

**INNOVATIVE METHODS OF DEVELOPING PATTERNS FOR TEXTILE SCREEN  
PRINTING**

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**of**

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## DEDICATION

I dedicate this publication to my better half – Rufus Quansah and children – Nana Aba, Nana Esi and Maame Edumaba.

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## CERTIFICATION

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

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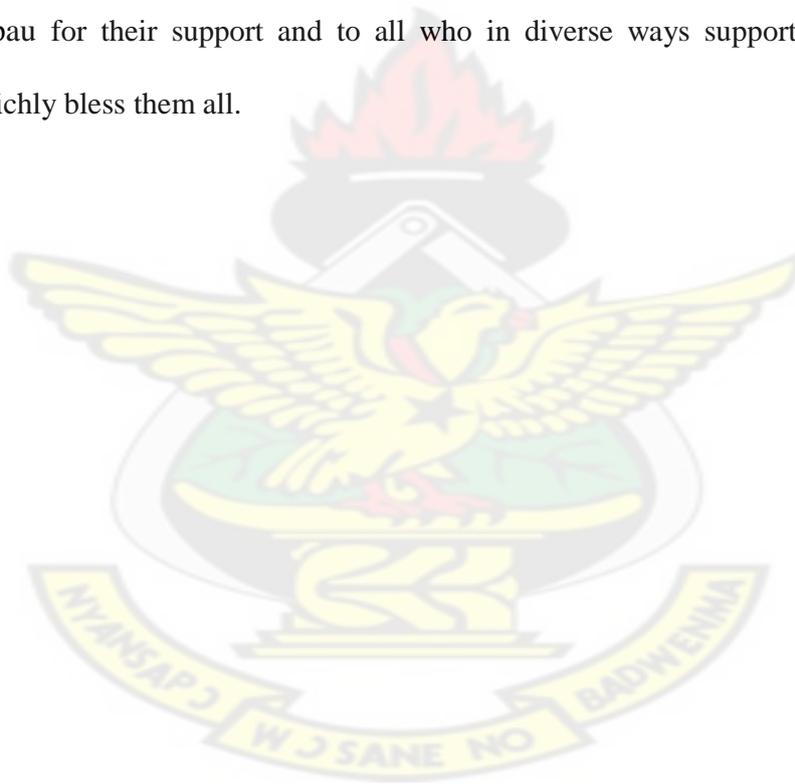
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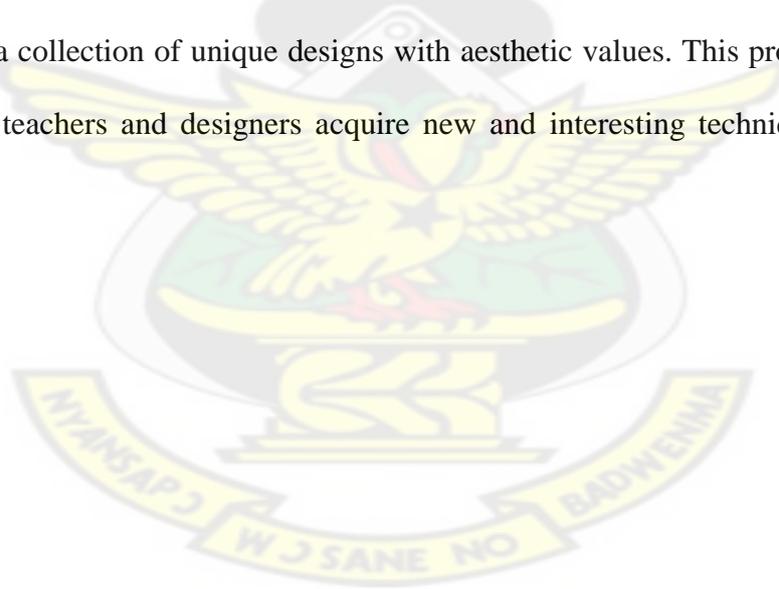
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## ABSTRACT

The conventional process of transferring designs unto screen has been the normal practice over the years. This method though useful, produces designs that are static and rigid. The research idea was focused on exploring other techniques of transferring designs unto screen using natural objects such as leaves, pieces of paper, saw dust, local sponge and threads among others. Other techniques such as printing objects directly unto fabric and developing screen manually were explored. The outcome of the result was discussed and analysed critically. The research was based on the qualitative research approach and made use of the experimental and descriptive methods of research. Observation and unstructured interview were the main instruments used for data collection. The study revealed that, developing and printing designs directly from leaves, weeds, twigs, traditional sponge and thread among others provided a collection of unique designs with aesthetic values. This project will enable textile students, teachers and designers acquire new and interesting techniques in creating textile designs.



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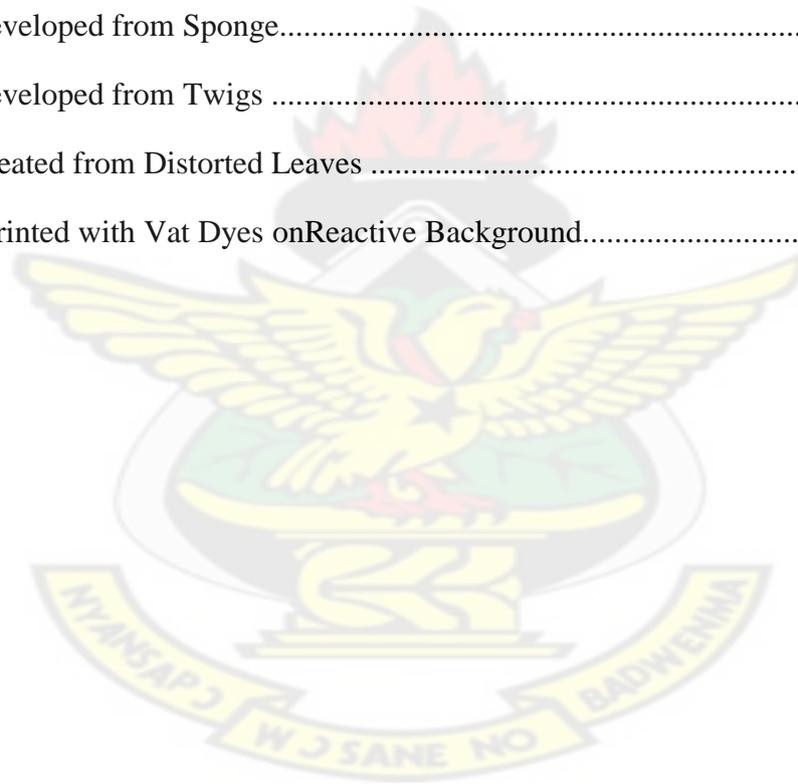
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# CHAPTER ONE

## INTRODUCTION

### 1.0 Background to the Study

Designing in textile is an important component of textile production. Variety of good designed fabric that is more appealing and marketable may have been influenced by the initial designing process. The execution of a good design needs the consideration of certain essential factors such as the motif or subject matter, arrangement of motifs and style of rendering combined with the use of colour. Design themes or motifs can be chosen from various sources such as natural, artificial, geometrical, traditional symbols, pictorial scenes, and proverbs among others. For a design to be transferred onto a fabric, it needs to go through a printing process.

Printing therefore is the process of transferring design from rollers, screen, block and so on onto a textile material with print paste and it includes Roller printing, Screen printing, Block printing, Heat transfer, Polychromatic and Electronic printing. In screen printing however, the design is transferred onto a well stretched screen so that all but the design is covered with a resist material. The design which is open for dye penetration is put on the cloth and dyes forced through the tiny holes by a squeegee.

The design is made in small unit on paper; the next stage is to transfer the design on to a fabric. The small unit paper design will have to be repeated several times to produce an appreciable length of printed fabric. "The design is transferred to the screen, often by a

photochemical process in which the design for each colour is photographed separately. The screen is coated with photosensitive material that serves as opaque sections of the screen, preventing dye penetration through the negative areas of the screen. The screen is held in contact with a tracing paper that corresponds to the patterns to be placed on the screen. This conventional method of developing screens is the photographic method where designs are copied onto screens coated with photo-sensitive chemicals which have been exposed to light, gives an accurate representation of designs when utilized. Again, designs produced by this method are static and rigid. This project on the other hand is devoid of conventional method of transferring paper designs onto tracing paper and subsequently onto screens. On the other hand, designs are achieved directly from natural and artificial materials such as leaves, pieces of papers, saw dust, wood chippings, traditional sponge, synthetic hair, egg shells, among others arranged into patterns before transferring onto screens for printing purposes. Other resist styles of printing are explored. The research affords one the ability to explore different creative and imaginative means of putting on fabric with extremely varied ideas and effects. Some materials from the natural environment as mentioned earlier are researched into and the appropriate ones selected for the project. One or more of the identified materials could be combined to develop designs for printing.

### **1.1 Statement of the Problem**

Screen printing has been an old method of patterning fabrics. It has gone through several changes of ensuring better result of printing. Among the numerous printing techniques, screen printing gives flexibility in designing and printing process. With evolution of time,

screen development has been explored in different methods to obtain designs or patterns on stretched silk mesh. Today, the conventional method of developing screens is by transferring paper designs onto tracing sheet before copying onto screens coated with photo-sensitive chemicals which have been exposed to light.

This conventional process of developing designs has been the normal practice over the years. It gives an accurate representation of designs when utilized but designs produced by the conventional method are static and rigid. This method apparently has been useful but more designs or patterns can be achieved by employing other innovative methods of screen development and printing.

It was against this background that the researcher sought to explore other innovative methods of screen developing to advance the knowledge in methods of screen developing and printing.

## **1.2 Objectives of the Research**

1. To explore innovative ideas and methods of developing designs directly onto screen without the use of a diapositive.
2. To discover other media that can be useful in creating patterns for screen printing.
3. To print sample cloths using developed screens and innovative printing methods.

## **1.3 Research Questions**

1. Which object or materials from the environment can be used to transfer designs directly onto screen for printing?

2. How can natural and artificial objects or materials from the environment be used in place of a positive design on paper to produce designs on screens?
3. Can textile designs generated from selected objects be printed onto fabrics?

#### **1.4 significance of the Study**

Research in this area would enable textile teachers, students and designers acquire new and interesting techniques in developing designs onto screen for printing. These new techniques will enhance innovation and creativity aiming at crafting new designs for the textiles market.

#### **1.5 Delimitation**

The scope covers the use of natural and artificial objects such as leaves, wood chippings, threads, local sponge among others to generate designs. The use of a single screen to register more than one colour and printing from different angles were explored.

#### **1.6 Limitations**

Taking into consideration the experimental nature of the project, it was not easy gathering enough materials that were feasible to achieve expected results within the time frame.

#### **1.7 Definition of Terms**

*Accessories* - Clothing that is worn or carried, but not part of the main outfit of one's dressing.

*Pattern* – An ornamental design or decorative element in fabric.

***Stylized*** – It is floral pattern or design with natural motifs such as leaves, flowers and trees.

***Fabric*** - a flexible sheet material that is assembled of textile fibres and yarns that are woven, knitted, plaited, or otherwise bonded together to give the material mechanical strength.

***Aesthetic*** - describes the beauty of an object or form usually with artistic works.

***Screen*** – It is a wooden or metal frame which consists of a synthetic fabric or metal gauze stretched tautly over it.

***Light box*** – It a term used for the screen exposure unit where designs or objects are transferred onto the screen for printing.

***Squeegee*** – A tool used in screen printing to force thickened dye paste through the screen onto the fabric.

***Diapositive*** – It is a paper design which is transferred onto screen by the photographic method.

## **1.8 Abbreviations**

***GDP*** – Gross domestic growth

***AGOA*** – African growth and opportunity act

***ATL*** – Akosombo Textiles Limited

*GTMC* – Ghana Textile Manufacturing Company

*GTP* – Ghana Textstyle Printing

*TGLEU*–Textile Garments and Leather Employees Union

*TUC* – Trade Union Congress

### **1.9 Arrangement of the Rest of the Text**

The presentation of the project report is as follows; The Abstract gives a summary of the project report. The Introductory chapter highlights the topic by stating the problem, objectives, importance of study, delimitation, research methodology and for research.

Chapter two contains the literature review that includes an overview of the topic from various authors on textiles printing, silk screen printing, textile design, element and principles of design, types of pattern, innovative methods of screen printing and development. Chapter three looks at Methodology, Chapter four discusses field research findings and generation of textile designs from selected materials. Chapter five discusses and analyses results. Chapter six summaries and conclude the report with recommendations.

## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

#### 2.0 Overview

This chapter seeks to review literary materials on other innovative methods of developing designs for screen printing by writers and textile artists. The review is structured under the following factors; definitions of screen printing, history of screen printing, history of textile design, the textile design/ market, textile design, sources of inspiration for textile design, types of patterns, motif arrangement, methods of developing designs unto screen and screen printing techniques.

#### 2.1 Definition of Screen Printing

Wynne (1997), defines screen printing as a form of stencil printing, whereby the screen consist of a synthetic fibre or metal gauze stretched taut over a frame. Parts of the gauze have the holes blocked off (non-printing area) and the printing paste is forced through the open printing areas by a rubber or metal blade, called a squeegee, and onto the fabric beneath.

Adu-Akwaboa (1989), explains screen printing as a process of transferring a good paper design unto a fabric. This is achieved by transferring the design unto a tracing paper (kodatrace) with opaque ink. Each colour on the design must have a separate tracing paper. In other words each colour will have a separate screen for printing. A photographic method is used to transfer the design from the tracing paper to the screen with the help of

light. During the photographic development of the screen, the opaque areas are left open for dye penetration while the negative areas are blocked to avoid dye penetration.

Tortora and Merkel (2005), explains the process of screen printing as a method of printing whereby the patterns are blocked out on a mesh fabric or screen so that when the colour is squeezed through it will penetrate the unblocked areas. The colour paste is forced through the screen by a squeegee. Each colour in the pattern requires a separate screen.

All the definitions above describe the conventional way of screen printing. But sometimes a deviation from the conventional way works very well. This project seeks to use unconventional ways of creating patterns for screen printing. Instead of the usual method of transferring the design onto a “kodatrace” before developing the design onto a screen for printing, the identified materials would be arranged directly on the photographic machine “light box” with the repeat of the design worked on the “light box” before developing the design onto the screen.

## **2.2 History of Screen Printing**

According to Miles (2003), screen printing is the most versatile and important of the methods used for introducing colour and design to textile fabrics. Considered analytically, it is a process of bringing together a design idea, one or more colourants, and a textile substrate (usually a fabric) using a technique for applying the colourants with some precision.

Screen printing as suggested by Putatunda (2010), is a technique first used by the Chinese almost 2000 years ago. They used human hair stretched across a wooden frame to form the screen. To that they attached a stencil made from leaves together into different shapes. Subsequently, the Japanese adopted the screen printing process and used woven silk to make the mesh and lacquers to make stencils. The use of silk is where screen printing got its alternative name – silk screening or silk screen printing. Silkscreen printing consists of three elements –the screen which carries the image to be printed, the squeegee and the inks. It can be used to print on most surfaces, including paper, plastic, fabric, and wood.

According to Storey (1992), the decoration of the body presumably predates the production of clothing. Early men and women used the colourants that were available to them, such as charcoal and coloured earths mixed with oils and fats, applying them at first with their fingers and sticks to a variety of substrates. Staining of fabrics with plant extracts provided a different approach; patterns could be produced by applying beeswax as a resist to the dye liquor or by tying threads tightly around the area to be resisted. The discovery that different mordants, applied first, gave different colours with the same dye suggested a style of printing that was to become of cardinal importance. Whether this style of printing originated in India, Egypt, China, or elsewhere is not clear. An early variety of cotton dyed fabric around 3000BC was found in jars in the Indus valley. Taylor (1986) gives evidence of flax found in Egypt and dated at 1400BC. In China the dyeing of silk was developed very early and China is credited with the invention of paper printing and therefore may well have seen the birth of fabric printing.

Centuries ago, the Japanese also developed the stenciling technique for textile printing and brought it to a fine art. They overcame the difficulty by using human hair or silk threads as ties. These were so fine that the colour spread underneath them, disguising their presence. By the 19<sup>th</sup> century, the use of this method for printing fabric had spread beyond Japan and was used worldwide.

In the mid 19<sup>th</sup> century, French printers introduced the use of woven silk fabric to provide a continuous support for the paper stencil. For the best results the support fabric was stretched across a frame, and the combination became known as a screen. The development was important because in this way not only were ties automatically provided, but the amount of colour paste could be controlled. Soon after, the paper stencil was replaced by a durable paint on the screen. From this time onwards the advantage of screen printing became increasingly appreciated.

According to Godwin (2010), there have been developments in acquisition of screens for printing over the years. However, the silk screen printing process is generally credited to English and American artists in the early-1900s. Samuel Simon of Manchester, England is said to have taken out the first patents related to the modern process of screen printing in 1907. Using sheets of silk and cotton stretched over wooden frames, Simon and William Morris placed single-colour, hand-painted stencils on top of the material to create a design. In 1914, John Pilsworth of the United States took out a patent for multi-coloured screen printing. Commercial screen printing became very popular around the time of World War I; it was most commonly used for printing flags and advertising banners that were placed in fledgling retail stores.

D'Elena (2009), suggest that in recent history, credit is generally given to the artist Andy Warhol for popularizing screen printing identified as serigraphy, in the United States. American entrepreneur, artist and inventor Michael Vasilantone developed and patented a rotary multicolour garment screen printing machine in 1960. The original rotary machine was manufactured to print logos and team information on bowling garments but soon directed to the new fad of printing on t-shirts. The Vasilantone patent was soon licensed by multiple manufacturers, the resulting production and boom in printed t-shirts made the rotary garment screen printing machine the most popular device for screen printing in the industry. Screen printing on garments currently accounts for over half of the screen printing activity in the United States.

Screen printing is widely used today to create many mass or large batch produced fabrics and garment. Screen printing, however, has remained an attractive, cost effective and high number production method of printing designs onto fabrics and garments. Screen printing often requires skilled artistic modification and involves several independent time consuming steps.

### **2.3 History of Textile Design**

According to Stuart (1969), the earliest printed textile known is a child's tunic from Achmim in Upper Egypt. It dates from the 4th century AD. It is white linen block-printed in blue with a diamond shaped pattern containing a star-shaped design (Figure 2. 1). Two early wooden blocks for printing remain. Their pattern is shown in (Figure 2.2)



Fig. 2.1(a) Diamond shaped pattern Fig 2.1 (b) Wooden blocks for printing

Stuart further says that, besides pigment, textiles were also printed with gums, resins, and gold powder or in some cases fine fibre flock were sprinkled on and adhered to the fabric to simulate more expensive brocades and (later) velvets. The earliest textiles were printed in one colour only on undyed fabric using small blocks. By the tenth century, the fabric was often dyed and then printed in multiple colours including gold and silver. Textiles printed with gold powder have been found in Persia (6th and 7th centuries).

The earliest European example of printed cloth comes from the tomb of St. Caesarius of Arles (502-43) in France. It is suspected that the textile is Egyptian in origin. Another example was found in the tomb of St. Cuthbert.

Printed fabrics touch many aspects of human lives. Textile designs appear on a wide range of woman's, men's, and children's clothing, including blouses, shirts, skirts, dresses, and jackets; ties, scarves, and other accessories; undergarments and sleepwear such as lingerie, shorts, and pyjamas; as well as evening cloths and swimwear. Man also lives with printed designs in every room of our homes, in many different applications, such as upholstery, drapery, and wallpaper and sheets and pillowcases, comforters, towels, shower curtains, tablecloths, and napkin.

However, no work of art, including a textile design, can be created in a vacuum. While each design may approach its theme or motif in a distinctive way, all require a source of inspiration or reference material. Of course a textile designer should not simply copy his or her source material, although in some cases the genesis of a current design is easily recognizable; in many others, the transformation from reference material to new design is remarkable inventive and subtle.

The best new designs, influenced by both traditional and contemporary ideas, motifs, colours, and layouts, reflect new patterns and trends; these designs in turn significantly influence the American and international fashion and home decorating markets. Textile designers today draw inspiration from a multitude of sources. The proliferation of exhibitions and published materials from all over the world make almost every culture and its artistic traditions easily accessible.

Godwin (2010), further asserts that, several fine arts movements have influenced textile design, including neoclassicism, art deco, art nouveau, the Bauhaus, the art and craft movements, chinoiserie, cubism, expressionism, ethnic, folk and pop art, Many individual fine artists have also inspired textile designers. Further evidence of this relationship are the fine artists who themselves have designed printed textiles, including William Morris, Henri Matisse, Raoul Dufy, Paul Klee, Charles Burchfield, Sonia Delaunay, David Hockney, Marie Laurencin, John Piper, Henry Moore, Graham Sutherland, Andy Warhol, and Keith Haring.

## **2.4 The Textile Industry/Market**

The textile industry in Ghana experienced rapid economic growth some years back. Most of these companies produced high quality materials, designs and very good textile brands, which sold, so well on the local market as well as other markets in the West African sub-region. Wax and fancy prints produced by these companies were in high demand on the Ghanaian market because they are use in making traditional apparels like the Kaba and slit and other exquisite wears. The Industry was not only a source of employment to many Ghanaians but also contributed significantly to the country's Gross Domestic Product (GDP).

Over the years, the textile industry in Ghana has experience a major decline in its production rate. A sector that contributed significantly to Ghana's economy in terms of revenue and employment creation is gradually collapsing.

According to Quartey (2006), during the 1970s the textiles industry dominated the manufacturing sector and contributed significantly to the economy. It employed about 25,000 of the labour force, accounted for 27% of total manufacturing employment and operated at about 60% of plant capacity. The textile industry has also been an important source of foreign exchange in Ghana. However, by 1982 shortage of foreign exchange for importing raw materials resulted in the industry operating at extremely low capacity. Consequently, most of these industries went out of business and the situation deteriorated under trade liberation in the 1980s and 1990s. Hence, employment declined from 7,000 in 1995 to less than 3000 as at now.

This huge decline led to increased importation of textiles and other used apparel, which facilitated the death and closure of many textile industries in Ghana. Over the past few years, the introduction of AGOA has encouraged the textile industry to show considerable interest to increase production for the local market but the threat of cheap imports remains a major challenge to the survival of the few existing industries.

A published item in the Daily Graphic,(2009), revealed that, with the exception of Akosombo Textiles Limited (ATL), industries such as Textstyles Ghana Limited formally Ghana Textile Printing (GTP), Ghana Textiles Manufacturing Company (GTMC), and Printex have all shut down their spinning and weaving departments due to cheap imports from abroad, especially China. These sections were said to be employing a chunk of the labour force in the industry. Total local production of textiles which peaked at 130 million metres per annum in the 1970's, dropped to below 39 million metres per annum in 2005 to 25 million per annum in 2009.

Apart from AGOA, other organizations have been established to save the industry from total collapse. An example is the formation of the Textile Garments and Leather Employees Union (TGLEU) which was established as a national union outside the Trade Union Congress (TUC) in 1993. According to (Erdtex), 2007, TGLEU believes that in order to save the textile and garment industry from virtual collapse, the Government has to rethink its policies:

1. Importers could be given a quota or pay higher tariffs to create a level playing field or promote healthy “Textile and Clothing Industry in Sub-Saharan Africa”,

2. The Government should encourage Ghanaians to order their mourning cloths from the local textile industries. It is a known fact that Ghanaians have maintained the culture of using mourning clothes and that may save the textile industry from eventual collapse.
3. It is also recommended that state institutions, religious bodies, schools/colleges, and the private sector should be encouraged to order their domestic, ceremonial, and anniversary cloths from the local textile industries.

## **2.5 Textile design**

Textile, according to Tortora and Merkel (2005), is derived from the Latin term, "textilis", which is based on the verb texere (Latin), to weave. It may be defined as follows:

1. A broad classification of materials that can be utilized in constructing fabrics, including textile fibres and yarns.
2. Designates the constructed fabric including woven, knitted, and non-woven structures as well as lace and crocheted goods.
3. Descriptive of processes, organizations, personnel associated with the manufacture of products from fibres to fabrics.

Microsoft Encarta (2009), asserts that, design can involve making products, machines, structures that serve their intended purpose and pleasing to the eye.

Adu-Akwaboa (1994), opines that design is a drawing, outline, plan or sketch, a framework or scheme of pictorial construction from which something useful may be made. He further adds that design can simply be an arrangement of accepted elements following certain principles. The elements which include lines, shapes, colours, texture, form, tone and light form the building blocks with which the work is constructed. If these elements are well organized, a design is created.

Tortora and Merkel (2005), describe textile design as an arrangement of form or colours, or both, to be implemented as ornamentation in or on various textile materials. Designs or patterns may be woven or knitted into the structure of a fabric; may form surface decorations; or a blend of colours and may brighten or improve the design or pattern.

There are many man-made and natural objects within the environment which serve as sources of inspiration for textile design.

## **2.6 Sources of Inspiration for Textile Design**

Adu-Akwaboa enumerates and cites specific examples of such sources in the following:

### **1. Natural sources**

- (a) Plants – trees, stumps, branches, leaves, flowers, fruits, roots, bark of trees etc.
- (b) Man and Animals – insects, reptiles, butterflies, moths, birds etc.
- (c) Rocks – mountains, valleys, stones, pebbles etc.
- (d) The Sky – cloud formations.

**2. Artificial** – household articles – cooking utensils, furniture, bags, boxes, books, etc; buildings, vehicles, and vehicle parts, machines and machine parts.

**3. Geometrical** – circles, squares, triangles, rectangles, spheres, hemispheres, diamonds, abstract scribbles, contours, etc.

**4. Traditional Crafts** – stools, swords, umbrellas, pots, calabashes, carving of human Figures, animals and abstract objects, etc.

**5. Adinkra Symbols** – different varieties such as “gyenyame”, “nkonsonkonson”, “dondo”, etc.

**6. Themes and Proverbs** – these are translated into motifs and used. For example, Unity is strength, „Seriousness is not indicated by red eyes or „Household pebbles cut deeper than cutlass.

**7. Pictorial** – interesting scenes, portraits, crests, symbols, objects etc.

**8. Modification of existing designs** – Modification by:

- a) Reduction of motifs;
- b) Enlargement of motifs;
- c) Adding to the motifs;
- d) Abstraction of the motifs;
- e) Subtracting from the motifs
- f) Modernization of the motifs;

g) Combination of two or more old and/or new designs.

Any of the above can be drawn and repeated several times in an orderly manner to create a design.

According Hatch (1993), design can be realistic or naturalistic. This depicts real objects such as human, animal, plants, or other objects in a natural manner. Stylized designs distort real object, but the original source of inspiration to the artist is still obvious.

Jerstorp and Kohlmark (1995), state that “in nature there are many patterned surfaces, but the patterns are always varied and are never repeated exactly” they further added that man has many beautiful and skillfully repeated surface designs at his disposal. For many cultures the fear of perfectly repeating patterns has made people “sneak” some little irregularity into the overall design.

## **2.7 Design Elements and Principles**

The elements and principles of design are the fundamental building blocks that make a good design. They form the basis of all visual design strategies including textile, graphic design, sculpture, painting, architecture and other industrial and fine art designs. Lovett (1999), describe the elements of design as the things that make up a painting, drawing, design and others good or bad - all art will contain most of, if not all, the seven elements of design. He also opined that, principles of design determine how successful one is in creating a work of art. In other words the principles of design describe how the elements are combined to make a work of art. William (2003), states that, the best designers

sometimes disregard the principles of design. When they do so, however, there is usually some compensating merit attained at the cost of the violation. Unless you are certain of doing as well, it is best to abide by the principles. This is to say that it is very difficult to come out with a good and appealing design without considering the element and principles of design.

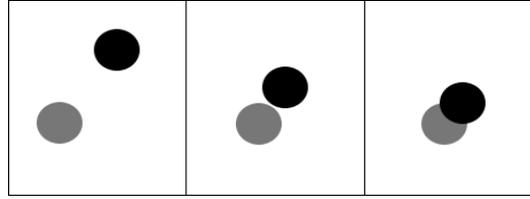
### **2.7.1 Design elements**

The free encyclopedia, from Wikipedia (2010), describe element of design as the basic units of a visual piece that make up a painting, drawing, design, among others. These include point or dot, line, shape, form, colour, space and texture.

### **2.7.2 Point or Dot**

Bradley (2010), describes a point or dot as the simplest element of design that is the building blocks of everything else. Every shape, form, mass, or blob with a recognizable center is essentially a dot regardless of its size. The defining characteristic of a dot is that it's a point of focused attention. Kovali and King (n.d) adds to bradley's definition by saying that a point serves as the focus of a visual, highlighting or drawing attention to important information. Several points in combination may represent a more complicated object or idea. A series of points can attract attention, especially as they move closer together.

Bradley further explains the characteristics of points or dots through illustration. The Figure below shows the relationship between two dots.

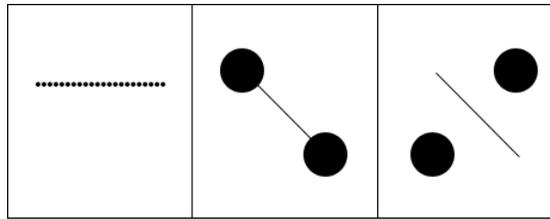


**Fig.2.2 (a): showing the relationship between two dots**

(Source;[www.vanseodesign.com](http://www.vanseodesign.com))

Two dots near each other shift the emphasis of the relationships of the dot with its surrounding space to the relationship and interaction between dot and dot. Two dots imply a structure. As the space between dots decreases, the tension between them increases. As that space approaches zero the tiny bit of space itself becomes more important than either dot or any other interval of space on the page. All the tension is held in that tiny bit of space.

As dots get closer together they start to be seen as a single object. Their identity moves to that of the single object instead of the multiple identities of distinct objects. One dot overlapping another creates a figure/ground relationship. One dot is now in the foreground and the other is pushed into the background. Overlapping dots form more complex shapes than either of the individual dots. This resulting cluster of dots is in itself a new dot with a different form.



**Fig. 2.2(b); shows a combination of dots implying direction and movement.**

(Source;[www.vanseodesign.com](http://www.vanseodesign.com))

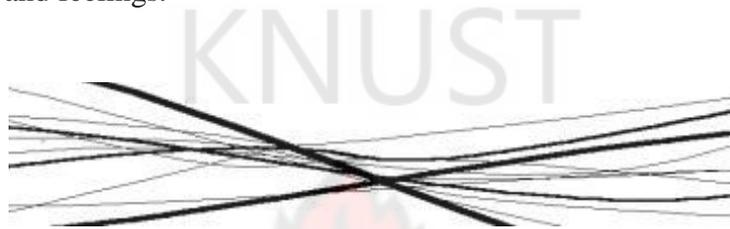
Dots working together can form an endless variety of arrangement and complexity. They can become lines and curves. They can form complex shapes, patterns, textures, and any other structure imaginable. Dots in combination can even imply direction and movement, bringing us to lines.

### **2.7.3 Line**

A line according to the free encyclopedia is a fundamental mark or stroke used in drawing in which the length is longer than the width. Two connected points form a line and every line has a length, width, and direction. Jirousek (1995), agrees this assertion by stating that, a line is a mark made by a moving point and having psychological impact according to its direction, weight, and the variations in its direction and weight. It is an enormously useful and versatile graphic device that is made to function in both visual and verbal ways. It can act as a symbolic language, or it can communicate emotion through its character and direction.

Berden (2004), also defines line as a "path" between two points. He further states that a line can be straight, curved, vertical, horizontal, diagonal, or zigzag. Lines imply motion and suggest direction or orientation. A line can also be implied, that is filled in by the

mind when several points are positioned geometrically within a frame. Gatto, Porter and Selleck (2000), say emphatically that a line is an element of art that is used to define shape, contours, and outlines, also to suggest mass and volume. It may be a continuous mark made on a surface with a pointed tool or implied by the edges of shapes and forms. The Figure below shows the characteristics of line in terms of width, length, thickness, direction, focus and feelings.



**Fig. 2.3(a): shows the different characteristics of line**

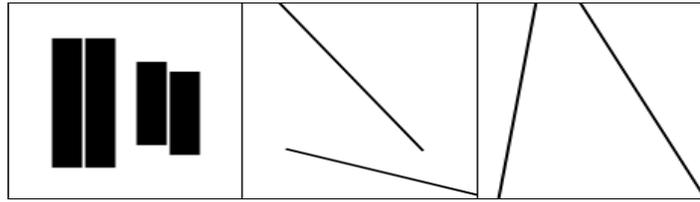
([www.princetonol.com/groups/iad/files/elements.](http://www.princetonol.com/groups/iad/files/elements.))

According to Bradley (2010) et al, changing the thickness or weight of lines and the intervals between lines creates a sense of depth. Lines that appear closer together have more tension between them and advance to the foreground. Lines further apart have less tension between them and recede into the background.

If a line or lines is to be added to a series of lines at an angle and allowed to cross several lines, a sense of depth is increased. It creates perspective.

Thick lines placed close together create a thin line in the negative space between them. This negative space line can often become the positive element and the original lines are seen as the new negative space.

Lines working together and in rhythm can form patterns and textures.



**Fig. 2.3(b): shows lines working together in rhythm to form patterns.**

(Source - [www.vanseodesign.com](http://www.vanseodesign.com) )

#### **2.7.4 Shape**

In reference to Gatto, Porter and Selleck's publication (2000), a shape is formed when a line crosses itself or intersects with other lines to enclose a space. Shape is two-dimensional, it has heights and width but no depth.

##### **Categories of Shapes:**

**Geometric Shapes**-Circles, Squares, rectangles and triangles. We see them in architecture and manufactured items.

**Organic Shapes**-Leaf, seashells, flowers. We see them in nature and with characteristics that are free flowing, informal and irregular.

**Positive Shapes**-In a drawing or painting positive shapes are the solid forms in a design such as a bowl of fruit. In a sculpture, it is the solid form of the sculpture.

**Negative Shapes**-In a drawing it is the space around the positive shape or the shape around the bowl of fruit. In sculpture it is the empty shape around and between the

sculptures. *Static Shape*-Shapes appear stable and resting. *Dynamic Shape*-Shapes appear moving and active.

Berden (2004), et al. asserts that shapes are the result of closed lines. However shapes can be visible without lines when an artist establishes a colour area or an arrangement of objects within the camera's viewfinder. Some primary shapes include circles, squares, triangles and hexagons all of which appear in nature in some form or another.

### **2.7.5 Form and Space**

Form according to the free encyclopaedia is any three dimensional object. Form can be measured, from top to bottom (height), side to side (width), and from back to front (depth). Form is also defined by light and dark. There are two types of form, geometric (man-made) and natural (organic form). Form may be created by the combining of two or more shapes. It may be enhanced by tone, texture and colour. It can be illustrated or constructed. Bradley (2010) et al, also describe form as any positive element placed on a page as opposed to the negative element on a space. *Form* is the point, line, plane, and volume. It is the shapes, dots, text, texture and images used in a design. If it is meant to be a positive element it is form. *Space* is the area between and around objects. The space around objects is often called negative space; negative space has shape. Space can also refer to the feeling of depth. Real space is 3-dimensional; in visual art, when a feeling or illusion of depth is created, it is called space.

Form and space are mutually dependent on each other. One cannot be changed without affecting the other. The relationship between form and space creates tension, determines

the amount of visual activity and movement, and gives a sense of three-dimensionality in a design. A viewer must first understand the relationship between form and space before understanding any of the individual objects on a page.

### **2.7.6 Texture**

Texture according to Lovett (1999), is the surface quality of a shape - rough, smooth, soft hard glossy etc. Texture can be physical (tactile) or visual. The free encyclopaedia describes tactile texture as actual three-dimension feel of a surface that can be touched. Painter can use impasto to build peaks and create texture and visual texture as an illusion of the surfaces peaks and valleys, as shown in plate 1. Any texture shown in a photo is a visual texture, meaning the paper is smooth no matter how rough the image perceives it to be.

Most textures have a natural feel but still seem to repeat a motif in some way. Regularly repeating a motif will result in a texture appearing as a pattern.



**Plate 2.6(a): Shows a picture of a tree's bark representing a visual texture**

(Source - [en.wikipedia.org/wiki/](https://en.wikipedia.org/wiki/))

Eftaiha (2010), gives a different perspective about texture as she asserts that no design element is more capable of moving your deep emotions than texture. The challenge of seeing and capturing texture is mostly based on one element – light. Texture can be accentuated by the side light of early sunny mornings or early evenings or by overhead light when the sun is vertical and high in the sky.



**Plate 2.6(b): Shows the effect of light on texture.**

(Source - [photo.tutsplus.com/.../6-elements-of-design-for-striking-phot](http://photo.tutsplus.com/.../6-elements-of-design-for-striking-phot))

With the sun high in the sky, the roughness of the walls of buildings, or the wood textures of tree trunks, or any kind of texture along vertical surfaces is emphasized as the overhead light casts small shadows along those surfaces. While the impact is subtle, it adds more depth, interest, and reality to the shots. Furthermore, it is worth noting that texture as a background can create an exciting and emotion-filled composition. And with the correct use of texture, pictures can become more alive and almost three dimensional.

### **2.7.7 Colour**

Bradley (2010), simply describes colour as light. Light is electromagnetic radiation and over a range of wavelengths it makes an impression on the human eye. This range of

wavelengths is the visual spectrum. He further describes colour in three ways as by name, purity and value or lightness. There are several terms used to describe colours in those three ways. These terms are;

**Hue:** it talks about the actual colour of an object. Green is a hue as are red, yellow, blue, purple, among others.

**Chroma:** Refers to the purity of a hue in relation to gray. When there is no shade of gray in a colour that colour has a high chroma. Adding shades of gray to a hue reduces its chroma.

**Saturation:** Is the degree of purity of a hue. It is similar to chroma, though not quite the same thing. Pure hues are highly saturated. When gray is added the colour becomes desaturated.

**Intensity:** is the brightness or dullness of a colour. Adding white or black to a colour lowers its intensity. An intense and highly saturated colour has a high chroma.

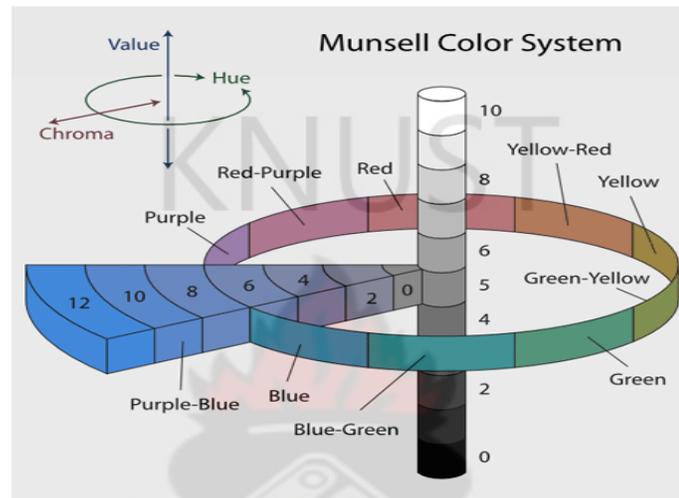
**Value/Luminance:** Is a measure of the amount of light reflected from a colour and is basically how light or dark a hue is. Adding white to a hue makes it lighter and increases its value or luminance. Consequently adding black makes it darker and lowers the value or luminance.

**Shade:** The result of adding black to a hue to produce a darker hue

**Tint:** The result of adding white to a hue to produce a lighter hue

**Tone:** In between black and white is gray. A colour tone is the result of adding gray to a hue. Shades and tints are tones at the extremes.

**Chart 1: The colour system described by Bradley (2010)**



(Source -[www.vanseodesign.com](http://www.vanseodesign.com) )

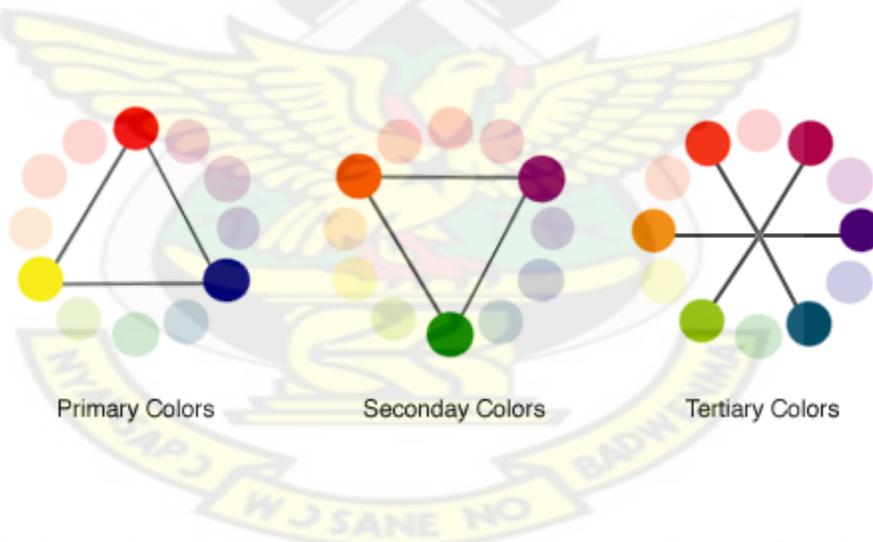
### 2.7.8 The colour wheel

A colour wheel in accordance with the free encyclopedia is an abstract illustrative organization of colour hues around a circle that shows relationships between primary colours, secondary colours, complementary colours, among others. The original color wheel is credited to Sir Isaac Newton who joined the red and violet ends of the visual spectrum into a circle. The arrangement of colours around the colour circle is often considered to be in correspondence with the wavelengths of light, as opposed to hues, in accord with the original colour circle of Isaac Newton. Modern colour circles include the purples, however, between red and violet.



**Fig.2.4(a):** shows the colour wheel

(Source - [photo.tutsplus.com/.../6-elements-of-design-for-striking-phot](http://photo.tutsplus.com/.../6-elements-of-design-for-striking-phot))



**Fig 2.4(b):** shows the relationship between primary, secondary and tertiary colours.

(Source - [www.vanseodesign.com](http://www.vanseodesign.com))

### 2.7.9 Colour scheme

The free encyclopedia describes colour schemes as logical combinations of colours on

the colour wheel. Colour schemes are used to create style and appeal. Colours that create an aesthetic feeling together commonly appear together in colour schemes. A basic colour scheme uses two colours that look appealing together. More advanced colour schemes involve several colours in combination, usually based around a single colour. Colour schemes can also contain different shades of a single colour; for example, a colour scheme that mixes different shades of green, ranging from very light (almost white) to very dark.

Bradley (2010), describe the type of colour scheme as follows:

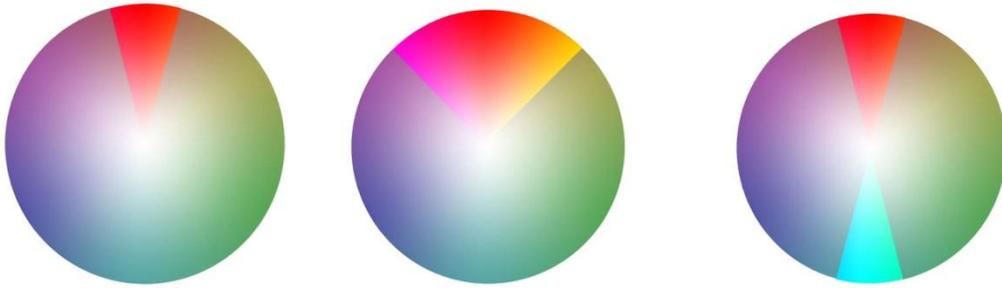
**Monochromatic** colour schemes are based on different tones of the same colour. Here is tint of red as shown in figure 5(a).

**Analogous** colour schemes are based on colours adjacent to each other on the colour wheel as shown in figure 5(b). They usually match well and create serene and comfortable designs.

Analogous colour schemes are often found in nature and are harmonious and pleasing to the eye.

**Complementary** colour schemes are based on colours opposite each other on the colour wheel as shown in figure 5(c). The high contrast of complementary colours creates a vibrant look especially when used at full saturation. This colour scheme must be managed well so it is not jarring.

Complementary colours are tricky to use in large doses, but work well when one want something to stand out.



**Fig. 5(a): Monochromatic    Fig.5 (b): Analogous    Fig. 5(c): Complementary**

(Source - [www.vanseodesign.com](http://www.vanseodesign.com))

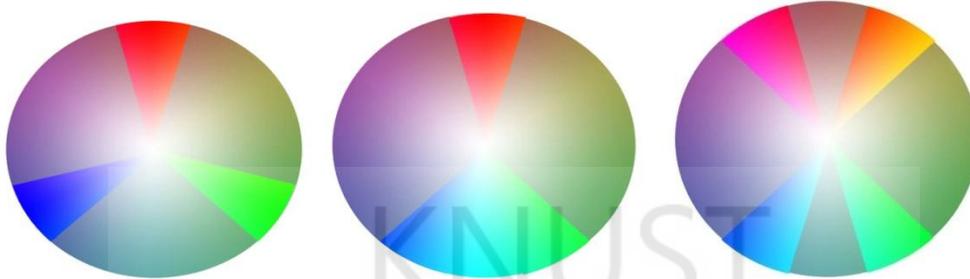
**Triadic** colour schemes use three colours equally spaced around the colour wheel as shown in Figure 5(d). Triadic colour harmonies tend to be quite vibrant, even if one uses pale or unsaturated versions of the hues.

To use a triadic harmony successfully, the colours should be carefully balanced - let one colour dominate and use the two others for accent

**Tetradic/Quadratic** colour schemes are created by choosing colours at the corners of a rectangle inscribed on the colour wheel as shown in Figure 5 (e). The quadratic colour scheme works best if one colour is dominant. Attention should be paid to the balance between warm and cool colours in the design.

**Split Complementary** colour schemes are created by choosing one colour and then two more colours that are adjacent to the complementary of the initial colour. Think of it as a combination of a complementary and analogous colour scheme as shown in Figure 7(f). Again, this colour scheme has the same strong visual contrast as the complementary

colour scheme, but has less tension. The split-complimentary colour scheme is often a good choice for beginners, because it is difficult to mess up.



**Fig. 5(d): Triadic**

**Fig. 5(e): Tetradic**

**Fig. 5(f): Split Complementary**

(Source - [www.vanseodesign.com](http://www.vanseodesign.com) )

Additionally there are colour schemes not entirely described by the colour wheel.

**Neutral** colour schemes include only colours not found on the colour wheel (various tones of brown and gray)

**Accented Neutral** colour schemes include neutral colours as above and one or more splashes of colours found on the colour wheel.

One last type of colour scheme one can talk about are those found in nature. They are colour schemes based on what one see occurring in nature.

### **2.8.0 The Psychological Effect of Colour**

Colour is often associated with a person's emotions. Colour may also influence a person's mental or physical state. For example, studies have shown that some people

looking at the colour red resulted in an increased heart rate, which then led to additional adrenaline being pumped into the blood stream.

Bear (2010), opined that colour is used effectively to represent traditional, cultural, or religious ideas, concepts, or feelings or to evoke physical reactions. Choosing colours based on symbolism can apply to everything from clothing to wall paint to home furnishings. She further asserts that colours are more than a combination of red and blue or yellow and black. They are non-verbal communication. They have meaning that goes beyond ink. According to Cherry (2010), while perceptions of colour are somewhat subjective, there are some colour effects that have universal meaning. Colours in the red area of the colour spectrum are known as warm colours and include red, orange and yellow. These warm colours evoke emotions ranging from feelings of warmth and comfort to feelings of anger and hostility.

The following are some of the psychological effect of colour

**The Colour White:** purity, innocence, cleanliness, sense of space, neutrality, mourning (in some cultures/societies).

**The Colour Black:** authority, power, strength, evil, intelligence, thinning / slimming, death or mourning.

**The Colour Gray:** neutral, timeless, and practical.

**The Colour Red:** love, romance, gentle, warmth, comfort, energy, excitement, intensity, life and blood.

**The Colour Orange:** happy, energetic, excitement, enthusiasm, warmth, wealth prosperity, sophistication, change and stimulation.

**The Colour Yellow:** happiness, laughter, cheery, warmth, optimism, hunger, intensity, frustration, anger, and attention-getting

**The Colour Green:** natural, cool, growth, money, health, envy, tranquillity, harmony, calmness and fertility.

**The Colour Blue:** calmness, serenity, cold, uncaring, wisdom, loyalty, truth, focused and un-appetizing.

**The Colour Purple:** royalty, wealth, sophistication, wisdom, exotic, spiritual, prosperity, respect and mystery.

**The Colour Brown:** reliability, stability, friendship, sadness, warmth, comfort, security, natural, organic and mourning (in some cultures/societies)

**The Colour Pink:** romance, love, gentle, calming and agitation.

### 2.8.1 Design Principles

According to Jirousek (2005), design principles are concepts used to organise or arrange the structural elements of design. Again, the way in which these principles are applied affects the expressive content, or the message of the work. Lovett (1999), agrees with Jirousek's assertion as he opined that the principles applied to the elements of

design bring them together into one design. How one applies these principles determines how successful a design may be.

The principles are: Balance, Hierarchy, Proportion, Rhythm, Emphasis, Unity and variety.

### **2.8.2 Balance**

Balance as defined by Jirousek (2005), is the concept of visual equilibrium, and relates to our physical sense of balance. It is a reconciliation of opposing forces in a composition that results in visual stability. Most successful compositions achieve balance in one of two ways: symmetrically or asymmetrically. White (2011), describes Symmetrical balance as a formal balance is a mirror image of one half of the picture. It is vertically centered, static, and evokes a feeling of class or formality. The objects in each half of the mirror image may not be identical, but may be mirror images in sense of colour, number of objects or any other element of design. Asymmetrical is described as an informal balance that is attention attracting and dynamic. It balances a number of items of smaller size on one side with a larger one on the other side. A good design contains elements that lead the reader through each element in order of its significance. The type and images should be expressed starting from most important to the least. The modern feel an asymmetrical design is complex to create as it takes skills to distribute the blank space. White (2011), describes two other types of balance as radial which is a type of balance arranged around a central element. The elements placed in a radial balance seem to 'radiate' out from a central point in a circular fashion and overall which is a mosaic form of balance normally

arises from too many elements being put on a page. Due to the lack of hierarchy and contrast, this form of balance can look noisy.

### **2.8.3 Hierarchy**

According to White, (2011), a good design contains elements that lead the reader through each element in order of its significance. The type and images should be expressed starting from most important to the least.

### **2.8.4 Unity**

Berdan (2004), explains unity as an ordering of all elements in an image so that each contributes to a unified aesthetic effect so that the image is seen as a whole. Failing to accomplish this results in the premature termination of the viewer's experience - they look away. There are a number of ways to achieve unity to attract and keep the viewers attention. Artists achieve this by repeating elements, overlapping shapes and directing the eye of the viewer around the work from one similar element to the next or along a line or shape. The eye is directed by the principles of design and composition so that the artwork has unity. The main function or job of the principles is to organise the elements into a unified artwork.

### **2.8.5 Proportion**

In reference to Jirousek (2005), proportion refers to the relative size and scale of the various elements in a design. The issue is the relationship between objects, or parts, of a whole. This means that it is necessary to discuss proportion in terms of the context or

standard used to determine proportions. The most universal standard of measurement is the human body; that is, our experience of living in our own bodies. The appropriateness of size of objects is judged by that measure. Use of appropriate scale in surface design is also important. For example, an overly large textile design can overwhelm the form of a garment or a piece of furniture. According to Berdan, (2004), one of the reasons proportion is often considered important in composition is that viewers respond to it emotionally.

### **2.8.6 Rhythm**

Canleyvale (2009), describes rhythm is about the rate the eye moves throughout the work of art. This is usually because the eye moves, jumps or slides from one similar element to another in a way similar to music..

Berdan (2004), makes it more interesting as he states, Rhythm is soothing and our eyes beg to follow rhythmic patterns. To be effective, rhythm also requires some variability - rhythm that is too similar or perfect may be boring. Therefore when composing your images look for repetition with variation.

### **2.8.7 Contrast**

Hortin (2009), Contrast allows one to emphasize or highlight key elements within your design. Contrast is created when two elements are total opposites. This does not necessarily have to be colours either. It can be achieved with fonts (classic/contemporary), lines (thick/thin) and shapes (big/small), just to name a

few. According to Lovett (1999), the major contrast in a painting should be located at the centre of interest. Too much contrast scattered throughout a painting can destroy unity and make a work difficult to look at. Unless a feeling of chaos and confusion are what the artist is seeking, it is a good idea to carefully consider where to place the areas of maximum contrast.

### **2.8.8 Harmony**

Lovett (1999), harmony in painting is the visually satisfying effect of combining similar, related elements. Example adjacent colours on the colour wheel, similar shapes among others.

### **2.8.9 Repetition**

Lovett (1999), Repetition with variation is interesting, without variation repetition can become monotonous. Repetition works with pattern to make the artwork seem active. The repetition of elements of design creates unity within the artwork.

### **2.8.1 Dominance**

White (2011), dominance is created by contrasting size, positioning, color, style, or shape. The focal point should dominate the design with scale and contrast without sacrificing the unity of the whole. Lovett (2011), adds that, dominance gives a painting interest, counteracting confusion and monotony. Dominance can be applied to one or more of the element to give emphasis. Berdan (2004), asserts that dominance can also be achieved through nonconformity that is the difference or exception. If all the elements are similar and one is different in colour, tone or shape- it will stand out and become dominant.

### **2.8.11 Variety**

Canleyvale (2009), says, variety gives an artwork interest and vitality, as the elements are repeated with enough change or difference to enhance each other. Variety, contrast and harmony work together to give unity. Too much variety leads to confusion and disunity. Too little leads to boredom.

### **2.8.12 Emphasis**

Emphasis is the part of the design that catches the viewer's attention. Usually the artist will make one area stand out by contrasting it with other areas. The area will be different in size, colour, texture, shape, among others.

## **2.9 Pattern**

Pattern is the repeating of an object or symbol all over the artwork.

### **2.9.1 Types of pattern**

#### **2.9.2 Florals**

In the textiles industry, patterns of richly coloured petaled roses and patterns of roses, sharp thorns and leaves are both referred to as florals. According to Yates (1995), florals have been the most common and bestselling printed fabrics in apparel or interior textiles for the past several hundred years. She describes floral pattern as a realistic or stylized representation of flowers and plants. Meller and Elffers (1991), category floral patterns as the gatherings of the flower garden, including grasses, but agricultural produce like

fruit and vegetables considered may also be considered a conversational subject as are nuts and pinecones. Trees too are conversational but leaves are classified as floral and so is wheat.

Cole (2007), describes floral patterns as organic patterns which portray the natural forms of flora and fauna and fall into what is considered to be the popular of the design categories. Meller and Elffer agree with Cole on the popularity of floral patterns by describing it as the most popular genre of fabric patterns. They attribute part of the explanation for this as sociological. They further explain by saying that men of the eighteenth century and earlier wore richly ornamented clothes, for the last two centuries, most male apparel has been relatively sober and undecorated. That has meant that women buy considerably more printed cloth than men do and though one hesitates to say that any motif is implicitly masculine or feminine, it is certainly more common to see women than men wearing florals and choosing them for home furnishing. Cole (2007), further states that, observational drawings play a major part in the creation of these designs often with an emphasis on the realistic depiction of fruits, flowers, leaves and animals. She asserts that many designers stylize their portrayal of plants to achieve their aims.

### **2.9.3 Geometric patterns**

According to Cole et al (2007), geometric patterns are non-presentational patterns that have been arranged into an ordered or regular repeat. Some of these designs have an entirely mathematical basis and almost all have underlying visible geometric grid upon which the pattern is constructed. Several of the designs have a regular structure which the

artists then deliberately interrupt to achieve an asymmetrical balance to their pattern. A few of the artists do not use a formal arrangement at all for their designs but still manage to attain a geometric look. Texture serves to soften the rigid outlines of geometric designs.

Yates (1995), asserts that designs derived from any geometric shape, are the most prevalent type of design other than floral. She further explains that a geometric may simply feature lines arranged on a single ground colour or ranging to much more elaborate design, paisleys, though originally derived from curved leaf forms, are often stylized and isolated to yield the effect of a geometric pattern. Meller and Elffer et al (1991), describes geometric patterns as designs with circles, squares, triangles, spirals, stars, dots, polka and many plaids.

#### **2.9.4 Abstract Patterns**

Cole et al (2007), describes abstract patterns as non representational design with freely drawn shapes and motifs with no recognizable figurative or narrative element to the design.

#### **2.9.5 Conversational Patterns**

Meller and Elffer et al (1991), assert that conversational patterns depict some real object or creature. It may show a whole scene, a landscape or city space. Conversational pattern as described by Yates et al, range from the crayons to seashells and even people. They may be oriented towards any segment of the market; juvenile patterns, designed to be

used for children's products are often conversational. Juveniles whether showing cars, balloons, animals or other popular motifs are usually boldly drawn and brightly coloured.

Cole et al (2007), conversational patterns are sometimes referred to as novelty prints and contain images of objects or situations. In these designs the artist inspirations are not always immediately apparent until examined closely. For example, one series of wallpaper has been based on the song lyrics of Edith Piaf. Some patterns may tell a story or promote a point of view. The inspiration for these motifs can be natural or manmade in origin and occasionally a design element or combine people of fantasy Figures or background.

#### **2.9.6 Ethnic Patterns**

Meller and Elffer et al (1991), mention that ethnic styles have their day in western design and then submerge to reappear whenever someone senses that the time is right for 'new' twist on the constant demand for a folkloric pattern. Like conversational such as the commemorative, however, ethnic pattern tend to be self- limiting. With the exception of the paisley which has been popular long enough to be completely assimilated into western fashion their vogue usually does not last more than one season. Ethnic design as espoused by Yates et al, is influenced by different cultures. It may be influenced by African inspiration, early American influence, Chinese and Japanese influences and any other culture may contribute motifs, patterns and techniques popular in various styles of design.

### **2.9.7 Patterns that Reflect Art Movement and Periods**

In reference to Meller and Elffer et al (1991), sometimes fabrics are designed by people consciously seeking to shape the look of their time, by ambitious artists such as Frank Lloyd Wright and William Morris or the more fashion oriented Paul Poiret and Mario Fortuny. Designers like these are often the links between cloth and the fine arts. They are part of the movements and ideas of the age and are moved to carry them through in textiles. Styles like psychedelic on the other hand, have no notable figures associated with them but reflect a kind of taste of a period.

### **2.10 Motif Arrangement**

For a textile design to be reproduced, it must eventually be developed into one standard unit containing a specific arrangement of the desired motifs. This one unit is called a repeat. The one unit of repeat will be repeated across the length and width of the fabric in a continuous manner. In arranging the motifs, the negative areas should be taken into consideration because they form part of the design. Some motifs because of their sizes and shapes need to be closer or wider apart from each other.

According to Adu-Akwaboa (1989), the arrangement of motifs may be full drop, half drop, one-third drop, one quarter drop, the ogee or all over pattern. Lecture notes by Ulzen Appiah (2009), give other types of motif arrangements such as spot design arrangement which mostly have plain background with textures concentrated on motifs, counter change, scalloped or meandering, composition, pictorial and other basic design

arrangements such as diamond within square, square within square, circle within square, triangle within square, oval within square among others.

Meller and Elffer et al (1991), enumerate types of all over patterns as follows:

### **2.10.1 All over non directional**

All over layout contains more figures than ground. The motif of the pattern covers more than fifty percent of the field. Such layouts are popular with textiles and fashion designers because they tend to disguise a pattern's repeats.

Non – directional designs, which have no implicit top or bottom, left or right are also commercial favourites; it makes no difference which way they go when the cloth is sewn into a garment and this eases the work of the cutter who can make more economical use of a bolt of cloth when shapes can be cut from it in any direction.

### **2.10.2 One directional design**

One directional designs have distinct top and bottom areas. The pattern cut from these fabrics must all be oriented in the same direction which limits the cutter's freedom of manoeuvre and leaves more wasted fabric in a bolt. Since World War II, the garment industry's economical designers have tried to reduce such waste by eliminating one directional designs which in fact appear less often in twentieth century cloth. Earlier designers were just as thrifty but they embraced these patterns perhaps because labour was cheap and more skilled or perhaps simply because they had a different sense of

propriety. One directional, after all, are natural layouts for floral patterns showing the flowers, vertical growth toward the light.

### **2.10.3 Allover set**

Allover set is a formal layout of grids and diagonals. It tends to be a static design, seeming antithetical to the delicate organic lines of motif, though when the motif is sufficiently stylized and simplified, orderly repetition becomes more active in the image than the form of the flower itself.

### **2.10.4 Allover tossed**

Allover tossed- the motifs look as if they have been freshly picked and scattered at random. The motifs all point in different directions, giving the print movement and informal air.

### **2.10.5 Allover –two- directional**

With allover –two- directional, the top and bottom parts are reversible, giving the fabric cutter more freedom than the one directional design allows. But where the non-directional design works equally well sideways as vertically, patterns cut from two directional prints must confirm to the vertical.

## **2.11 Dyeing with reactive dyes**

Kiron (2012), describe reactive dye as a dye, which is capable of reacting chemically

with a substrate to form a covalent dye substrate linkage. The dye contains a reactive group and this reactive group makes covalent bond with the fibre polymer and act as an integral part of fibre. This covalent bond is formed between the dye molecules and the terminal –OH (hydroxyl) group of cellulosic fibres on between the dye molecules and the terminal –NH<sub>2</sub> (amino) group of polyamide or wool fibres. According to Corbman (1983),there are now several varieties of reactive dyes, which actually react with fibre molecules to form a chemical compound. While these dyes were first designed for cellulose fibres, types are now available for wool, silk, nylon, acrylics and blend of these fibres. Some advantages of reactive dyes are their excellent fastness to light and washing and their brilliant shades, which are rivaled only acid dyes on silk. Other properties reiterated by Kiron are;

1. Reactive dyes are soluble in water.
2. During dyeing the reactive group of this dye forms covalent bond with fibre polymer and becomes an integral part of the fibre.
3. The dyes have very stable electron arrangement and can protect the degrading effect of ultra-violet ray.
4. Textile materials dyed with reactive dyes have very good wash fastness.
5. Reactive dye gives brighter shades and has moderate rubbing fastness.
6. Dyeing method of reactive dyes is easy. It requires less time and low temperature for dyeing.
7. Reactive dyes are comparatively cheap.
8. Reactive dyes have good perspiration fastness.

According to Hussain (2012), the dyeing mechanism of material with reactive dye takes place in three stages:-

**1. *Exhaustion of dye in presence of electrolyte or dye absorption.***

When fibre is immersed in dye liquor, an electrolyte is added to assist the exhaustion of dye. Here NaCl (sodium chloride) is used as the electrolyte. This electrolyte neutralizes absorption. So when the textile material is introduced to dye liquor the dye is exhausted onto the fibre.

**2. *Fixation under the influence of alkali***

Fixation of dye means the reaction of reactive group of dye with terminal –OH (hydroxyl) or-NH<sub>2</sub> (amino) group of fibre and thus forming strong covalent bond with the fibre and thus forming strong covalent bond with the fibre.

**3. *Washing-off the unfixed dye from material surface***

As the dyeing is completed, a good wash must be applied to the material to remove extra and unfixed dyes from material surface. This is necessary for level dyeing and good wash-fastness. It is done by a series of hot wash, cold wash and soap solution wash.

Reactive dye is the most permanent of all dye types. Unlike other dyes, it actually forms a covalent bond with the cellulose or protein molecule. Once the bond is formed, what is achieved is one molecule, as the dye molecule has become an actual part of the cellulose fibre molecule. No wonder one can safely wash a garment that has been dyed in bright reactive colours with white clothing, a hundred times, without endangering the whites in the least - even if it is solid black.

## 2.12 Dyeing with vat dyes

From the Free Encyclopedia (2008), Vat dyes are an ancient class of dyes, based on the natural dye, indigo, which is now produced synthetically. Vat dyeing is a process that refers to dyeing that takes place in a bucket or vat. Almost any dye, including fibre-reactive dyes, direct dyes, and acid dyes, can be used in a vat dye. Cotton, wool, and other fibres can be all dyed with vat dyes. Although almost all dyeing can be done in a vat, the term vat dye is used to describe a chemical class of dyes that are applied to cellulosic fibre (cotton). Corbman (1983), asserts that, Vat dyes are expensive because of their method of application. They are insoluble pigments, but are made soluble in water by the use of a strong reducing agent; sodium hydrosulphite and in the alkali, sodium hydroxide. Hussain (2012), adds that, reactions such as oxidation, reduction, temperature control are often necessary when dyeing with vat dyes. The dissolution process necessitates measuring out appropriate quantities of caustic soda and sodium hydrosulphite in order to achieve reduction. The dye is soluble only in its reduced (oxygen-free) form. The fibre is immersed repeatedly in this oxygen-free dyebath, and then exposed to the air, whereupon the water-soluble reduced form changes colour as oxygen turns it to the water-insoluble form. Because of the use of caustic soda, and the very high temperature of the dye bath in the dyeing process, wool cannot be dyed using vat dyestuffs. Wool is soluble in caustic soda solutions.

According to the Free Encyclopedia, Vat dyes have a very rapid strike, a good degree of exhaustion and a very low rate of diffusion within the fibre. Vat dyes of different chemical structure may differ in the solubility of their sodium leuco-vat, stability towards

over-reduction, stability towards over-oxidation, substantivity and rate of diffusion. Commercial competitive dyes have fairly equal particle sizes. Large particle sizes give dispersions of poor stability. For some vat dyes, colour yield decreases with increasing particle size. The effect is generally dye-specific.

***The main stages in the dyeing of cotton with vat dyes are as follows:***

- Conversion of insoluble vat pigment into soluble sodium leuco-vat anions (reduction).
- Diffusion of sodium leuco-vat anions into cellulosic fibres.
- Removal of excess alkali and reducing agents by washing off.
- Oxidation of the soluble dye into insoluble pigment form within the cellulosic fibres.
- Soaping, during which the isolated molecules of vat pigments are re-orientated and associate into a different, more crystalline form.

***Important requirements of vat dye reducing agent are as follows:***

- A level of reducing power (reduction potential) sufficient to reduce all commercial vat dyes to their water soluble form, quickly and economically.
- Conversion of the vat dyes into products from which the original pigment can be restored (no over-reduction).

Hussain (2012), further reiterate that, various reducing systems for vat dyes have been proposed and used. The most common type of reducing agent used for dyeing with vat

dyes is sodium hydrosulphite, commonly known as hydros but more correctly known as sodium dithionite, which has the chemical formula  $\text{Na}_2\text{S}_2\text{O}_4$ . Although a part of the hydros is used up in the reduction of vat dyes, a large part of it may be destroyed by its reaction with oxygen in the air (oxidation), particularly at higher temperatures.

***The rate of reduction of vat dyes depends upon various factors, such as the following:***

- Particle size of the dye.
- The temperature and time during reduction.
- Concentration of the reducing agent.

***The properties of Vat dyes are as follows:***

- Vat dyes are having all around fastness properties which cannot be possible in any class of dyes .the only problem in this class is slightly poor rubbing fastness which can be increased by special after treatment.
- They have excellent wash fastness which is attributed to the large vat dyes molecule as well as its aqueous insolubility. The large vat dye molecule is trapped within the polymer system of the fibre because of its size and aqueous insolubility and it is absorbed within the fibre system by vanderwals forces.

### **2.13 Methods of Transferring Designs unto Screen**

Storey (1992), states that “the transference of pattern to the screen can be done in a great

variety of ways from the extremely simple one of painting out the background with vanish to the most advanced photochemical techniques”

An early method was to create a stencil by hand in the desired shape, either by cutting the design from a non-porous material and attaching it to the bottom of the screen, or by painting a negative image directly on the screen with a filler material which became impermeable when it dried.

According to Jackie and Marilyn (2011), creating a stencil for screen printing, also known as ‘wash-out’ was developed in the 1940s to permit grease-based marks painted or drawn directly on to the mesh to be printed. A drawing was made with solid wax or liquid lithographic tusche and the whole screen then covered with water-soluble filler. This water-based ‘block-out’ was repelled by the drawn grease, but effectively filled the remainder of the mesh. When it had dried, the grease was dissolved by a solvent, which opened the drawn areas to the passage of ink.

Photo-stencils can be made either by filling the mesh with a light-sensitive coating or by adhering a film to the screen after processing. The light-sensitive surface is exposed under a negative or dispositive in the form of a transparent sheet on which opaque image areas have been hand-drawn or photographically produced. Those parts of the stencil exposed to light harden, so blocking the screen, while those protected from light by the opaque areas remain soluble and wash away, opening the mesh to ink. Many different manipulative photographic procedures can be used, but when the half-tone process

common to other forms of photomechanical printing is employed, the dot size must be larger than the space between the mesh threads.

According to Lafler (2010), there are several ways to create an image on the mesh that either blocks or allows ink to flow through it when the squeegee is drawn across the screen. The simplest method is a basic stencil that can be cut from paper and attached to the screen. Although it is very easy, the final image will be a very simplistic one. Carter (2010), affirms this position by stating that, using stencil with screen is a helpful technique when working on artworks because it allows for quick and temporary masking-off of simple shapes.

Ryan (2003), mentions a different approach to the stencilling technique whereby a textured effect can be created by cutting portions of the stencil with a sharp blade to produce crisp edges and sharp detail, or the edges can be torn, burnt or abraded. The stencil can also be punctured to allow ink to pass through the openings or it can be worn thin with sandpaper or a razor blade to allow ink to seep through as a light film.

(Of course, these operations are performed on the paper stencil before it is attached to the screen.)

Reuels (2002), gives three approaches for preparing screens:

Drawing fluid - screen filler method:

### ***Step-A***

An illustration is made on a plain sheet of paper. The layout is placed on the on a table

and the screen placed over it, top side up. The design is traced directly on the screen fabric with a soft lead pencil.

### ***Step-A-Alternative***

The preparation of a layout is to help guide the application of drawing fluid. In a situation where a guide is unnecessary, step B follows directly.

### ***Step-B***

At this stage, an appropriate brush is selected. This is determined by the type of line or texture to be produced. Either side of the screen can be worked on. However, the printing will be done from the top side of the screen. The screen should be elevated not touching table. The areas of the layout that are to be printed are painted with the drawing fluid. The screen is left to dry in a level, flat position. Nothing should touch the areas covered with drawing fluid.

### ***Step-C***

After the drawing fluid is completely dry, the screen filler should be mixed thoroughly to a smooth consistency. The filler should be poured on the screen fabric on the same side of the screen used for the application of drawing fluid. The squeegee or a plastic spreader should be used to apply the evenly smooth coating over the entire screen. One pass should be sufficient. Multiple passes of screen filler will dissolve the drawing fluid. Again, the screen should be dried in a horizontal position making sure nothing touches the fabric. It is important that the screen filler dries completely.



**Fig. 2.13 (a): shows the application of screen filler**

(Source - [www.reuels.com](http://www.reuels.com))

***Step-D***

When the screen filler has thoroughly dried, cold water should be sprayed on both sides of the screen. The spray should be concentrated on the areas where drawing fluid was applied. These areas will dissolve and the screen will become open at those points so that ink can flow through them.

If some areas remain slightly blocked, it should be scrubbed lightly with a small stiff brush on both sides of the screen (an old toothbrush will do a good job). Hot water should not be used during this stage. The screen should be allowed to dry in a level (horizontal) position, bottom-side up. Drying time may be accelerated by using a hair dryer or fan.



**Fig. 2.13 (b): Spraying of cold water on the screen**

(Source - [www.reuels.com](http://www.reuels.com))

### **2.13.1 Screen filler method:**

The screen filler is used to block out those areas which is not to be printed. This allows the ink to be forced through the screen whenever the screen filler has not been applied.

#### ***Step-A***

An illustration is made on a plain sheet of paper. The layout is placed on a table and the screen placed over it, top side up. The design is traced directly on the screen fabric with a soft lead pencil.

#### ***Step-B***

The screen filler is stirred until it is thoroughly mixed to a smooth consistency. An appropriate brush is selected. This will be determined according to the type of line or texture to be produced. Either side of the screen can be worked on. The bottom of screen should be elevated not touching table. Areas of the layout that are not to be printed are painted with the drawing fluid. When all areas to be blocked out are covered with screen filler, the screen should be flipped over and places where the filler may have collected on the opposite side of the screen should be smoothed out.



**Fig. 2.13 (c): Painting of negative areas with drawing fluid**

(Source - [www.reuels.com](http://www.reuels.com))

### *Step-C*

The screen should be left to dry in a level position, making sure nothing touches the areas covered with screen filler. Thorough drying is necessary. Overnight drying is recommended to assure best results. Pin holes should be blocked-out before printing.

### **2.13.2 Paper-stencil-method:**

It is the fastest, least expensive, and simplest way to prepare a screen. It is done by cutting the message or illustration from paper. Newspaper or newsprint works satisfactorily. The paper should be kept flat and not wrinkled. For more accurate and durable cut paper stencils, waxed paper should be used. Designs can be cut with scissors or stencil knife or they can be "torn" to create a textured appearance.

### *Step-A*

A paper stencil should be cut. A design may be created by folding and cutting the paper as illustrated.



**Fig. 2.13 (d): Paper stencil**

(Source - [www.reuels.com](http://www.reuels.com))

### *Step-B*

The printing paper should be placed under the frame. The cut-outs should be laid on this paper as desired and the screen lowered on it.

### *Step C*

The screen frame should be pressed down to ensure complete contact with all cut-outs. A first print can now be made. The ink will cause the cut-outs to stick to the underside of the screen creating a stencil effect. This is an early method of developing a design onto screen for printing.

These processes enabled the artist to incorporate their hand into the process, to stay true to their drawing.

Ryan et al (2003), describes another interesting technique of developing a screen using a profilm. He describes a profilm as a very thin but tough material layered onto a transparent and flexible plastic sheet which is available in a wide range of colours, all transparent and may be either water soluble or of the lacquer type. The profilm is taped over the master drawing so that it lies flat and does not shift. A sharp stencil- cutting knife is used to cut through the film (but not the backing) and the areas which are outlined with the knife, that is, those through which ink is to pass, are lifted away or "stripped." In principle it is similar to the cut paper stencil, but it can produce images of much greater detail and precision. After the areas which are to print have been cut and stripped, the rest of the stencil remains attached to the plastic backing sheet. It is then placed under the screen and adhered to the fabric with the proper solvent. When dry, the backing support is peeled away, leaving the stencil firmly attached to the screen.

Adu-Akwaboa (1989), outlines other methods of silk screen development. These are;

## **1. Using Objects as Positive Designs**

Objects of different shapes can be used in place of a positive design on a paper to produce designs on screens. Flat objects like cut-out shapes from papers, flat leaves, feathers and other flat objects with interesting shapes can be used.

## **2. The Lacquer Method**

If the design is not complicated but simple with bold motifs it can be traced directly onto the screen which is not coated and then painted with lacquer. In this case, the negative are painted and blocked leaving the design areas open for dye penetration.

## **3. The Wax Method**

The screen is not sensitized or coated when using this method. Arrange objects with interesting shapes on a flat or table. Put the screen on them with the hollow part showing upwards. Rub a candle against the objects on the inside portion of the screen. The wax will block the areas where the objects are and bring out their shapes.

## **4. The Stencil Method**

Use a sheet of paper (brown paper, cartridge, newsprint among others.) which is large enough to cover the outer surface of the screen. Cut the designs out in the paper and paste it onto the outer surface of the screen with adhesive tape or any fairly strong gum.

According to Tortora and Merkel (2005), there are two types of screen printing, which include: Flat bed screen printing, in which colour is forced through one or more flat screens, the screens are lifted, the fabric is advanced at the length of one pattern repeat, and the screens are lowered to print again. Manual flat screen printing allows production of very large patterns but is very slow. Automatic flat screen printing is used both to print yard goods and to print such garment as knitted shirt. Modern rotary screen printing machines allow for the continuous movement of fabric. The squeegee is contained within the cylindrical metal screen, and colour paste is fed automatically. Rotary screens can be arranged horizontally, vertically, or centrally.

Storey et al (1992), states that, the great importance of hand screen printing as an industry is that it affords the creative and imaginative designer the means of putting on cloth in extremely varied ideas and effects.

There is an assortment of chemicals that can be applied to the screen around the image to block the flow of ink in certain areas. Wax was originally used for this but has been replaced with modern chemicals. It takes more time and skill to create this type of screen, but it is necessary for more complex final images.

The most difficult method of imaging the screen is photographic emulsion. In this method, the screen is chemically treated, exposed to the image and then processed (similar to photo development in the 20th century). Special equipment and chemicals are required for this, but photographic emulsion screen imaging allows for the most complex final images, including those with very fine detail or reproduction of photographs.

A method that has increased in popularity over the past years is the photo emulsion technique. The original image is created on a transparent overlay such as acetate or tracing paper. The image may be drawn or painted directly on the overlay, photocopied, or printed with an inkjet or laser printer, as long as the areas to be inked are opaque. A black-and-white positive may also be used. A screen is then selected. There are several different mesh counts that can be used depending on the details of the design being printed. Once a screen is selected, the screen must be coated with emulsion and left to dry in the dark. Once dry, the screen is ready to be burned/exposed. The overlay is placed over the emulsion-coated screen, and then exposed with a light source containing ultraviolet light in the 350-420 nanometer spectrum. The ultraviolet light passes through the clear areas and creates a polymerization (hardening) of the emulsion. The screen is washed off thoroughly. The areas of emulsion that were not exposed to light are dissolved and washed away, leaving a negative stencil of the image on the mesh. ((<http://en.wikipedia.org/wiki/Screen-printing>))

Braniac (2010), also provides a step by step approach for developing screens in the sun:

### ***Step 1***

The silkscreen frame - coated with emulsion that is dried should be placed in the contact exposure unit. The well of the screen should have the foam inserted into it and be locked down in position, flat face up.



**Plate 2.13 (a): Inserting the foam into the well of the screen**

(Source - [www.Ehow.com](http://www.Ehow.com))

***Step 2***

The artwork to be exposed on the emulsion surface should be placed (backwards) in the centre of the screen.



**Plate 2.13 (b): artwork to be exposed placed on centre of the screen**

(Source - [www.ehow.com](http://www.ehow.com))

***Step 3***

The plate glass should be placed over the art, sandwiching the art between the glass and the silkscreen mesh.

***Step 4***

Using a dolly or two people, the entire unit should be taken out into direct sunlight, being careful not to disturb the glass or move the art around in any way.

***Step 5***

The contact unit should be left in the direct sun for at least 20 minutes.

***Step 6***

The contact unit should be wheeled into a shady area (or indoors if there is an area set up for washing inside) after exposure.

***Step 7***

The unit should be disassembled, removing the art and glass from harmful way.

***Step 8***

The screen should be placed in an upright position, braced in such a way so as not to move when sprayed with water.

***Step 9***

A garden hose or power washer should be used to spray the entire surface of the screen with water. This should be done with low pressure from a distance. Within 2 minutes the screen will start to open up and the positive areas will start washing away.



**Plate 2.13 (c): Spraying screen surface with water**

(Source - [www.ehow.com](http://www.ehow.com))

***Step 10***

If necessary, the pressure of the hose should be increased focusing it on any areas that do not seem to be washing away.

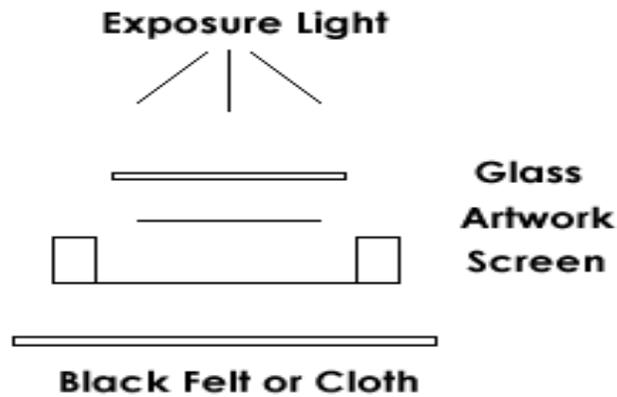


**Plate 2.13 (d): Focusing on areas that do not seem to be washing away.**

(Source - [www.ehow.com](http://www.ehow.com))

***Step 11***

The process should be continued until all the positive, unexposed places in the screen are washed clear. Apart from the sun an exposure light can be placed above the screen for exposure. The following illustration explains the process:



(Source - <http://www.silkscreenbiz.com>)

**Fig. 2.13(e): Screen developing process**

A factor that has influenced these innovative methods of developing screen is the ease or flexibility of preparation, realistic representation of objects used, aesthetic sophistication and cost effectiveness. These screens produce designs that are unique and cannot be easily reproduced and therefore suitable for making custom designs.

#### **2.14 Silk Screen Printing Techniques**

The Free Encyclopedia (2009), describes different materials for printing without using the normal print paste or ink. One method is the use of discharge ink to print lighter colours onto darker fabrics. The ink works by removing the dye in the fabric leaving a much softer texture. This gives a less graphic effect and the colours are difficult to control.

Flocking is another method which consists of glue printed onto a fabric and then flock or (other special effect) material applied for a velvet feel. Again glue can be printed in the

shape of the design, to which small plastic beads are then applied. This works well with solid block areas creating an interesting tactile surface.

Expanding ink (puff)- with this technique, an additive is added to plastisol inks which raises the print off the garment, creating a three dimensional feel.

It further states that, “Screen printing is more versatile than traditional printing techniques.” The surface does not have to be printed under pressure, unlike etching or lithography, and it does not have to be planar. Screen printing inks can be used to work with a variety of materials, such as textiles, ceramics, wood, paper, glass, metal, and plastic.

According to Reuels (2002), the possibility of multi-colour printing with one screen can be achieved as simply blocking the portion which is not to be printed with a masking tape or paper on the bottom side of the screen fabric. After the first print, the screen should be washed and dried. The same process should be repeated until all the colours are printed. An interesting effect can also be made by having two colour prints on overlapping areas. These "overlaps" can add a third (darker) value to the print.

Screen printing techniques have advanced in technical and aesthetic qualities so as to rival the more established forms of printmaking. Such interesting techniques give rich and unique patterns that can dazzle the eye. Reuels (2002), asserts that, screen printing is one of the most exciting methods of printing because it offers the widest range of possibilities. It makes possible the printing of fine line drawings, various hand and commercial lettering techniques, as well as photographic half-tone positives.

It further explains that in the past the rate at which the ink dried determined the rate of production; modern innovations and improvements have increased the production rate greatly today. Some of the innovations that have been incorporated, which have resulted in improving the production rate and have also led to the popularization of screen printing are:

1. The introduction of automatic presses, which have largely replaced hand operated presses. Improvement in the method of drying, which has increased the production rate significantly.
2. The introduction of ultra violet curing ink technology.
3. The development of rotary screen presses, which allows the press to be operated continuously.

From using meshes made of hair, to silk, to polymer, screen printing technology has come a long way indeed. Although the basic technique of screen printing has remained the same, the advent of computers and electronics and other new innovations have brought a change. But with hand screen printing, little has been done about the technique being employed. It is therefore expedient that new innovative techniques are explored to enhance creativity aiming at crafting new designs for the textile market. This will also generate new excitement in the business of screen printing.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0 Overview**

This chapter discusses the methodology employed for the research of innovative methods of developing patterns for textile screen printing. It is made up of the research design which principally looks at planning and organising structures ahead of the study, library research which revolves around gathering information on what others have done or said concerning the research. It also looks at population for the study which is centred on specific materials needed for the study. This is followed by sampling which downsizes the population to a limited number and finally data collecting instrument which offers the platform for gathering materials for the research.

#### **3.1 Research Design**

According to McMillan (2008), research design is a plan for carrying out a study. For the purpose of this study, qualitative research design was employed. Marczyk, Dematteo and Festinger (2005), described qualitative research as studies that do not attempt to quantify their results through statistical summary or analysis but it typically encompasses observations and interviews without formal measurement.

Borg and Gall (1989), state that, qualitative research method is largely subjective, and that they rely heavily on the skill of observation and interpretation to provide valid information. Ary, (2006), also indicates that data are collected in natural settings, and the

research aims at generating theory rather than testing theory. To have had the focus of the study centred on observation and interviews, qualitative research was most appropriate.

### **3.1.1 Descriptive Research Method**

Trochim (2001), describes descriptive research method as studies designed primarily to describe what is going on or what exists. Descriptive research is used when the objective of the research is to provide a systematic description that is as factual and accurate as possible. It also provides data about the population being studied; however, it can only describe the: "who, what, when, where and how" of an existing situation. One of the major limitations of descriptive research is that it cannot establish a causal relationship between variables.

Sharp and Howard (2000), regard descriptive research as the type where emerged conclusions are based solely on experiences related to the variables under investigation. Further definition from Marczyk, Dematteo, and Festinger (2005), state that, descriptive research refers to the process of defining, classifying, or categorising phenomena of interests.

The researcher deemed it appropriate to employ this method since it gave room to describe, analyse, and interpret designs created.

### **3.1.2 Experimental Research**

In experimental research, the investigators have control over one or more factors in the study that may influence the subjects' behaviour (McMillan, 2008). In this design, the

researcher considers various materials that are likely to produce desired results. According to Ary (2006), experimental research involves a study of the effect of one variable(s) on another variable. Similarly, Best and Kahn (2006), assert that experimental research describes what will be when certain variables are carefully controlled and manipulated.

The above research method was utilised during the design process. Feasibility of materials was ascertained. Materials which could not be used to achieve desired results were replaced with alternatives that were feasible.

### **3.2 Library research**

Various libraries were visited by the researcher to obtain relevant secondary data for the study. These included the College of Art library, Department of Art Education library, KNUST Main library. Other libraries visited by the researcher include; Takoradi Polytechnic library, Kumasi Polytechnic library and the internet.

Secondary data collected from these libraries were mainly from documented sources like books, encyclopaedias, dictionaries, journals, catalogues and publications.

### **3.3 Population for the study**

Population is a term that refers to a group of people or objects of which the results of the study are intended to apply. According to Salkind (1991), given the constraints of limited research funds that almost all scientists live with, the next best strategy is to take a portion of a larger group of participants and do the research with that smaller group. In

this context, the larger group is referred to as a population and the smaller group selected from a population is referred to as a sample.

The object for this study is natural and artificial objects from the environment. Due to the vastness of the researcher's environment, certain materials were selected for the study. These include; local sponge, cardboard, leaves (fresh and dry), coconut husks, sawdust and crocheting thread, orange peels, wood chipping and egg shells. The area of study is Takoradi Polytechnic and Takoradi township in the western region, Ghana. The accessible population for the study is made up of selected lecturers, technicians and students of the textiles department of Takoradi Polytechnic and selected textile designers in Takoradi township.

### **3.4 Sampling**

Sampling is a subset of the population and comprises individuals, objects, or events that form the population. According to Frankel and Wallen (1996), most populations of interest are large, diverse, and scattered over a large area. Finding, let alone contacting, all the members can be time-consuming and expensive, hence, sampling becomes very essential in research to select a manageable size of respondents from the parent population to be studied. The researcher therefore needed to take a decision whether every element of the population must be included in the study or some of the members be selected (sampling).

There are so many types of sampling selection procedures and that include systematic, convenience, quota, stratified random, proportional random, simple random among

others. However, the researcher selected purposive sampling for this study. As stated by Frankel and Frankel and Wallen (2006), in purposive sampling, researchers do not study whoever is available, but use their judgment to select a sample that they believe, based on prior information, will provide the data they need.

The importance of sampling in this study was to select appropriate kinds of objects that were suitable for creating patterns and subsequently developing them onto screens for printing. Based on this, the researcher selected leaves (fresh and dry), sawdust, cardboard, crocheting thread, local sponge and coconut husks. It was also necessary to interview some lecturers, technicians and students of Takoradi Polytechnic to solicit their views on the need for innovative screen printing techniques. On this basis, the researcher selected three textile lecturers, three technicians and twenty students from Takoradi Polytechnic and four small scale textile designers. Their in-depth knowledge in textile printing gave the researcher some ideas and information that were relevant to the study.

### **3.5 Data Collecting Instrument**

Data collecting instruments are special tools used by researchers for the execution of plans towards the achievement of established goals. As a qualitative study, the data collecting instrument used in this research was observation and interviews.

Marinosson (2002), states that observation is the result of looking and seeing while interpretation is based on the observer's assumption. Observation enabled the researcher to see and discover things that might otherwise be missed by others. Marinosson (2002), further points out that seeing is creating order out of the chaos of signals reaching the

brain, glean information from the environment by placing significance of some things, making out of a situation, even noticing the absence of things and being aware of in-built ones. This gave the researcher the opportunity to gather certain materials from the environment and created design patterns out of them for screen printing.

The interviews with which the researcher gathered information was structured interview with open-end questions. An interview as a research tool may range from structured interviews, in which questions are asked and the answers are recorded on a standardized schedule. According to Trochim (2001), the interviewer in direct interview has the opportunity to ask follow-up questions, interviews are generally easier for respondent, especially if information being sought is about opinions or impressions. This makes room for question modification to follow the line of conversation in an informal interview. This helped the researcher to generate ideas and information on the theme; innovative ways of developing patterns for textile screen printing.

### **3.6 Data Collecting Procedure**

Individual interviews were conducted with respondents. They included selected lecturers, textile technicians and students of Takoradi Polytechnic and small scale textile producers in Takoradi. The interviews were conducted on the Takoradi Polytechnic campus and Takoradi metropolis. The structured interview with open ended questions employed by the researcher created a better opportunity for soliciting useful information. Respondents responded freely and frankly. The open-ended format of the interview facilitated detailed description and expansion of the views of respondents. This enabled the researcher to understand respondents better, which is not possible with the use of other research instruments.

Observation gave the researcher the platform to examine and assess the selected objects for the designs. The techniques employed for the experiment, required the use of objects with flat surfaces that could have a firm contact with the screen. On this basis, suitable objects were selected. The observational tool also facilitated analytical assessment of the possibility to use such objects to generate textile designs.

# KNUST



## **CHAPTER FOUR**

### **PRESENTATION AND DISCUSSION OF FINDINGS AND GENERATION OF TEXTILE DESIGNS FROM SELECTED OBJECTS**

#### **4.0 Overview**

This chapter looks at presentation and discussion of the field research findings with special reference to the responses from lectures, students, technicians of Takoradi Polytechnic and small scale textile designs of Takoradi metropolis and describes the procedure used in creating textiles design patterns from the natural and artificial objects selected for the project.

#### **4.1 Field Research Findings**

The primary data collected were obtained from lecturers, students, technicians of Takoradi Polytechnic and small scale textile designers of Takoradi metropolis through interviews conducted at Takoradi Polytechnic campus and Takoradi township all in the Western region. At Takoradi Polytechnic, the lecturers interviewed are textiles lecturers who have in-depth knowledge in textile design and printing. The technicians interviewed are people with higher national diploma in textiles who have practical knowledge in textile and have worked with the textile department for years. The next groups of people interviewed were students who are pursuing textiles in higher national diploma and bachelor of technology. A cross section of small scale textile designers of Takoradi township was also interviewed for the purpose of sourcing information for the study. In

all, three lecturers (3), two technicians (2), twenty students (20) and five small scale textile producers (5) from Takoradi were reached for the interview. Table 4.1.1 shows the breakdown of the people interviewed.

Table 4.1.1 Interview Respondents

STATUS	FREQUENCY	PERCENTAGE
Lecturers	3	10
Technicians	3	10
Students	20	66
Small scale textile designers	4	14
Total	30	100

The outcome of the interviews and information gathered from the various groups of people summarized below gave the researcher an insight into how people understand the art of generating designs for screen printing.

#### 4.2 Responses from Lecturers

Interviews with lecturers indicate that hand screen printing is one of the versatile printing process in textile printing. Screen printing process was described as traditional method of printing images onto fabric. It is possible to duplicate an image many times using the silk screen. A printing paste is poured onto the screen to one side of the screen and then dragged across the screen using a squeegee. The print paste is pushed through the fine

mesh of the screen and transferred to the fabric. The areas of fabric blocked by the screen remain untouched. The printing process can be repeated along a length of fabric making it possible to create unique printed fabric for curtains, bed linen, clothing and more. Alternatively, the screen can be used to print items such as T-shirts, posters, cards, scarves and ties.

It was also revealed that, screen printing comes with certain challenges that can disturb an intended design. Some of the challenges mentioned were;

- Photo emulsion not completely washed after exposure due to artwork not prepared with a visually or photographically opaque material or the sensitized screen been exposed to too much light or heat before exposure to art work.
- Too much or all photo emulsion washed out of screen after exposure due to improper mixing of emulsion and sensitizer, underexposure, tracing paper or film not sufficiently transparent, washout temperature was too high, screen not dry before coating, screen not dry before exposure.
- Some small details on photo emulsion screen not washed out completely due to under exposure to light.
- Failure to use a black, non-reflective background under the screen during exposure.
- Printing paste drying in screen due to the type and viscosity of print paste used.
- Using the wrong type of squeegee for printing could also contribute to poor registration of design.

It was also revealed that other innovative techniques of creating designs using the screen will create interest and variety. It was suggested that using one screen for multicolour printing will create interesting designs at the same time reducing the cost of making screen for each colour.

#### **4.3 Responses from Technicians**

Interaction with technicians indicated that they had in-depth knowledge about the conventional method of screen printing since they have handled the practical aspect with students for a long time. It was revealed that students mostly have problems with repeat during printing. Especially when it has to do with designs which have straight lines and sharp edges.

They also go through a lot of stress transferring designs unto screen for printing and sometimes do not get the actual effect required after printing.

They therefore welcome the idea of innovative method of screen printing that could be easier and less stressful as well as creating variety and uniqueness in design.

One of the respondents suggested the use of paper stencil with screen as the fastest, simplest and least expensive way to prepare a screen for screen printing that gives room for versatility and innovation. The process was described as first cutting out the design from a strong paper. The next stage is to position the fabric to be printed, placing the cut-outs in place, the screen is then lowered for printing to be effected. The screen frame should be pressed down to ensure complete contact with the cut-out. The first drag of

thesqueegee will stick the stencil to the screen mesh creating a stencil that can reproduce an appreciable length of prints.

#### **4.4 Responses from Students and Small Scale Textile Producers**

The researcher interacted with a section of students and small scale textile designers to ascertain their level of knowledge in screen printing. All twenty students interviewed exhibited an appreciable knowledge in screen printing. Almost all of them could describe the processes involved in the conventional method of developing screen right to the printing stage. Fifteen of the students were able to identify certain challenges involved in hand screen printing. Some of the problems identified were loss of small details in design, disjointed motifs and textures after printing due to problems with repeat patterns especially when lines are involved. They also complained that the kinds of topics lecturers ask them to work on restrict them from exploring their creativity. They are interested to learn new and innovative printing techniques to enhance their knowledge in screen printing and to exhibit versatility in their designs.

The small scale textile designers interviewed were mostly involved in printing of t-shirt and banners for organisation. They receive contract on yardage printing for churches, schools and other social organisations occasionally. They do not print on their own for their customers unless contracted to do so. This is due to lack of innovative and creativity in hand screen textile printing. They think coming out with new innovation in screen printing to create unique designs for the market will create employment for textile designers and improve their business.

From the interview responses it was apparent that exploring new innovative ideas in screen printing will go a long way to create uniqueness and variety in textile design as well as producing custom made designs since most of the designs cannot be easily reproduced. Each design made will be unique.

#### **4.5 Generation of Textile Designs from Selected Objects**

This session describes the procedure used in creating textile design patterns from the natural and artificial objects selected for the project. The designs were created out of the researcher's innovation and creativity. Four different techniques were employed in the design process.

#### **4.6 Technique One; Using Objects as Positive Design**

##### **4.6.1 Developing designs with leaves (Design 1)**

Leaves are natural materials that are readily available in the environment and its use in textiles design cannot be underestimated. They are flexible and easy to manipulate. It is able to adjust to any position in terms of creating patterns.

Experimenting with leaves was an interesting exercise. The design started by arranging the leaves on a plain rubber sheet to create a floral pattern as shown in plate 4.6.1(b).



Plate 4.6.1(a) Leaves



Plate 4.6.1(b) Design generated from leaves



Plate 4.6.1(c) Developing design on light box



Plate 4.6.1(d) Developed screen

The design was then sent to the dark room for exposure. It was first placed on the light box and the coated screen was put on the design. To ensure a firm contact between the design and the screen, sand bag was placed in the hollow part of the screen. The white light was then switched on for exposure. After 15 minutes, the screen was removed and water was splashed on both sides of the screen to develop the design. The screen was used to print the design unto the fabric and dried in the sun. The fabric for this design was first dyed with Vat dye before printing. The design was first printed in one colour and a second print in three colours with the same screen. With the second print, the three colours were poured at different portions of the screen and squeegeed simultaneously to create a three colour way effect.



Plate 4.6.1(e) Printing of design



Plate 4.6.1(f) Printed design in one colour    Plate 4.6.1(g) Printed design in three colours

#### **4.6.2 Design 2**

The second design was created from distorted leaves. The partial holes created naturally by insects made them look interesting for textile design. The leaves were arranged directly on the lightbox. It was subsequently developed into a screen for printing. The fabric was printed in three colours (red, blue and green). After each print, the screen was tilted at an angle of thirty degrees for another print to be made. This process continued until the whole background was covered. The effect it created after printing was a multicoloured fancy print.

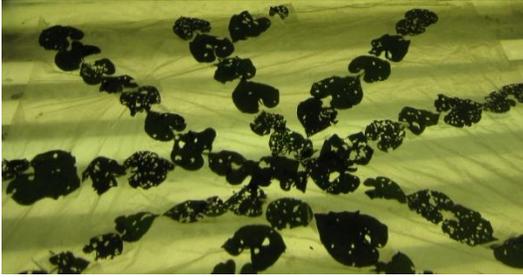


Plate 4.6.2(a) Arranged pattern on the "light box"



Plate 4.6.2(b) Developing of design

on screen



Plate 4.6.2(c) Developed design on screen

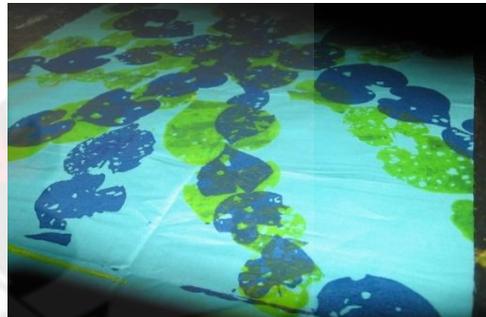


Plate 4.6.2(d) Initial printing stages



Plate 4.6.2(e) Subsequent printing stages



Plate 4.6.2(f) Final print

### 4.6.3 Creating Designs with Weeds(Design 3)

The approach employed in this design was the side by side arrangement to create a floral pattern. The design was transferred onto a screen photographically. The design was printed on a cotton fabric. The fabric was dyed with a yellow vat dye as shown in the printed fabric below.



Plate 4.6.3(a) Weeds



Plate 4.6.3(b) Arranging pattern on a 'light box'



Plate 4.6.3(c) Developing of design onto screen

Plate 4.6.3(d) Developed screen



Plate 4.6.3(e) Printing of fabric

Plate 4.6.3(f) Printed fabric in one colour

#### 4.6.4 Creating Design with Crocheting Thread (Design 4)

The crocheting thread was arranged to form a net-like abstract pattern entangling each other in an all over non directional pattern. The thread was arranged on a rubber sheet and held in position with the help of white glue. The design was taken to the dark room to be transferred unto a screen through a photographic means. The design was printed on a piece of cotton fabric dyed in brown vat dye. Since the design is an all over pattern, the screen could be turned at different angles without distorting the design. For this reason, the same screen was used to print a second colour unto the first print at an opposite angle to create a two way colour effect.



Plate 4.6.4(a) Crocheting thread.

Plate 4.6.4(b) Pattern created from crocheting thread.

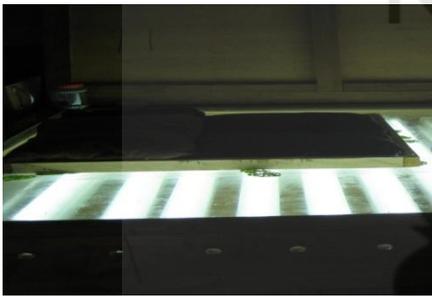


Plate 4.6.4(c) Developing of design

Plate 4.6.4(d) Developed screen



Plate 4.6.4(e) Printed design

#### 4.6.5 Creating Design with a Cardboard (Design 5)

The cardboard was cut into rectangular shapes of different sizes. The cards were arranged in an all over spotted pattern. The different sizes of the cardboard created a variety and

excitement in the design. The design was developed unto a screen and printed unto brown vat dyed background as shown in plate 4.6.5(e).



Plate 4.6.5(a) Design created from cardboard.



Plate 4.6.5(b) Developing of design



Plate 4.6.5(c) Developed screen



Plate 4.6.5(d) Printing of design



Plate 4.6.5(e) Printed design

#### 4.6.6 Creating Design with Wood Chippings(Design 6)

This design experiment was carried out directly on the light box. The wood chippings were spread on the light box in no particular order. A coated screen was placed on it and the design was developed unto the screen as shown in plate 4.6.6 (b). The design showed a tree bark effect. It was printed on a yellow vat dyed background with a brown print paste.



Plate 4.6.6 (a) wood chippings spread on “light box”



Plate 4.6.6 (b) Coated Screen on placed on design



Plate 4.6.6(c) Developed screen



Plate 4.6.6(d) Printing of design



Plate 4.6.6(e)Printed fabric

#### 4.6.7 Creating Design with Coconut Husk and Coconut Tree Bark(Design 7)

The coconut tree bark was arranged in an all over one directional pattern whilst the coconut husk was arranged in an all over tossed pattern. Both designs were developed onto the screen photographically.



Plate 4.6.7(a) Coconut tree bark pattern    Plate 4.6.7(b) Coconut husk pattern

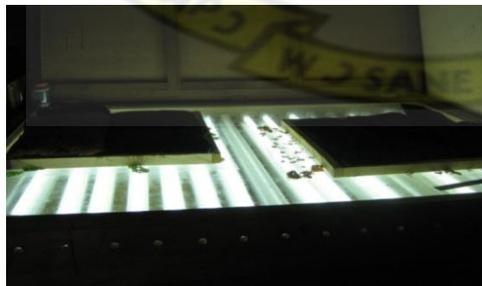


Plate 4.6.7(c) Developing of both designs    Plate 4.6.7(d) Developed screens

The developed designs were printed on a fabric dyed in blue vat dye. The coconut tree bark pattern was first printed with blue and red print paste and the second screen with the coconut husk design was printed unto the first design with a green print paste.



Plate 4.6.7(e) First print with coconut bark design



Plate 4.6.7(f) Second and final print on first print with coconut husk design

#### **4.6.8 Design 8**

The technique employed for this design was to arrange the local sponge directly unto the light box to create a pattern. A coated screen was then placed on the design to develop the design unto the screen. The design came out well and was printed in two colours. After

printing the first colour (green), a second colour was printed by shifting the screen to take a different position from the first print. A second colour (violet) was printed to create a two colour effect using the same screen.



Plate 4.6.8(a) Creating of pattern with sponge



Plate 4.6.8(b) Placed screen on design with weight



Plate 4.6.8 (c) Developed screen



Plate 4.6.8(d) First colour print

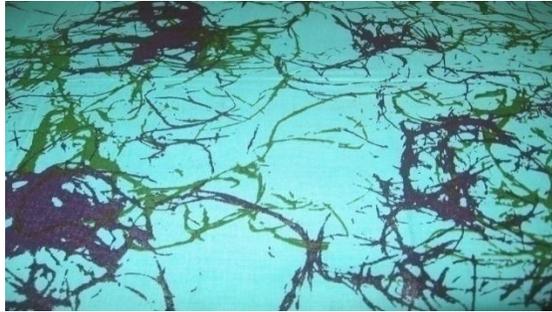


Plate 4.6.8(e) Second and final colour print

#### 4.6.9 Creating Design with Twigs(Design 9)

This design was achieved by creating an all over tossed pattern with the twigs directly on the light box. A coated screen was placed on it to transfer the design unto the screen for printing. The printing was carried out in two colours simultaneously (green and wine). After the first print, the screen was shifted away from the first position to effect another print in a different colour (orange). The first print made with two colours gave a heavier thickness than the second print made with one colour.



Plate 4.6.9(a) Creating of pattern on a “light box”



Plate 4.6.9 (b) Developed screen



Plate 4.6.9(c) printing of design

Plate 4.6.9(d) Printed fabric

## 4.7. Technique Two; Printing Directly on Fabric Using Selected Objects as Resist Agent

### 4.7.1 Creating Design with Leaves and Flowers (Design 1)

This design took a direct printing technique, whereby the leaves and flowers were arranged directly onto the fabric in an all over non directional pattern. A screen was placed firmly on fabric for printing to be made. The leaves and flowers on the fabric served as resist materials to prevent the print paste from getting into certain areas of the fabric. Two colours were printed simultaneously (green and orange on a light brown background) to create a blend of two colours.



Plate 4.7.1 (a) Arranging of design unto fabric

Plate 4.7.1.(b) Arranged design on fabric



Plate 4.7.1(c) Screen positioned on design

Plate 4.7.1(d) Printing of design



Plate 4.7.1 (e) Printed fabric

#### 4.7.2 Design 2

This design was created with large leaves. The leaves were arranged in an irregular pattern on the fabric. A screen was placed on it and printed just as the second design. After printing the leaves were removed to show the printed design.



Plate 4.7.2 Arranging of leaves on fabric

Plate 4.7.2(b) Printing of design



Plate 4.7.2(c) Removal of screen after printing

Plate 4.7.2(d) Printed fabric

### 4.7.3 Design 3

The second design was quite interesting. An irregular pattern was created directly onto the fabric and an uncoated screen was placed on it for printing. After printing, the weeds were removed gently from the fabric and the fabric allowed to dry. The print paste covered most of the negative areas of the fabric, leaving the areas covered with the weeds. In other words, the weeds served as resist agent, which created an interesting effect.



Plate 4.7.3(a) Arranged pattern on fabric

Plate 4.7.3(b) Uncoated screen placed on fabric



Plate 4.7.3(c) Printing of fabric



Plate 4.7.3(d) Printed fabric

#### 4.7.4 Creating designs with traditional sponge (Design 4)

The local sponge was arranged directly onto the fabric in an all over tossed pattern and a screen placed on it for printing. The fabric was printed in two colours (green and brown). After printing, the traditional sponge which was arranged on the fabric was removed to show the design created.



Plate 4.7.4(a) Arranged material on fabric



Plate 4.7.4(b) Screen placed on fabric



Plate 4.7.4 (c) After printing of fabric



Plate 4.7.4(d) Final design after removal of sponge

#### **4.8 Technique Three; Transferring Design onto Screen Manually**

The experiment was carried out directly on the screen. A pattern was created with leaves on a screen. By the use of a spray gun, the photo emulsion was sprayed on the negative areas of the screen to block those areas that should not take print paste. After spraying, the screen was allowed to dry for thirty minutes. The leaves were then removed to bring out the design. The leaves served as resist material at the same time creating a design. The screen was used to print two samples. The first sample was printed in one colour (green) and the second sample in two colours (green and brown).



Plate 4.8.1(a) Creating of pattern on screen surface



Plate 4.8.1(b) Spraying of negative areas of design



Plate 4.8.1(c) Dried screen after spraying



Plate 4.8.1(d) Printing of design in one colour    Plate 4.8.1(e) Printing of design in two colours.

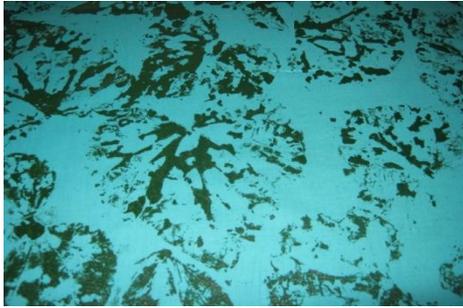


Plate 4.8.1 (f) Printed design in one colour      Plate 4.8.1(g) Printed design in two colours

#### **4.9 Technique Four; Printing Some of the Designs with Vat Dyes on Reactive Background.**

##### **4.9.1 Role of Dyes and Other Chemicals Used in the Experiment**

**Reactive Dyes:** Reactive dyes are water soluble dyes which are also known as procion dyes (trade name). It is one of the rare dyes found in the Ghanaian market even though it possesses good dyeing properties. Reactive dyes are noted for their bright colour appearance and good receptivity to cellulosic fibres. Excellent shade range, high fastness properties due to its covalent bond, and its anionic compound makes it unique to use as dye for cellulosic fibres. Reactive dyes have excellent fastness to light and washing. To be able to dissolve the dye molecule and subsequently dye successfully, soda ash and common salt are added in a slightly warm solution with the right ratio according to the number of yards of fabric to be dyed.

**Vat Dyes:** Vat dyes are insoluble in water and has nonionic compound and cannot be used for dyeing without modification. The vat dyes are found among the oldest natural

colouring matters used for textile. Vat dyes (or indigo dye) have been known in India since the earliest period for which historical records exist. They are the most common chemical dye found in the Ghanaian market and very expensive. Most vat dyes are sold in insoluble oxidized form. When treated with reducing agent they are converted into leuco compounds, all are soluble in water in the presence of alkalis. The first operation therefore consists of reduction to the leuco compound and dissolving the later in an alkali solution. Sodium hydrosulphite (dithionite) and caustic soda (sodium hydroxide) are the main chemicals used in dissolving the dye as well as opening the molecular structure of the fibre (pore of the fibre) and subsequently fixing the dye. Common salt is added to help in dye receptivity and also improve fastness. With vat dyes brighter colours are often difficult to achieve. When used they have excellent fastness to light and washing.

### **Water (H<sub>2</sub>O)**

Water was the only solvent suitable to dissolve both the Vat and the Reactive dyes.

### **Soda Ash and Common Salt**

These were the two chemicals used in addition to water to dissolve the reactive dye as well as fix the dye into the fabric.

### **Sodium Hydrosulphite and Sodium Hydroxide (Caustic Soda)**

The main chemicals used to make the vat dye soluble and subsequently fix the dye to the fabric. The presence of the hydrosulphite was important since it reacted with the background of the fabric which was dyed with reactive dye.

### **Cassava starch**

Starch was prepared from cassava and this served as the thickening agent used for sample one and two.

### **Flour starch**

Starch was prepared from wheat flour and this served as the thickening agent used for sample three and four.

### **Preparing the Salt Solution and the Reactive Dye Liquor.**

**Materials used:** Reactive dye (Yellow, Red, Blue and Violet), common salt, water and soda ash.



Plate 4.9(a) Common salt



Plate 4.9 (b) Soda ash



Plate 4.9(c) Reactive dyes

Two sachets of common salt were dissolved in about two cups of water **plate (d)** Table spoonful of reactive dye, salt solution and soda ash in the following ratio i.e. **2: 3: 2** were mixed to achieve the dye liquor. The liquor was then poured into a bigger basin which also contains water about 7 to 8 cups, **plate(g)**.

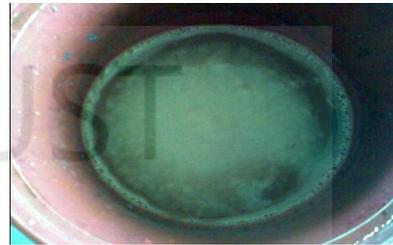


Plate 4.9(d) Mixing the Salt Solution

Plate 4.9 (e) Salt Solution



Plate 4.9 (f) Mixing the dye liquor

Plate 4.9 (g) Pouring the dye liquor into the dye bath

#### 4.9.2 Dyeing the cotton fabric with Reactive dye

Samples of cotton fabrics were first dipped in water. It is important to wet the fabric in water in order to open the pores (molecular structure) of the fabric which will aid in dye absorption. The wet fabric was then immersed into the dye bath for about ten to twelve minutes (**10 – 12min**).



Plate 4.9.2 (a) Cotton fabric



Plate 4.9.2(b) Wetting the fabric in water



Plate 4.9.2(c) Immersing the fabric into the dye bath



Plate 4.9.2(d) Fabric in dye bath



Plate 4.9.2(e) Squeezing excess dye from the fabric



Plate 4.9.2(f) Final colour after dyeing



Plate 4.9.2(g) Drying and folding after dyeing

### 4.9.3 Mixing the Print Paste

**Material used:** Cassava starch, flour starch, vat dye liquor, container, a wooden stick, and water.



Plate 4.9.3(a) Cassava starch



Plate 4.9.3(b) Flour starch

To be able to achieve a good viscosity of the print paste (using vat dye and starch) one must consider the amount of water, thickness of starch as well as amount of dye and hydrosulphite to use. First and foremost the dye liquor was prepared before the addition of the starch. For the purpose of this experiment, five to six table spoonful of water was poured into a small container. Afterwards two table spoonful of dye was then added. Caustic soda and hydrosulphite were added in the following ratio, **1:2**. That is one part of caustic soda is to two parts of hydrosulphite. After stirring thoroughly, three to four table spoonful of the starch was then added. This process was repeated for all the samples produced.

**4.9.4 Printing with vat dye using cassava starch and flour starch as thickening agents**



Plate 4.9.3(c) Mixing the print paste



Plate 4.9.3(d) Printing with cassava paste    Plate 4.9.3(e) Printing with corn flower



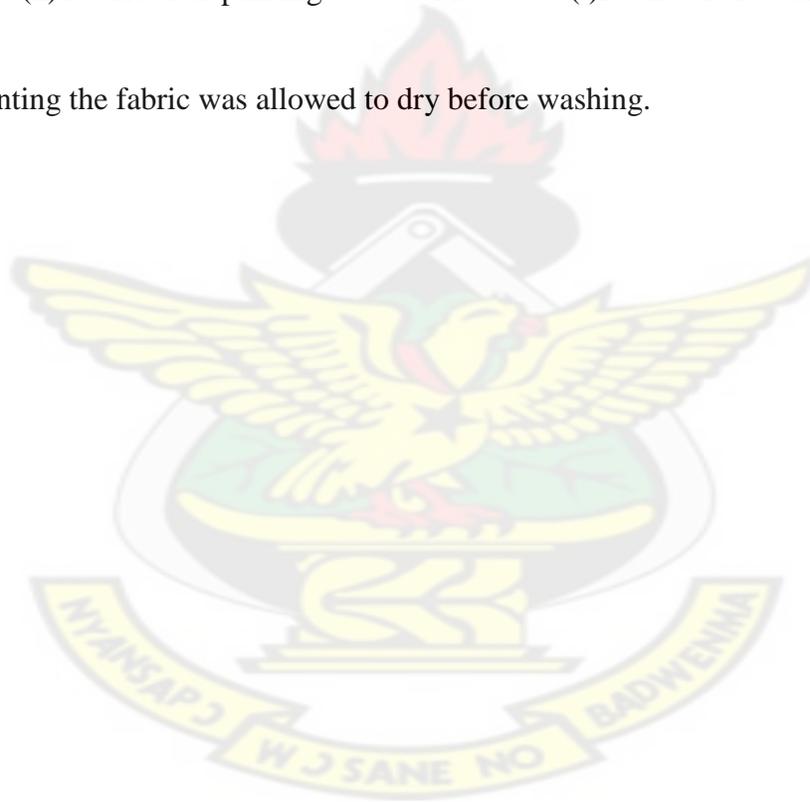
Plate 4.9.3(f) Fabric after printing.    Plate 4.9.3(g) Fabric after washing (Cassava base)



Plate 4.9.3(h) Fabric after printing

Plate 4.9.3(i) Fabric after washing (Corn base)

After printing the fabric was allowed to dry before washing.



## CHAPTER FIVE

### ANALYSIS AND APPRECIATION OF DESIGNS

#### 5.0 Overview

This chapter analyses and appreciates the final designs generated from the selected materials. The appreciation considers the aesthetic qualities with reference to arrangement of motifs, textures, colour combinations and discusses the significance of the designs, and the impact they can have on the society.

#### 5.1 Analysis and appreciation of design 1



Plate 5.1(a): Printed design in one colour      Plate 5.1(b): Printed design in three colours

The design in plate 5.1(a,b) is a floral design that was arranged in an all over pattern. The winding and climbing of the vine and leaves indicate growth. Showing growth in a floral pattern is an important part of the design composition. In a practical sense, the floral motif used as a pattern base is because it is attractive and adaptable. It serves a seemingly endless source of variation which helps to overcome the problem of monotony in the

design. However, the use of the floral motif goes a long way to show the relationship between humans and nature. It constantly reiterates the role of natural species in a natural world.

The colour used for the first print was green which symbolises youth, spring, growth, calmness and persistence. It is also associated with money, healing and harmony. It is very productive to work in a room decorated with green colour and also helps one to better take in and analyse new information. The first print is therefore suitable for interior decoration for homes and offices.

The second print is made up three colours which were achieved by blending two colours (blue and red to get the third colour green. The blue, green and red colours are a combination of warm and cool colours. The blue and green with an accent of red which signifies life force, materialism, passion and love makes it appropriate for the living room. The design can also be used for women's apparel. This is because floral patterns have feminine attributes due curvy and flexible nature. It is therefore common to see women than men wearing floral designs and choosing them for home furnishing.

## 5.2 Analysis and appreciation of design 2



Plate 5.2: design printed with small leaves

The design in plate 5.2 was printed directly from leaves arranged on the fabric in a non directional all over pattern. The design is a stylised or floral pattern that represents realism and presents a fresh interpretation of timeless textile design that forms a bond with the natural beauty and the environment that surrounds us. The design was printed in two colours. The colours were green and orange which is a combination of warm and cool colours. The green colour is relaxing and helps alleviate depression, nervousness and anxiety. It also offers a sense of renewal, self-control and harmony whilst orange is fun and flamboyant colour that radiates warmth and energy. It also stimulates activity, appetite and encourages socialization. The design portrays the natural form of flora and fauna and therefore when used for interior design will create a tranquil and refreshing effect in a room. The floral nature of the design gives it a feminine touch that also makes it appropriate for female apparel.

### 5.3 Analysis and Appreciation of Design 3

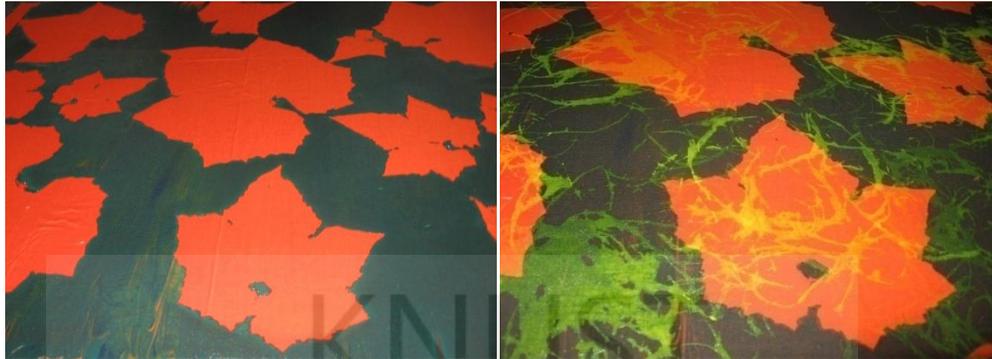


Plate 5.3(a, b): Design printed with large leaves

The design in plate 5.3(a) was printed with large leaves that were arranged directly on the fabric in an all over layout and printed in one colour. The print paste covered the negative areas of the fabric, thus the background with the motifs taking the original colour of the fabric. The striking colour (orange) and the refreshing colour (green) create a mix feeling of warmth and coolness. The design can be used for both male and female apparel. An accent of this design in a garment for a romantic outing will immediately draw attention to a particular element and also boost the wearer's confidence. In design 5.3(b), a vibrantly coloured leaves have been combined with an abstract pattern created from traditional sponge. The design will be appropriate for home furnishing, especially curtains due to the large motifs.

#### 5.4 Analysis and appreciation of design 4



Plate5.4: Design printed with distorted leaves

The fourth design was developed from leaves that have been eaten partially by insects. The design was arranged in an all-over set diagonal pattern meeting at a focal point presenting unity in diversity. The design was printed in three colours (red, blue and green). The design shows a background of multicoloured print with shades of red merging into blue and green. The juxtaposed nature of the colour gives an illusion of movement creating a lot of activity in the design. This design is a fancy print and will be appropriate for casual wear for especially women and children due to the colourful nature of the print. It can also serve as a curtain design.

## 5.5 Analysis and appreciation of design 5



Plate 5.5: design developed from weeds

Plate 5.5 shows a design developed from weeds. The design was arranged in a side by side vertical layout. The use of weeds in this design indicates the judicious and productive use of waste in textile design. This shows that nothing is waste in the environment. What is seen as waste can be explored and used as a resource for textile design.

The design was printed in one colour (green). The colour chosen suits the design perfectly because green occupies more space in the spectrum visible to the human eye. Green is the pervasive colour in the natural world that is an ideal backdrop in interior design because humans are used to seeing it everywhere. The design will therefore be useful for curtains in a home, office and hospitals. It creates an illusion of bringing the natural environment into the room.

### 5.6 Analysis and appreciation of design 6



Plate 5.6: design printed with weeds

The design shown in plate 6 was printed directly from weeds. It was arranged in a non-directional all-over layout. The weeds are presented in curves that look beautiful and elusive. It shows movement from different directions that makes the design interesting. The delicate details that appear in the design makes it unique and alludes to the natural environment. The curves depicted in the design make it suitable for female outfit and also for interior decoration.

### 5.7 Analysis and appreciation of design 7



Plate 5.7: design made from crocheting thread

The design in plate 5.7 was generated from crocheting thread. Crochet is a process of creating fabric from yarn, thread, or other material strands using a crochet hook. Crocheting, like knitting, consists of pulling loops through other loops, but additionally incorporates wrapping the working material around the hook one or more times. The idea for this design was gotten from the crocheting process. The entangling nature of the thread in the design depicts the crochet process whereby a slip-knot loop on the hook, pulling another loop through the first loop, and so on to create a chain. The chain is either turned and worked in rows, or joined end-to-end and worked in rounds. This method distinguishes crochet from other methods of fabric-making as it is composed entirely of loops and is only secured when the free end of the strand is pulled through the final loop.

The layered undulating shapes created in the design depict different moods through shapes and placement. The areas of filled and unfilled spaces create a very interesting subconscious pattern. The design is also related to an Adinkra symbol 'nkyinkyia, meaning changing oneself. This is an Adinkra symbol which signifies that there is the need for adjusting oneself to be able to play many roles in society. The design will be suitable for interior decoration items such as table runners, chair bags, coffee table covers among others.

## 5.8 Analysis and appreciation of design 8



Plate 5.8: design developed from cardboard

The design in plate 5.8 was created from cut outs made from cardboard. It was given a spot design arrangement by varying the sizes of the cut outs to create interest. The bigger sizes concentrated at certain portions of the design make those areas of the design more pronounced making those areas with smaller sizes relegated to the background. This design was motivated by making use of material found in the environment and turning them into something useful. The process of looking around ones environment helps to establish the environmental links between the built and natural spaces as well as addressing issues of sustainable practice whereby materials that are said to be waste can be turned into textile designs.

Although designs with geometric shapes are associated with men, the nature of the arrangement or layout makes it suitable for women's wear as well.

## 5.9 Analysis and Appreciation of design 9



Plate 5.9: design created from sawdust

The design in plate 5.9 was generated from sawdust. Again the issue of turning waste materials into textile design comes to play in this particular design. Sawdust or wood dust is a by-product of cutting, grinding or drilling wood with a saw. It is composed of fine particles of wood. It is also the byproduct of certain animals, birds and insects which live in wood, such as the carpenter ant. A major use of sawdust is for particle board; coarse sawdust may be used for wood pulp. Sawdust has a variety of other practical uses, including serving as a mulch or as a fuel. This design has proven beyond reasonable doubt that saw dust is a useful material to the textile designer as well. This design can be used for a casual wear for both men and women.

## 5.10 Analysis and appreciation of design 10



Plate 5.10: design created from coconut husks

The design in plate 5.10 was created from two patterns; the back of the coconut tree and the husks of the coconut fruits. Coconut palm is known to be one of the best species of the plant family. It is a unique tree that has a lot of usefulness to mankind. Several Philippine proverbs demonstrate the usefulness of this species: *"If you could count the stars, then you could count all the ways the coconut serves us."* *"He who plants a coconut tree, plants vessels and clothing, food and drink, a habitation for himself, and a heritage for his children."*

The fruit husk is composed of tightly packed fibres known as coir. If soaked in salt water, they separate and can be woven into a variety of items including rope, twine, mats, rugs, chair and cushion stuffing, and bags. A textile design created out of coconut fruit husks is therefore not out of place. The design can be used for garments and for interior decoration purposes.

### 5.11 Analysis and Appreciation of design 11



Plate 5.11: design printed from traditional sponge

The design in plate 5.11 was printed directly from local sponge. When the word sponge is mentioned, what comes to mind is bathing and not textile design. In this context, a traditional sponge has been used to produce a unique textile print that is interesting and striking. The vein lines in the design create an illusion of crackle effect in batik making. It also creates an illusion of an embossed surface design. The design was printed with two colours (green and brown) on an orange background. This design can be used to accent garment design and some fashion accessories such as bags, shoes, hat among others.

### 5.12 Analysis and Appreciation of design 12

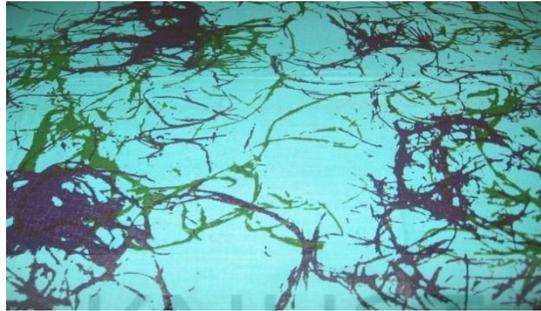


Plate 5.12: design developed from sponge

The design in plate 5.12 was also developed from local sponge with a different technique. Unlike the design in plate 5.11, this was developed onto screen before printing. The design is an all over pattern which took the natural form of the sponge. It was printed in two colours; (green and violet) on a light green background. The design is suitable for curtains and women's garment due to the curvy nature of the pattern.

### 5.13 Analysis and Appreciation of design 13



Plate 5.13: design developed from twigs

The design in plate 5.13 was developed from twigs. The motifs were arranged in an irregular manner and printed in three colours; (red, brown and green) on a yellow background. The overlapping nature of the motifs created different shades of the colours used for the printing creating a multicolour print. The scattered nature of the motifs depicts the natural arrangement of dry stems seen on the environment. The design relate with the natural environment in a unique way. It is suitable for both garments and interior decoration when the right colours are employed.

#### **5.14 Analysis and Appreciation of design 14**



Plate 5.14: design created from distorted leaves

The design in plate 5.14 was developed manually unto screen and printed. The design was arranged in an all over pattern and first printed in one colour (green) on a light green background giving a monochromatic print. A second print was made in two colours (green and brown). The process used for this design gave it a natural representation of the motif used. The technique employed will be more appropriate for areas where there is no electricity or the necessary equipment for developing designs unto screen. The design

when used for curtains will be interesting. It will bring the environment to the room creating a serene and refreshing atmosphere.

### **5.15 Analysis and Appreciation of design 15 and 16**



Plate 5.15: Designs printed with vat dyes on reactive background.

The designs in plate 5.15 are the result of printing with Vat dye on Reactive dyed background. The purpose of this experiment has been achieved thus, the ability to print vat dye as a print paste on reactive dyed background, to allow individual dyes to react with each other. There is such an infinite variety of patterns and colour combinations that never gets boring and tiresome. The best fabrics to use are natural fibers, such as cotton and silk, since they will absorb the colour better than artificial fibres.

## CHAPTER SIX

### MAIN FINDINGS, SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 6.1 Findings

- Developing and printing designs directly from objects was an interesting experience. Each design came with its own unique effect. Designs developed on the light box came out well, giving a natural feel of the objects used.
- Designs that were printed directly onto the fabric using the object as resist agent also gave special effect with some of the colours running into some of the negative areas of the background creating interesting effects.
- Some of the materials discovered were not suitable for the techniques employed. Developing and printing directly from objects required materials with flat surfaces that could as well lie flat on a surface. For that reason, certain discovered leaves though interesting could not be used because of their bulkiness. Also, food stuff like beans, rice, pepper and objects such as tree bark, seeds of fruits among others could not be used though they had interesting surface designs. This was because the techniques required objects with flat surfaces that could have a firm contact with the screen.
- Printing vat dye on reactive background came with certain challenges. After printing, it was observed that the dye on the fabric became dark in colour and the true shade of the colour could not be ascertained until after washing and drying. It was also observed that the fabric became hard and hash after printing. In order to

achieve a soft and subtle fabric the final printed fabric should be washed in lukewarm – water, dried under shade and ironed on the reverse side of the fabric. The hydrosulphite in the print paste created a hallowing effect around the motif giving a tonal variation effect.

- The technique of printing object directly unto fabric gave a phenomenal effect that could not be easily replicated. However it can only be used to print on few yards of fabric and therefore could be used to accessorize certain parts of garments and also used for fashion accessories such as bags, shoes and hats. It can also be used to produce custom made designs since each technique produced unique designs that could not be easily replicated.

On the whole, the research was successful since new techniques of producing designs with the screen have been achieved.

## **6.2 Summary**

The main objective of this research was to explore innovative ideas and methods of creating designs for screen printing and to discover other screen printing techniques. The thesis began with review of related literature to the topic. Looking at what others have done and said concerning the topic helped the researcher to understand the topic better. Qualitative research which employed experimental research tool with observation and structured interview with open-ended questions enabled the researcher to solicit useful information for the research. Through these research tools the researcher was able to discover four major techniques of creating textiles designs using the screen. Successful

designs were printed, analyzed and appreciated considering aesthetic qualities with reference to arrangement of motifs, textures, colour combinations, discussed the significance of the designs, and the impact they could have on the society.

### **6.3 Conclusion**

Screen printing has increasingly become appreciated especially by textiles designers. Designs are relatively easy to transfer to screens and frame size can be readily varied. The designer also has the freedom to choose any repeat size. A significant characteristic of screen printing is that a greater thickness of the ink can be applied in the printing process than is possible with other printing techniques. This allows for some very interesting effects that are not possible using other printing methods. Because of the simplicity of the ink application process, a wider range of ink can be used in screen printing than in any other printing process.

The process of exploring other methods of transferring designs unto screen and printing has been very interesting and challenging. The process however yielded highly artistic results, some of which are unobtainable by the conventional method of drawing and painting the design on a tracing paper. The natural forms of the materials used for the design appeared as they are and made the designs very unique. Printing with the leaf for instance provided a natural effect that cannot be achieved with the conventional type. This is a unique process that must be pursued not only by textile students but small scale textile designers. It is important to realise that textile designers can adopt similar method of creating designs as a means of producing exclusive fabrics for specialized market.

These specialized fabrics can be highly patronized by fashion homes for producing custom made garments. This approach is highly capable of improving the textiles and the fashion industry in Ghana and abroad.

#### **6.4 Recommendations**

Based on the findings of the study, the following recommendations have been made for consideration.

- It is recommended that further research should be conducted to explore various innovative techniques in screen development and printing that is commercially viable to create competition in the textile market.
- Waste can actually be a good resource for textile screen printing. It is therefore recommended that textile students and designers should look around their environment and make maximum use of what they see as waste by turning them into good resource for textile designs.
- Lecturers and instructors in tertiary institutions should give screen printing project works that will compel students to use alternative materials and techniques different from the conventional method of screen printing.
- Students should be encouraged to undertake experiment in printing with different dye stuffs that have not been explored.

- Results from such experiment should be documented for teaching aid and further research.
- The textile section of Kwame Nkrumah University of Science and Technology should set the pace by showcasing such innovative designs for garment and accessories in fashion shows.

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## APPENDIX 1

### A Guided Interview Schedule for Lecturers at Takoradi Polytechnic

1. How long have you been teaching textiles in this institution?
2. What is your perception about textile screen printing being taught in this institution?
3. Are you satisfied with the screen printed works produced by students?
4. What are some of the challenges involved in textiles screen printing?
5. Do you think the conventional method of screen printing has been overused?
6. Do you think it is possible to achieve better results by employing other techniques?
7. Can you suggest other innovative techniques apart from the conventional method of textile screen printing?
8. Do you think using such techniques will produce interesting and unique designs?
9. Will fabrics produced by such techniques be appealing to the market?

## APPENDIX 2

### A Guided Interview Schedule for Technicians at Takoradi Polytechnic

1. How long have you been a technician in this institution?
2. How long have you been involved in textile screen printing?
3. Are you satisfied with the conventional method of textile screen printing?
4. What are some of the challenges involved in textiles screen printing?
5. Do you think the conventional method of screen printing has been overused?
6. Do you think it is possible to achieve better results by employing other techniques?
7. Can you suggest other innovative techniques apart from the conventional method of textile screen printing?
8. Do you think using such techniques will produce interesting and unique designs?
9. Will fabrics produced by such techniques be appealing to the market?

## APPENDIX 3

### A Guided Interview Schedule for Students and Textile Printers at Takoradi

1. What is your general knowledge in textile screen printing?
2. Have you been practically involved in textile screen printing?
3. How long have you being involved in textile screen printing?
4. Are you satisfied with the conventional method of textile screen printing?
5. What are some of the challenges involved in textiles screen printing?
6. Do you think the conventional method of screen printing has been overused?
7. Do you think it is possible to achieve better results by employing other techniques?
8. Can you suggest other innovative techniques apart from the conventional method of textile screen printing?
9. Do you think using such techniques will produce interesting and unique designs?
10. Will fabrics produced by such techniques be appealing to the market?