teaching „weaving and stitching“ in Primary School.

Assessment for group work: the groups must be required to submit their produced resources.

Assessment for individual work: the individual participants must be required to submit their sample resources produced from waste materials.

Instruction plan 4

Instruction Title: Recycling to create instructional resources for teaching „printmaking“ in Primary School **Objectives:**

1. To teach participants to make useful instructional resources from plastic waste for teaching „printmaking“.
2. To make participants in groups and individually to produce samples of the resources.

Tools and Materials: hard foam from old refrigerators, Styrofoam, disposable bowls, knife,

Lesson procedure: Introduction

Teacher activity: the types of printing techniques must be briefly explained to participants.

Main Activity

Teacher activity: samples of instructional resources for teaching „printmaking“ in Primary School from waste materials must be shown to the participants. The teacher must use at least one hour to teach participants to use the waste materials to create resources for teaching block and stencil printing.

Production Processes

‘Block printing’: participants must be taught to carve out simple relief blocks from hard foam or Styrofoam for teaching „block printing“.



‘Stencil printing’: participants must be taught to draw and cut out simple designs from disposable plastic bowls for teaching stencil printing.



Participant activity: participants must be made to work in groups during the training and individually after the training to make samples of the resources.

Assessment for group work: the groups must be required to show their successful resources for teaching „printmaking“.

Assessment for individual work: the individual participants must be required to submit their successful resources for teaching „printmaking“.

Instruction plan 5

Instruction Title: Recycling to create instructional resources for teaching „perspective“ in Primary School **Objectives:**

1. To teach participants to produce useful instructional resources for teaching „perspective“ from plastic and paper waste.
2. To make participants in groups and individually to practice the processes and create samples of the instructional resources.

Tools and Materials: plastic bottles, Styrofoam, box paper, acrylic paint, water, spoon, mixing bowl, glue, cutting knife, brush, **Lesson procedure:**

Introduction

Teacher activity: samples of instructional resources for teaching „perspective“ in Primary School must be made available to participants to see and have a feel of it.

Main Activity

Teacher activity: the teacher must use one hour to teach participants to use plastic bottles, Styrofoam and box paper to create instructional resources for teaching „one point and colour perspective“ in Primary School.

Production Processes

‘One point perspective’: participants must be taught to arrange plastic bottles in two parallel lines that seem to meet at one vanishing point, measure and cut the bottles by making sure each bottle is taller than the one that comes before it by at least 2cm. The cut bottles can be glued on a box paper or used like that for teaching. Styrofoam can also be used aside the plastic bottles.



Colour perspective: for teaching colour perspective, the participants must be taught to paint the bottles by making the bottles close to the vanishing point lighter than those that are farther away from the vanishing point after cutting and arranging the bottles for them to seem to meet at one vanishing point.



Participant activity: the participants must be made to work in groups during the training and individually to create samples of resources for teaching „perspective“ in Primary School.

Assessment for group work: the groups must be required to show and explain their successful produced resources on perspective.

Assessment for individual work: the individual participants must be required to submit their successful produced resources on perspective.

Instruction plan 6

Instruction Title: Recycling to create instructional resources for teaching „construction and assemblage“ in Primary School **Objectives:**

1. To teach participants to create useful instructional resources for teaching „construction and assemblage“ from plastic, paper and fabric waste.
2. To make participants in groups and individually to practice and create samples of the resources.

Tools and Materials: plastic, paper and fabric waste, acrylic paint, water, spoon, mixing bowl, glue, knife, scissors, brush,

Lesson procedure:

Introduction

Teacher activity: samples of instructional resources for teaching „construction and assemblage“ in Primary School must be made available for the participants to see.

Main Activity

Teacher activity: the teacher must use at least one hour to teach participants to create samples of the resources that can aid them to teach „construction and assemblage“.

Production Processes

Construction of ‘Forms’: participants must be taught to use old calendar and box paper to create different kinds of forms for teaching.



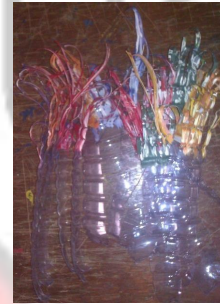
‘Desk Organiser’: participants can be taught to cut the top part of plastic bottles and glue the cut bottles together in a set of three, two or four. Aside plastic bottles, plastic cups or the paper roll inside toilet roll can also be used. Fabrics and coloured papers can be used for decoration.



‘Flower Vase’: participants can be taught to creatively cut the top part of plastic bottles and decorate the cut edge with either acrylic paint or fabrics.



‘Artificial Flowers’: participants can be taught to cut plastic bottles into strips, coil and paint the strips with acrylic paint or participants can be taught to cut decorative patterns from fabrics and glue them on strips of box paper or straw.



‘Suggestion House’: participants can be taught to cut the top part of a plastic bottle and make a cone out of paper to cover the opening. An opening must be cut on the bottle as a door through which suggestions can be dropped into the bottle and a small hole must be created on the bottle to hang it.



‘Picture Frame’: participants can be taught to use and cut box paper as a base for the frame and glue strands of cut box papers on the edges of the base. Fabrics, plastics or decorative papers can be used to decorate the edges of the frame.



‘Paper File’: participants can be taught to fold and glue box paper to create a file.



‘Wall Clock’: participants can be taught to use a plastic bottle as a base for a clock by gluing strips of decorated box paper onto the bottle to represent the numbers on the clock. Fabrics or coloured paper can be used as decoration.



‘Artificial Buildings’: participants can be taught to cut the top part of plastic bottles and make cones out of paper to cover the cut bottles and use fabrics to represent the windows and the doors on the bottles and glue the cut bottles on a box paper creatively.



‘Model Bag’: participants can be taught to cut, fold and glue box paper together to create a bag. The bag can be decorated with fabrics or coloured paper.



‘Car, Train, and Aeroplane’: participants must be taught to create trains, aeroplanes and cars out of plastic bottles.

‘Animals’: participants can be taught to use plastic bottles and disposable bowls to create different kinds of animals.

Participant activity: participants must be made to work in groups during the training and individually after the training to produce samples of the resources.

Assessment for group work: the groups must be required to submit their produced resources.

Assessment for individual work: the individual participants must be required to submit their produced instructional resources.

Part 2

Instruction Plans for Basic Design and Technology (Visual Art option) and General

Knowledge in Art

Instruction plan 1

Instruction Title: Handmade papers from waste scraps for teaching „hand papermaking“

Objectives:

1. To teach participants to make useful handmade papers from waste cotton fabrics, waste papers and the inner bark of the paper mulberry plant.
2. To make the participants practice the process to make samples of the papers and experiment with drawing and painting mediums of their choice on the papers that will be produced by them.

Tools, materials and equipment: waste cotton fabrics, waste papers, inner- bark of the paper mulberry plant, mould and deckle, water, pulp, buckets, rubber pan, scissors, foam, metal plates, knife, old blender, wooden board, a thick wooden stick, **Lesson procedure:**

Introduction

Teacher activity: the teacher must introduce the idea of hand papermaking to the participants. Hand papermaking simply means making papers manually and not mechanically. Samples of handmade papers from fabric and paper waste must be made available for participants to see.

Main Activity

Teacher activity: the teacher can use thirty minutes to teach participants how to process the waste fabrics, waste papers together with the inner bark of the paper mulberry plant (the paper mulberry plant can be found at Offinso in the Ashanti region, they are added to the waste materials because the inner bark contains high amount of cellulose which helps paper pulps to bind together easily) before they can be used to make the papers.

Production Processes

Participants must be taught that the paper mulberry plant is harvested and boiled with caustic soda to get the inner bark soft for pulping. They must be taught to cut the fabrics, waste papers and the inner bark of the mulberry plant into very smaller pieces and pulp them with water in an old blender.

In a situation where there is no blender the fabrics cannot be used but the papers and the inner bark of the mulberry plant can be used. The inner bark of the paper mulberry plant can be beaten with a thick wooden stick on a wooden board to break the fibres and the waste papers can also be soaked in water and mashed with the hand. The teacher must demonstrate how the pulp is poured into a pan filled with water to at least the middle and a mesh like mould and deckle is used to take some of the pulp, transfer the pulp on a metal plate, use a foam to squeeze excess water from the back of the mould, remove the mould and allow the paper to dry.



The teacher must process some of the pulp and take it to the training session.

Participant activity: participants must be made to practice how to cut the waste materials and the mulberry bark for pulping. They must also be made to practice how to use the wooden board and the wooden stick to beat the mulberry bark to break the fibres for papermaking. Afterwards, the participants must be made to fill two plastic pans with water and mix some of the already prepared pulp with the water. Each participant must be made to make one paper and experiment with drawing and painting mediums on the paper.

Assessment for individual work 1: each participant must be required to show one successful produced handmade paper.

Assessment for individual work 2: each participant must be required to submit their experimented works on the produced papers.

Instruction plan 2

Instruction Title: Recycling to create instructional resources for teaching the „principles of design“ in Junior and Senior High School **Objectives:**

1. To teach participants to make useful instructional resources for teaching the „principles of design“ in Junior and Senior High School.
2. To make participants in groups and individually use waste materials to create samples of the resources.

Materials and Tools: waste fabrics, waste papers, waste plastics, glue, scissors, knife, **Lesson procedure:**

Introduction

Teacher activity: the concepts involved in the ‘principles of design‘ must be briefly made known to participants.

Main Activity

Teacher activity: samples of the resources from waste materials must be shown to the participants. The teacher must use at least two hours each in two days to teach participants to create samples of the instructional resources.

Production Processes

‘Balance’: participants can be taught to cut pieces of fabrics and arrange them to illustrate symmetrical and asymmetrical balance for teaching. Plastic cups, plastic bottles, Styrofoam and hard foam from old fridges can also be used to create instructional resources for teaching „balance“.



‘Repetition, Movement and Rhythm’: participants can be taught to cut black and white coloured fabrics into strands making the black strands taller than the white ones and arrange them to form a circle by placing one tall black strand followed by two short white strands in that order on a box paper. Plastic bottles can also be used to create samples of the resources.



‘Unity’: participants can be taught to cut out patterns from fabrics and arrange them to illustrate „unity“ for teaching.



‘Harmony’: participants can be taught to use harmonious coloured fabrics like yellow, yellow green and green or red, red orange and orange fabrics and combine them to create designs for teaching „colour harmony“.



‘Contrast’: participants can be taught to use contrasting coloured fabrics like green and red fabrics, violet and yellow fabrics or blue and orange fabrics to create designs for teaching „contrast“.



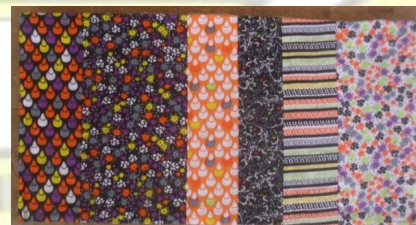
‘Dominance’: participants can be taught to use coloured plastic bottle tops at least two of them and arrange them in rolls on a box paper making the rolls of one of the colours to be more than the other. Example red coloured bottle tops taking four rolls in the middle and blue coloured bottle tops taking two rolls at the ends of the four rolls as shown below.



‘Emphasis’: participants can be taught to arrange short plastic cups or bottles in a circle on a box paper and use another plastic cup or bottle taller than the ones in the circle and cover it with a bright coloured fabric and place it in the middle of the circle to place emphasis on it.



‘Variety’: participants can be taught to cut and glue waste fabrics with different colours, shapes, patterns and designs and arrange them on a box paper to show „variety“.



Participant activity: participants in groups must be made to work during the training to create samples of the instructional resources. Individually the participants must also be given an assignment based on the instruction.

Assessment for group work: each group must be required to show and explain one successful produced resource.

Assessment for individual work: each participant must be required to submit one instructional resource that can aid in teaching a principle of design at Junior and Senior High School.

Instruction plan 3

Instruction Title: Recycling to create instructional resources for teaching „colour“ in Junior and Senior High School **Objectives:**

1. To teach participants to produce useful instructional resources for teaching „colour“ from plastic waste.
2. To make participants in groups and individually experiment with waste materials to create samples of the resources.

Materials and Tools: plastic bottles, plastic tyre, fabrics, acrylic paint, water, spoon, mixing bowl, epoxy steel, knife, brush,

Lesson procedure:

Introduction

Teacher activity: samples of instructional resources for teaching „colour“ made from plastic waste must be made available for participants to see and have a feel of it.

Main Activity

Teacher activity: the teacher must use at least forty minutes to teach participants to use waste plastics to create instructional resources for teaching „colour“ in JHS and SHS.

Production Processes

Participants must be taught to use acrylic paint to paint the primary, secondary, tertiary and intermediate colours on same kind plastic bottles with a plastic spoon and allow the colours to dry. Participants must also be taught to measure and divide a round plastic tyre into twelve equal parts and fix the tops of the bottles on the plastic tyre with epoxy steel so that the coloured bottles can be screwed in and out of the tops on the tyre for teaching. Aside acrylic paints, coloured fabrics can be used instead to cover the plastic bottles.



Participant activity: participants must be made to work in groups during the training and individually after the training to produce samples of the resources.

Assessment for group work: the groups must be required to show their successful produced resources.

Assessment for individual work: the individual participants must be required to submit their successful produced instructional resources.

Instruction plan 4

Instruction Title: Recycling to create instructional resources for teaching „weaving and stitching“ in Junior High School **Objectives:**

1. To teach participants to make useful instructional resources for teaching „weaving and stitching“ from plastic and fabric waste.
2. To make participants practice the processes in groups and individually.

Materials and Tools: waste fabrics, waste plastics, scissors, knife, needle, thread **Lesson**

procedure:

Introduction

Teacher activity: samples of the resources for teaching „weaving and stitching“ from waste scraps must be shown and explained to participants.

Main Activity

Teacher activity: the teacher must use at least two hours each in two days to teach participants how to create instructional resources for teaching check weaves, twill weaves, satin weaves, different types of stitches, stitching to create a coil, plaiting and knotting to create an item.

Production Processes

‘Weaving’: participants can be taught to use rice sack as warp and weft yarns for making resources for teaching check, twill and satin off loom weaves.



‘Stitching’: participants must be taught to make the basic stitches (temporary, permanent and decorative stitches) on a piece of fabric for teaching.

‘Stitching to create a Coil’: participants can be taught to stitch three strands plaited fabrics or polythene bags by coiling them to form a table mat, bag etc.



‘Plaiting’: participants can be taught to use strands of polythene bags or fabrics to plait items for teaching.

Six strands plaiting: six strands of three strands plaiting can be plaited by dividing the strands into two with four strands on the left and two on the right. The fourth strand on the left must be placed over and under the next three and joined to the two on the right for it to be three strands on each side. The third strand on the right must be placed under and over the next two and joined to the three strands on the left to make four strands on the left and two on the right. The process must be repeated to create the six strands plaiting resource.



Seven strands plaiting: seven strands of three strands plaiting can be plaited by dividing the strands into two with four strands on the left and three on the right. The fourth strand on the left must be placed over and under the next three and joined to the three strands on the right to make it four. The fourth (last) strand on the right must be placed over and under the next three and joined to the three strands on the left to make four strands on the left and three on the right. The process must be repeated to form the seven strands plaiting resource.



‘Knotting’: participants can be taught to use strands of polythene bags to knot items for teaching.

Three strands knotting: three of three strands plaiting can be knotted by placing the left strand over the middle strand and placing the right strand under the middle strand, and knotting the left and right strands. Then the left strand must be placed under the middle strand and the right strand over the middle strand after which the left and right strands must be knotted. The process must be repeated to create the three strands knotting resource.



Participant activity: participants must be made to practice the procedures in groups during the training. The individual participants must be assigned to create instructional resources based on the instruction.

Assessment for group work: the groups must be required to show samples of their resources.

Assessment for individual work: the individual participants must be required to submit their produced resources from waste materials available to them.

Instruction plan 5

Instruction Title: Recycling to create instructional resources for teaching „printmaking“ in Junior and Senior High School

Objectives:

1. To teach participants to make useful instructional resources from plastic and fabric waste for teaching „printmaking“.
2. To make the participants in groups and individually practice the processes.

Materials and Tools: hard foam, Styrofoam, waste fabrics, polythene bags, glue, knife, **Lesson procedure:**

Introduction

Teacher activity: the participants must be made to mention and explain the types of printing techniques. Samples of instructional resources for teaching „printmaking“ from plastic and fabric waste must be made available for participants to see.

Main Activity

Teacher activity: the teacher must use at least one hour to teach participants to use the waste materials to create instructional resources for teaching „printmaking“.

Production Processes

‘Block or Relief printing’: participants must be taught to carve out relief blocks from hard foam or Styrofoam for teaching „block printing“.



‘Intaglio printing’: participants must be taught to carve out the positive parts of designs so the designs show as negative spaces below the surface of the Styrofoam or hard foam as shown below.



‘Stencil printing’: participants must be taught to draw and cut out designs from disposable plastic bowls for teaching „stencil printing“.



‘Screen printing’: participants can be taught to draw a design on a lining fabric and glue a black polythene bag to cover the negative parts, for the positive parts to stand out as shown below.



Participant activity: participants must be made to practice the processes in groups during the training. The individual participants must be given an assignment based on the instruction.

Assessment for group work: the groups must be required to submit their produced instructional resources.

Assessment for individual work: the individual participants must be required to submit their produced instructional resources.

Instruction plan 6

Instruction Title: Recycling to create instructional resources for teaching „visual communication“ in Junior High School **Objectives:**

1. To teach participants to create useful instructional resources for teaching „visual communication“ from plastic, paper and fabric waste.
2. To make the participants practice in groups and individually to create samples of the resources.

Materials and Tools: plastic, paper and fabric waste, glue, knife, scissors

Lesson procedure:

Introduction

Teacher activity: the teacher must make participants explain how they understand „visual communication“. Samples of instructional resources for teaching „visual communication“ from plastic, paper and fabric waste must be made available and explained to participants.

Main Activity

Teacher activity: the teacher must use one hour to teach participants to use waste scraps to create instructional resources for teaching „visual communication“ at the Junior High level.

Production Processes

Participants must be taught to glue waste scraps on a box paper to create designs considering good and bad spacing, good and bad arrangements of text and images, readability of text, appropriate use of working surface, emphasis of important points with colour (colour theory), the use of images and symbols to communicate visually, etc.



Participant activity: participants must be made to practice the processes in groups and individually to create samples of the resources.

Assessment for group work: the groups must be required to submit samples of their „visual communication“ resources from waste materials.

Assessment for individual work: the individual participants must be required to submit samples of their „visual communication“ resources from waste materials.

Instruction plan 7

Instruction Title: Recycling to create instructional resources for teaching „perspective“ at Junior and Senior High School **Objectives:**

1. To teach the participants to produce useful instructional resources for teaching „perspective“ from plastic and paper waste.
2. To make the participants practice in groups and individually to create samples of the resources.

Materials and Tools: plastic bottles, box paper, acrylic paint, water, spoon, mixing bowl, white glue, knife,

Lesson procedure:

Introduction

Teacher activity: samples of the instructional resources must be shown and explained to the participants.

Main Activity

Teacher activity: the teacher must use two hours to teach participants to use plastic bottles and box paper to create instructional resources for teaching „one, two, three and colour perspective“.

Production Processes

Resource for teaching one and colour perspective: participants must be taught to arrange plastic bottles in two parallel lines that seem to meet at one vanishing point, measure and cut the bottles by making sure each bottle is taller than the one that comes before it by at least 2cm. The cut bottles must be painted by making the ones farther from the vanishing point darker and the ones close to the vanishing point lighter. The bottles can be glued on a box paper or used like that for teaching.



Resource for teaching two point perspective: participants must be taught to measure and cut two lines of at least eight sets of plastic bottles making each bottle taller than the one that precedes it by 2cm and arrange the bottles in a „V“ like shape by placing the tallest bottle in the middle followed by the reduced bottles on each side to create two vanishing points. The bottles can be glued on a box paper or used like that for teaching.



Resource for teaching three point perspective: participants can be taught to measure and cut two lines of eight sets of plastic bottles by slanting them to make each bottle taller than the one that precedes it by 2cm and glue the bottles in a „V“ turned upside-down „^“ like shape starting with the tallest slanted bottle in the middle followed by the rest on each side to obtain three vanishing points, two at the sides and one on top.



Participant activity: the participants must be made to work in groups during the training and individually after the training to create samples of resources for teaching perspective at Junior and Senior High School levels.

Assessment for group work: the groups must be required to show and explain their successful produced resources on perspective.

Assessment for individual work: the individual participants must be required to submit their produced resources on perspective.

Instruction plan 8

Instruction Title: Recycling to create instructional resources for teaching „construction and assemblage“ in Junior High School **Objectives:**

1. To teach the participants to create useful instructional resources for teaching „construction and assemblage“ from plastic, paper and fabric waste.
2. To make the participants in groups and individually to practice and create samples of the resources.

Materials and Tools: waste plastics, waste papers, waste fabrics, glue, knife, scissors,

Lesson procedure:

Introduction

Teacher activity: samples of instructional resources for teaching „construction and assemblage“ at Junior High School must be made available for participants to see.

Main Activity

Teacher activity: the teacher must use at least one hour to teach participants to create samples of the resources for teaching „construction and assemblage“.

Production Processes

‘Decorative Piece’: participants can be taught to use waste plastics, fabrics and papers to create decorative items for teaching.



‘Jewellery Shelf’: participants can be taught to cut off the top part of plastic bottles and glue the base together to form a „jewellery shelf“. The shelf can be decorated with fabrics and coloured papers.



Construction of an item useful for Community or School: participants can be taught to use cut plastic bottle tops, fabric and coloured paper strands to construct a visual communicative piece on a box paper for the school or community.



Participant activity: the participants must be made to work in groups during the training and individually to produce samples of the resources.

Assessment for group work: the groups must be required to show their produced resources.

Assessment for individual work: the individual participants must be required to submit their produced resources.

Instruction Title: Recycling to create instructional resources for teaching „figure drawing“ at Senior High School **Objectives:**

1. To teach participants to produce useful instructional resources for teaching „figure drawing“ from hard foam.
2. To make the participants in groups and individually to produce samples of the resources.

Materials and Tools: hard foam from refrigerators, cutting knife, glue **Lesson**

procedure:

Introduction

Teacher activity: samples of male and female carved figures from hard foam for teaching „figure drawing“ must be made available for participants to see and have a feel of it.

Main Activity

Teacher activity: the teacher must use two hours each in three days to teach participants to carve out the parts of the male and female figures from hard foam for teaching.

Production Processes

Participants must be taught to glue the pieces of foam together to get the desired thickness and sizes of the foam to carve the parts of the human figure. Participants must be taught to model the figures after the male and female human figures.



Participant activity: the participants in groups during the training and individually after the training must be tasked to produce samples of the male and female human figures from the hard foam.

Assessment for group work: the groups must be required to show their successful produced resources.

Assessment for individual work: the individual participants must be required to submit their produced resources.

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