Conceptual design method and creativity in textile design

Abstract

In textile sector intuitive non-engineering methods and skill based designer oriented design processes are regarded as appropriate for textile manufacturing. However, design presented by the use of Prescriptive design models concludes to be more direct and rapid when compared to the Descriptive design models. For these reasons, systematic design techniques prove to be more scientific and easy to manipulate when compared to classical intuitive design techniques. Since textile, as an industrial product in essence, has its own design paradigms and scientific background, it has to define its own methodology in an attempt to form a scheduled, programmed and repeatable design process.

The primary objective of this research is to provide support to the textile designer during early stages of the design process by using Conceptual Design steps, which can be used as a creative analysis process in textile design problems providing a high level of creativity. The Pahl and Beitz model is employed to investigate critical and complicated design problems of three design projects, each conducted by different student, solving different design requests from different fields of textile sector and thus, each fulfilling different transformation functions and design solutions. The resulting collections are presented and the steps of process are discussed in the Results & Discussion part.

Keywords: textile design, systematic design approach, conceptual design, pahl & beitz model, creativity

Introduction

Design has long been regarded as an intentional problem solving action and has become the focal point of events prepared for professional activities almost in every sector. In design practice, though a methodological approach to design problems is usually not formalized and hardly internalized, a precise design problem is generally observed. Assoreira Almendra's work concludes that the lack of methodological approach in design “results in irregular final solutions in terms of overall quality, productivity, as well as strategic adequacy to markets and firm’s aims”. Despite the deficiency of a clearly described design method, a designer is often urged to start investigating about the concept and context of the problem together. However, the usual design approaches of intuition, visualizing and feeling ones way round a solution do not help when a designer is unable to fully envisage how the solution will behave Love. In case he is intuitively successful and keen to transform the ill focused multi- possibility initial stage into a well-defined, fully detailed, final design stage, he presents “the solution” satisfying the contend of the problem.

The study of design processes is one field of Design Research that for the past four decades consistently has produced more information and reflection. Design is accepted as problem solving activity that can be considered in the light of cognitive science. This is best recognized in the definition of Christiaans & Restrepo’s: “...[design is] an information processing activity...being the problem solvers [designers] assumed [design] as information processing systems.” However, Christiaans & Restrepo also complains about the deficiency of information about the problem: because of the very nature of design problems, there is very often very little information about the problem, even less information about the goal (solution) and absolutely no information about the transformation function. This means that design problems require a lot of structuring.

Problem structuring and solution structuring have been studied intensely in the past twenty years in various areas of Design Knowledge. It is the case of design engineering where some of the models produced propose that first engineers make the analysis of the problem and in sequence they synthesize a solution Pahl & Beitz; Roozenburg & Eckels. Unfortunately textile sector is a design domain where Design Research plays a relatively small role in the everyday routine, even though design is the essential key to the products that are manufactured. The paucity of research in textile sector is best explained by the presence of understanding that intuitive non-engineering methods and skill-based designer oriented design processes are appropriate for textile manufacturing. For many years, textile and apparel sector focused only on answering the orders received from the market and fulfilling the trends opposed by others in a commissionaire approach. Though textiles have many wider scientific implications and are regarded as scientific assets for many other sectors from automotive industry to medical applications, they have long been regarded as ‘beautiful aesthetic fabrics’. Studd mentions that research tends to assume textiles to be either product-related or about surface patterns, and so akin to the graphic. Moxey discusses about the lack of rules or conventions dictating how couture products should be developed and presented.

However, textile designers are getting more and more curious about the Design Research and Design Knowledge both in aesthetic and technical fields of textile. Non-intuitive methods and design strategies best suited for textile design have been studied more nowadays. Many creative design strategies have been developed in...
textile design field and various design tools have been developed for
designers to work with design situations. It is known that all the design
solutionstive. After every phase a 'decision-making step' is performed to
assess the results of the phase and decide whether the subsequent phase
iteratively. After every phase a 'decision-making step' is performed to
satisfies various technical and economic criteria. Detail Design
Embodiment Design then elaborates the design into a layout that
against technical and economic criteria. The input of this phase
firming up into principle solution variants and evaluating variants
principles into working structures; selecting suitable combinations;
working principles that fulfill the subfunctions; combining working

Conceptual design

Some researchers, mostly in the engineering domain conclude
that creative design presented by the use of Prescriptive Design Models concludes to be more direct and rapid when compared to
the Descriptive Design Models. This is because systematic design
techniques prove to be repeatable, logical, scientific and easy to
manipulate when compared to classical designer based intuitive
design techniques. Conceptual Design method, which is one of the
most applied models to solve complex engineering design problems,
has been introduced as the beginning phase of the well-known
Prescriptive Design Process in 1984, later became as one of the most
frequently used design methods. It is the most detailed and widely
referred model of design which was developed by Pahl & Beitz. It
is our belief that by the help of Conceptual Design method used as
decision-making process and employing the previous solutions of the
similar problems, the structure of the design problem becomes lucid
and thus, the most difficult textile design problems can be solved.

Conceptual Design aims to identify the basic principles and
outline of a design solution (or concept) Kannengiesser & Gero. The
Systematic Approach in Pahl and Beitz model describes engineering
design as a sequence of four phases: Clarification of task, Conceptual
Design, Embodiment Design, and Detail Design Pahl & Beitz (Figure
1). Task Clarification is concerned with collecting, formulating
and documenting the requirements of the product to be designed
Kannengiesser & Gero. The activities a designer should conduct in
Task Clarification phase are listed as defining basic market demands;
defining attractiveness demands of the market segment; documenting
customer-specific technical performance requirements; refining and
extending the requirements using the checklist and scenario planning
and determining demands and wishes. The input of this phase is the task
info and the output of this stage is the specifications list. Conceptual
Design phase begins with identification of the essential problem and
deals solely with concept. The activities inside Conceptual Design
phase is abstracting to identify the essential problems; establishing
function structures: overall function – sub functions; searching for
working principles that fulfill the subfunctions; combining working
principles into working structures; selecting suitable combinations;
firming up into principle solution variants and evaluating variants
against technical and economic criteria. The input of this phase is the
specifications list and the output of this stage is the concept. Embodiment Design then elaborates the design into a layout that
satisfies various technical and economic criteria. Detail Design
finalizes the design and prepares production documents. Each of the
four phases comprises a sequence of activities that may be executed
iteratively. After every phase a ‘decision-making step’ is performed to
assess the results of the phase and decide whether the subsequent phase
can be started or whether the phase needs to reiterate Kannengiesser
& Gero. 

As a basic psychological process, concept design is often divided
into three phases, which are described by Osborn18 as the creative
problem solving process comprising: fact finding (problem definition
and preparation), idea finding (thinking up ideas and leads) and
solution finding (evaluation and adoption). Similarly, Wodehouse &
Ion19 argues that Prescriptive processes tend to follow a basic structure
of analysis-synthesis-evaluation where analysis addresses all the
design requirements for a problem, synthesis addresses solutions for
each performance specification and evaluation addresses the accuracy
with which these meet the requirements. If we are to equalize the
two approaches for the best understanding of the phase, fact finding
usually gathers around the analysis stage or the clarification of the task
phase. Idea generation [finding], on the other hand, gathers around
the conceptual design phase during identifying essential problems and
establishing function structures of a design problem. Solution finding
stage is determined as the technical and economical evaluation phase
at the end of conceptual design.

Creativity in conceptual design of a textile product

Creativity is often regarded as the generation of imaginative
new ideas Newell & Shaw, 12 involving a radical newness innovation
or solution to a problem, and a radical reformulation of problems.
Imagination, which involves the generation of ideas not previously
available as well as the generation of different ways of seeing events, is
important to achieve creative actions Dt Ogilvie. 15 When talking about
idea generation, Goldschmidt14 proposes creativity as an important
issue to attend to. Creativity is the sudden insight which comes to a
designer as significant during problem solving. However, Dorst &
Cross 13 explain this sudden insight as the retrospective moment “that
the designer (…) is able to identify a point during the design process
at which the key concept began to emerge". They also conclude
that retrospective accounts of creative events in design made by the
designers themselves may not be wholly reliable Dorst & Cross. 15
Since creativity cannot be induced into an empty content; it should be
furnished with knowledge derived from design practice, field expertise
or ethnographic measures and mostly from insights gained through
requirement analysis and critical observations. An intention to create
new forms can be a starting point for any designer who will also use
elements derived from the social and natural environment to achieve
product variations Colchester. 10 This activity is often focused upon the
achievement of some objective that manifests itself in the form of a
problem. A number of researchers argue that designers solve specific
problems that are either presented to them or defined by themselves
Cook,2 Goldschmidt.20

Although solution finding for solving a problem force designers
to plan the steps of design process by preparing briefs about the task,
anticipating customer and market requirements, producing design
samples, Bruce & Cooke 20 confirm that designers spend a fraction
of the total project time developing design ideas. Developing design
ideas is the way creative designers manage to draw inspiration and
produce novel solutions for the design solution. It is however, true that
inspiration drawing in intuitive design processes happens incidentally
and design creativity needs a search process in the form of a less
formal investigation. Designers appear actively to seek periods where
the serendipitous discovery of elements Tucker,20 the incubation of
ideas, and the resolution of problem impasses may occur. However, in
Conceptual Design function analysis urges designer’s mind to be more
creative and open, therefore he can innovatively think and respond
to the unusual solutions for the concepts with respect to functional

DOI: 10.15406/jteft.2017.03.00086
requirements. Conceptual Design educates designer’s imagination to generate obscure solutions or to design product concepts which satisfy desired functions unconventionally. This situation is because of the wider range provided by the function analysis phase of Conceptual Design.

Finding the transformation function or primarily function analysis is the key to success in Conceptual Design. Though researchers have attributed different meanings to the term “function”, many of them agree in classifying such notion into two categories (Deng, 2002 cited in Giampa, Muzzupappa & Rizzuti, 2004:1) such as purpose function and action function. Purpose function is explained as the description of the designer’s intention or the purpose of a design. It is thus abstract and subjective, whereas action function is explained as an abstraction of how one wishes the product to function and at the same time it individualizes the more convenient working Giampa et al.21 In textile design problems we suggest the study of functions of the textile as a whole not as purpose function and action function separately, unless it is high-tech textile based engineering design problem.

So, creativity is a ‘highly complex construct’ Mumford & Gustafson;22 Perkins.23 As a response to this complexity, a multidisciplinary community of creativity theorists has emerged in an effort to understand its peculiarities. This has resulted in theories that attempt to describe the underlying cognitive, social, and cultural variables that regulate the generation of creative products. A theory that encompasses textile design process must address this multiplicity and large number of variables. Thus, the multidisciplinary nature of the textile designer’s role means that the textile designer should be equipped as part artist, part technologist, and part social scientist to meet the ever-increasing demands for innovation, variety, and consumer satisfaction. For example an appropriate response repertoire for a printed textile designer would mean awareness of both historical and current developments in printing technology, wet processes, dyestuffs, fiber properties, fabric structures, mixed media, painting techniques, design styling, and design repeat layouts if chances of creative achievement are to improve Joyce.24 This greater repertoire urges textile designer to derive information and inspiration from an ocean of concepts from magazines, trade fairs, exhibitions, museums, galleries, art movements, theatres, cinema, published materials, books, architecture, television, to ‘the street’. Designers in textile sector can be inspired by history, philosophy, myths, art, music, motion pictures, and etc.

Roy25 explains the working methods of a designer for creativity as: Inventors and designers tend to adopt a ‘solution-focused’ strategy with an initial idea or ‘primary generator’ created early on which guides the product development process. This primary generator is often derived from the accumulated technical or design ‘repertoire’ of the individual, comprising knowledge of particular production processes or materials, admired or favorite products, and so on. This repertoire of knowledge and experience is far more useful than the numerous formal techniques that have been developed to foster creativity. Individual inventors and designers typically employ a mix of 2D sketching and 3D physical modeling to conceive and then develop their inventions and designs. The mix will depend partly on the nature of the problem to be solved and partly upon the preferred working method of the individual.

While doing inspiration drawing designers use sketchbooks, visual diaries, journals, and notebooks, which contain elements such as postcards, fliers, photocopies, photographs, sketches, painted work, fabric indicators, yam wrappings, trimmings, and written notes (records of ideas and thoughts) to overcome problems with memory recall. These storage devices can act as both an aide memoire and a source of inspiration in which eclectic borrowings of everything and anything reflect ‘long periods of research’ McDowell.26 These are vital for generating successful concepts from which the final collection will be developed. Conceptual design method may also enjoy the use of simple aesthetic tools together with engineering tools like CAD, simulation software as a source of inspiration or memory.

Observational drawing and sketching (as external representations of internal concepts) are an important part of the training of both fashion and textile designers Conran.27 Fashion sketches are used primarily to represent the size and shape of silhouettes (which describe the outline of a garment) and in describing the relationship of design elements in 2D form. A sketch can quickly and efficiently describe design elements such as proportion, balance, and rhythm Frings.28 Both fashion and textile designers produce observational drawings and sketches that act as the basis for motifs and pattern elements. Fashion and textile designers often present ideas in the form of montages composed of visual material (photographs, magazines clippings, color chips, fabric indicators, trims, and bundles of yam) collected from sensory wanderings Bruce & Cooper.29 These represent composites of distinct visual elements that reinforce the direction the product solution should follow such as Mood, Story, Concept or Color boards. These boards are used to communicate trends, end-user lifestyles, aesthetic considerations, and functional aspects of future solutions. They support and clarify the concept being represented: a form of multiple representations that is ‘essential in indeterministic processes such as design problem-solving’ Goldschmidt.30

Either 2D sketching or 3D Physical modeling, it is important that elements of information and materials collected from these periods of research are recorded and arranged in a form that assists the development of ideas and prosper creativity. Moreover, when Conceptual Design method is applied to textile, the search for stimuli should be planned systematically through use of design methodology steps and deeper analysis for each of the solution alternatives presented in Function Analysis Table should be done and each combination should be studied logically.

Materials and methods

The methodology for this study included qualitative research collected from primary and secondary resources regarding new textile product development processes. The sample included the textile and apparel collections constructed for and in local textile companies in Turkey. The study was conducted in 2017 AW season to question the possibility of employing conceptual design process steps explained in Figure 1 for the construction of new design projects of various textile fields.

The participants of this research were three design teams making 3 different design projects according to the Conceptual Design algorithm prepared by Pahl & Beitz (Figure 1). Each teams consisted of two persons; a novice designer, who directed the design project herself and an experienced senior designer who limited the assets of the conceptual design method. The design problem was given to each team and after literature review each team presented its project to determine function structures overall function and sub-functions. Using the brainstorming technique together with all the participants, the teams decided to use the same overall function. For each project, description of the task was made and the sub-functions of the product (Fi) and the solution
alternatives set (Ri) were determined by the teams independently and presented below (Tables 1-3).

The Design problems for the teams were Project 1 double sized print bed linen-duvet collection; Project 2 print scarf collection for women; Project 3 print fabric collection for women’s apparel. The expected features of the collections were expressed to be focusing upon aesthetic and financial concerns for marketability and technical concern for manufacturability. As seen from the function tables below, the combinations of sub function alternatives were evaluated and decided upon the optimal solution of the design problem. The researchers’ industry backgrounds, experiences and expertise areas provided the opportunity to dialogue with industry personnel, as well as identify the key issues in design, development, materials, marketing, and technology required in the project. Senior designer’s expertise being in design management, with more than 25 years in the textile industry with experiences in hosiery, apparel, couture and home furnishings industries, with the most recent industry position as Apparel Packing and Quality Control Director for one of the Turkey’s largest textile companies. The second researchers in each team had the expertise in textile and design and were being educated at the level of graduate.

Decisions on which fabric to utilize in garment design can be decided by aesthetic criteria (e.g. color, texture, lustre, pattern, handle), functional criteria (e.g. sewability, insulation, dissipation, rub-fastness), and commercial criteria (e.g. right time, right price, right quality) Carr & Pomeroy. Likewise, decision on the solution alternatives of Conceptual Design can be decided by aesthetic criteria, functional criteria, commercial criteria and financial criteria. These requirements can be defined quantitatively, for example, by achieving color-fastness, light-fastness, and seam-strength standards. However, much of fashion and textile design is regulated by attributes that escape these kinds of measurement. These include a desire for symmetry (or asymmetry) and the communication of personality statement and social status. In some couture problems designers who are engaged within what McRobbie calls ‘ideas fashion’ McRobbie tend to give aesthetic problems priority over performance and price. This situation is abstract and subjective since the overall purpose function differs in every design problem, but may well be overcome through experience and knowhow of the textile sector. When the number of combination possibilities of (Fi over Ri) are determined, it is well recognized that Conceptual Design will enhance creativity of a designer in the same problem by only changing the combinations of the function solution thus switching the satisfaction degree of design problem function namely the textile or apparel customer.

Results and discussion

Cross argues Prescriptive processes tend to follow a basic structure of analysis, synthesis and evaluation sequence. Conceptual Design method as a prescriptive process follows the same sequence too. The process began with the search for the Transformation function, namely function analysis and the solution alternatives for each sub function are summarized in tables below (Tables 1-3).

![Figure 1 Design process Pahl & Beitz, cited in Assoreira Almendra.](image)

The Design problems for the teams were Project 1 double sized print bed linen-duvet collection; Project 2 print scarf collection for Project 1: Print duvet collection for double size (Table 1)

<table>
<thead>
<tr>
<th>Table 1 Solution alternatives for Project 1</th>
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<tr>
<td><strong>Sub Functions</strong></td>
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<tr>
<td>F1: Material-structure</td>
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<tr>
<td>F2: Print technique</td>
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</tbody>
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**Citation:** Gürcüm BH. Conceptual design method and creativity in textile design. J Textile Eng Fashion Technol. 2017;3(1):561–570. DOI: 10.15406/jteft.2017.03.00086
Analysis: The analysis phase is the phase which addresses all the design requirements for a problem. Defining the task clearly, basic market needs and attractiveness demands of the market segment are the basis of understanding the customer appeal. Each design team prepared customer-specific technical performance requirements for the textile product collections and made inquiries about their project. This step eased the refinement of requirements of the collection and the solution sets. It is known by the researchers that if analysis of the problem is not well done, detail design and manufacture cannot fix the results of a poor conceptual design analysis. Though there are many techniques and tools for generating creative ideas, brainstorming is undoubtedly one of the most popular creative techniques used by organizations. After the design problem was given teams focused on deriving useful information about the concepts. They sought information and inspiration from art, history, philosophy, myths, music, motion pictures magazines, trade fairs, exhibitions, museums, galleries, theatres, cinema, published materials, books, architecture, television, to ‘the street’. They made literature reviews and many observations, which were presented to other teams in many design sessions. After a two month time for searching, presenting, discussing about the specs of their project, the teams made a brainstorming session to determine function structures overall function and sub-functions. Using the brainstorming technique together with all the participants, the teams decided to describe sub-functions of the product (Fi) as F1: Material-structure; F2: Print technique; F3: Design style; F4: Motif form; F5: Motif style; F6: Color.

Later each teams decided independently on the solution alternatives set (Ri) were determined by the teams independently and presented above (Tables 1-3). Solution alternatives were presented by each team with samples, research files and design outcomes were also discussed for each of it. As seen from the function tables above, the combinations of sub function alternatives were evaluated and decided upon the optimal solution of the design problem. The researchers’ industry backgrounds, experiences and expertise areas added much in deciding the creative, innovative, unique designer made solutions for textile products.

Synthesis: The synthesis phase is the phase which addresses solutions for each performance specification. When dealing with the design problem, designers often forget to consider the solution through the transformation function and all its agents. Normally, a concept at this stage is evaluated and selected on the basis of the desired functional requirements only, neglecting the impact of concept selection on subsequent life-cycle phases like manufacturing, use, maintenance, and
disposal, as well as on the user satisfaction of the product. Also important to the adoption of this stage as a central one was the fact that it is the phase that is most studied, under different perspectives and about several issues and that provided us with richness of information that was important to the development of this approach. In this way, it is possible to compare results and also contribute for a better knowledge of this complex and very dynamic stage of design processes Assoreira Almendra.\textsuperscript{1}

After selection and prioritization of each project (Project 1 double sized print bed linen-duvet collection; Project 2 print scarf collection for women; Project 3 print fabric collection for women’s apparel), researchers reported that the design process may begin with consumer or sector observation to define technical and form specifications. Designers also need to find reasonable inspiration sources and have to develop interesting stories deriving from concepts. The functions and design principles of each project and the solution alternatives for each function are presented. For each of the design problem function structures overall function-subfunctions are established. The teams have searched for working principles that fulfill the subfunctions (Tables 1-3).

Concept design is often divided into three phases, which are described by Osborn\textsuperscript{10} as fact finding (problem definition and preparation), idea finding (thinking up ideas and leads) and solution finding (evaluation and adoption). Here fact finding was used as inspiration and idea finding was used as theme and solution finding as concept generating. Below tables (Tables 4-6) detail the concept generating phases of each design team. The inspiration sources resulted in Art Movements after rigorous study. They are explained as Fact finding in Tables 4-6. The teams also constructed sketches, CAD designs, and story, mood and color boards about their projects around a theme, which they presented. The themes they chose should coincided with the combo of alternatives they have made in function analysis stage. They rationalized their choice of themes. These are explained a Idea Finding in Tables 4-6.

**Project 1: Print duvet collection for double size (Table 4)**

| Fact finding: Charles Francis Annesly Voysey & Art Nouveau |
| Idea finding: nature |
| Concept generating: abstraction |
| Solution finding: designs |
Fact finding: Team 1 derived inspiration from Charles Francis Annes-ly Voysey, renowned architect and his Art Nouveau designs. Studying Voysey’s biography and designs, the team concluded about the sub-functions of the design F1 (Material and structure) as %100 viscose and satin; F2 (Print technique) as digital print; F3 (Design style) as Art Nouveau; F4 (Motif form) as natural; F5 (Motif style) as animals and F6 (Color) as using color harmonies.

Idea finding: Team 1 decided to derive ideas from nature and use pastoral scenes.

Concept generating: Team 1 generated their concepts by abstracting Voysey’s previous designs.

Project 2: Print scarf collection for women (Table 5)

Table 5 Concept generating phases for Project 2

Fact finding: pablo picasso & cubism

Idea finding: neighborhood

Concept generating: sketching-CAD design

Solution finding: designs
Fact finding: Team2 derived inspiration from Pablo Picasso, famous painter and his Cubic designs. Studying Picasso’s biography and designs, the team concluded about the subfunctions of the design F1 (Material or structure) as %100 silk Satin; F2 (Print technique) as digital print; F3 (Design style) as Cubism; F4 (Motif form) as Stylized; F5 (Motif style) as geometric and ribbon motifs and F6 (Color) as 2017AW trend colors

Idea finding: Team 2 decided to derive ideas from neighborhood and use scenes from daily life.

Concept generating: Team 2 used 2D sketching techniques, namely hand sketched all the scenes in mind. Then they transferred all the sketches (around 30 sketches) to CAD software and colored.

Project 3: Print fabric collection for women dress (Table 6)

Table 6 Concept generating phases for Project 3

<table>
<thead>
<tr>
<th>Fact finding: raoul duffy &amp; art deco</th>
<th>Idea finding: backyard</th>
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<tbody>
<tr>
<td>Concept generating: abstraction and CAD design</td>
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</table>

Fact finding: Team3 derived inspiration from Raoul Duffy, famous designer and his Art Deco designs. Studying Duffy’s biography and designs, the team concluded about the subfunctions of the design F1 (Material or structure) as %100 silk Satin; F2 (Print technique) as digital print; F3 (Design style) as Art Deco; F4 (Motif form) as Stylized; F5 (Motif style) as Vegetal and F6 (Color) as 2017AW trend colors

Idea finding: Team 3 decided to derive ideas from backyard and use photos taken from the garden.

Concept generating: Team 3 generated their concepts by abstracting Duffy’s previous designs. Then they transferred all the sketches (around 30 sketches) to CAD software and colored.
Project 3: Print fabric collection for women dress (Table 6)

Goldschmidt describes the use of various methods for representing concepts, which include written and oral representations, three-dimensional models, diagrams, ad-hoc graphic utterances, and sketches Goldschmidt. Oxman explain these as visual and mental transactions between an individual and that which he or she is trying to represent. Fashion conceptualists have been more concerned with tackling philosophical questions than considering their implications for investment in new machinery and workforce-training should the garment go into large-scale production Carr & Pomeroy.

Evaluation: As the last step of Conceptual Design process of engineering design, researchers have to evaluate variants against technical and financial criteria and have to decide for the optimal solution combinations at the end of the process. In engineering design problems the necessity of combining working principles into working structures may occur, but since non-functional textile design is not a complex medium, teams decided to bypass this step finding it unnecessary. When selecting suitable combinations for the optimal manufacturing conditions and features of the product is determined, teams ended up evaluating all the possible combo of solution. Successful designers are aware that the combinatorial play of combining basic elements of yam, color, shape, form, style, theme, and motif is not enough.

Textile and clothing concepts, as visual responses to information and ideas collected at the research stage, represent early attempts at solving problems. The visual concepts of a fashion or textile designer may make some calculations, 3 dimensional models, diagrams, ad-hoc graphic utterances, and sketches that include written and oral representations, three-dimensional models, diagrams, ad-hoc graphic utterances, and sketches that Goldschmidt describes the use of various methods for representing concepts, which include written and oral representations, three-dimensional models, diagrams, ad-hoc graphic utterances, and sketches. Oxman explains these as visual and mental transactions between an individual and that which he or she is trying to represent. Fashion conceptualists have been more concerned with tackling philosophical questions than considering their implications for investment in new machinery and workforce-training should the garment go into large-scale production. Carr & Pomeroy.

Conclusion

It is not wrong to say that a designer starts by thinking about the concept and context of the problem first, then by proposing a solution to satisfy the contend of the problem, he transforms initial stage into a final design. As a specific type of designer, textile designers have to satisfy the contend of the problem first, then by proposing a solution to firm up into principle solution variants stage. Then as the last step of Conceptual Design process of engineering design, researchers have to evaluate variants against technical and economic criteria and choose the optimal solution combinations at the end of the process.

At the last step of this research the teams proposed their collections to the market. The first team composed a collection of 3 fabric styles and their color variants; the second team composed a collection of 12 scarves and the third team composed of 2 fabrics and their color variants.

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Textile and clothing concepts, as visual responses to information and ideas collected at the research stage, represent early attempts at solving problems. The visual concepts of a fashion or textile designer may make some calculations, 3 dimensional models, diagrams, ad-hoc graphic utterances, and sketches that include written and oral representations, three-dimensional models, diagrams, ad-hoc graphic utterances, and sketches. Oxman explains these as visual and mental transactions between an individual and that which he or she is trying to represent. Fashion conceptualists have been more concerned with tackling philosophical questions than considering their implications for investment in new machinery and workforce-training should the garment go into large-scale production. Carr & Pomeroy.

Conclusion

It is not wrong to say that a designer starts by thinking about the concept and context of the problem first, then by proposing a solution to satisfy the contend of the problem, he transforms initial stage into a final design. As a specific type of designer, textile designers have to satisfy the contend of the problem first, then by proposing a solution to firm up into principle solution variants stage. Then as the last step of Conceptual Design process of engineering design, researchers have to evaluate variants against technical and economic criteria and choose the optimal solution combinations at the end of the process.

At the last step of this research the teams proposed their collections to the market. The first team composed a collection of 3 fabric styles and their color variants; the second team composed a collection of 12 scarves and the third team composed of 2 fabrics and their color variants.