CREATING A DESIGN PROCESS AND CONSTRUCTIVIST CURRICULUM FOR

THE EFFECTIVE INTEGRATION OF FASHION AND INDUSTRIAL DESIGN

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CREATING A DESIGN PROCESS AND CONSTRUCTIVIST CURRICULUM FOR THE EFFECTIVE INTEGRATION OF FASHION AND INDUSTRIAL DESIGN

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Nicodemus Pitre Bernard, the youngest of two, was born in Eunice, Louisiana to Joseph Roy and Philomena Pitre Bernard. Nicodemus earned his Bachelor's of Industrial Design in May of 2005 from the University of Louisiana at Lafayette, graduating cum laude. While working on his Masters, Nicodemus worked for the Auburn University Sustainable Initiative as an intern and for Auburn University as a Graduate Teaching Assistant.

THESIS ABSTRACT

CREATING A DESIGN PROCESS AND CONSTRUCTIVIST CURRICULUM FOR THE EFFECTIVE INTEGRATION OF FASHION AND INDUSTRIAL DESIGN

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With increasing nano and micro technologies, the way we interact and communicate with each other and our environment in the future will continue to evolve, becoming more personal and suited to the human body through clothing. These new waves of wearable technologies promise to change our way of life forever. Although there has been much interest into the two diverging worlds of industrially designed products and fashion-designed apparel, designers who have tried to merge the two worlds have done so with little success, creating clunky sci-fi (space age) aesthetics that remain unmarketable. The purpose of this thesis and subsequent research will be to create a

guideline set and curriculum for the effective integration of Fashion and Industrial Design in a manner that is functional, meets the objectives of both designers and is not only applicable but marketable to mass consumers. Of the greatest problems that affect the way designers go about creating is the occurrence of *Selective Attention Theory* and learned knowledge, which states that individuals selectively choose stimuli within an environment to address (Shapiro, 2001).

This particular stimuli selection is influenced by a multitude of factors. For designers, these aspects of Selective Attention directly influence and affect problem solving methodology, the design process, ideation, and ultimately the overall aesthetic that varies depending of what each genre equates with successful design. Research, analytical and statistical studies of Industrial and Fashion Design methodology, dogma, selective attention/information processing, curricula, and design processes will pinpoint the exact differences and dynamics that hinder the successful interface between Industrial and Fashion Design. By manipulating Selective Attention through a curriculum and learned knowledge base set and determining what factors must be incorporated to meet the needs and objectives of each design field, the study will establish a common ground and list of essential procedures, processes, and goals for a final merger that is effective from an educational, designer, manufacturer, and consumer standpoint.

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Style manual or journal used	American Psychological Association
Computer software used	Adobe Illustrator
	Adobe Photoshop
	Microsoft Word

Preface

"Once the sewing machine has been replaced or sophisticated, once a designer can spray on clothes, or transmit fabrics to the body, or to see wearable computers as a new step in our evolution as a species. Moving computing into clothing opens a new era in how we interact with each other, new things will happen… The designer will become less artistic, more technician" (Gernreich, 1971, p. 56). It was over three decades ago, in 1971, when the futuristic designer Rudi Gernreich predicted the demise of Fashion Design, as it exists today. Since then many designers have tried to merge the two worlds of fashion and technology, focusing on taking electronics housed within computers and other technologies and distributing them around the body as efficiently as possible, while solving problems of data viewing and retrieval, interface, connectivity and energy sourcing. A top-down approach practiced by industrial designers and scientist were to put computers into clothing, leading to problems in comfort, aesthetics, washability and user-friendliness and the aimless approach of fashion designers to incorporate technology into fashion has always been through extrapolated appendages, gadgets or unrealistic add-ons. The problem is a real one, a true lack of good design that merges the worlds of industrially designed technology and fashion designed garments with consideration on behalf of each. As technologies have continued to grow and miniaturize, the two worlds of Industrial and Fashion Design have been slow to realize the importance of their blending in a technology-laden market.

The average twenty-first century commuter carries any combination of mobile phone, personal data assistant, MP3 player, digital camera, laptop, global positioning system or health monitor. It is these items that have become the artifacts that classify and categorize our modern society. Fashion's potential to engineer and enhance traditional materials, replace computerized devices, and assume forms, promises to forever disrupt the historical narrative of fashion evolution. As our society moves toward mobility at all levels of human interaction and existence, there is a need to incorporate the technologies we use constantly into the articles of clothing we wear daily. Technologies used by man have become as important as the shelters we occupy, and in essence, the clothing we shelter our bodies in, blurring the lines between what makes each truly different and more importantly, the same.

TABLE OF CONTENTS

LIST OF FIGURES xv

LIST OF IMAGES xvii

LIST OF TABLES xviii

LIST OF DIAGRAMS xix

Introduction

Problem Statement 1

Need for Study 2

Literature Review 5

Selective Attention

Propensity and Learned Knowledge

Learned Knowledge

Propensities Effect on Industrial Design

Propensities Effect on Fashion Design

Literature Review Evaluation

Objective of Study 13

Assumptions 15

Scope and Limitations 16

Procedure and Methodology 18

Anticipated Outcome 21

Chapter I: Manufactured Pleasures

Psychology of Selective Attention 24

Selective Attention and Education 27

Chapter II: Facilitating a Merge

Introduction to Wearable Technologies 32

Creating a Paradigm 34

Chapter III: Evaluating Curricula

Industrial Design39

Auburn University

Rhode Island School of Design

Savannah School of Art and Design

University of Louisiana- Lafayette

Objective of Industrial Design Holistic Model 55

Holistic Undergrad ID Curriculum

Fashion Design 64

Fashion Institute of Technology

Kent State University

Parsons New School of Design

Rhode Island School of Design

Objective of Fashion Design Holistic Model 80

Holistic Undergrad FD Curriculum

Chapter IV: Pedagogy Deliberation

Curriculum Creation 91

Constructivist Curriculum

Structure of Constructivist Curriculum Characteristics

Introduction to Blended Curriculum 98

Technofashion Defined

Philosophy and Rationale

Needs Assessment

Course Considerations

Assessment and Evaluation

Constructivist Curriculum Overview 104

Module 1

Module 2

Module 3

Module 4

Module 5

Module 6

Module 7

Module 8

Technical Approaches and Subsets 115

The Design Process 116

Design Research

Development

Communication

Systematic Tools / Techniques 121

Chapter V: Application of a Paradigm

Introduction to Using the Design Process 127

Problem Definition 128

Research Considerations

Applying a Curriculum and Design Process 137

Conceptualization and Ideation

Creation

Solvency

Methodology

Finalization

Conclusion

REFERENCES 160

APPENDIX 161

GLOSSARY 165

LIST OF FIGURES

FIGURE 1: Selective Attention Conjunction Search 27

FIGURE 2: Industrial Design (ID) /Design Process 41

FIGURE 3: Auburn University Industrial Design Curriculum 42

FIGURE 4: Rhode Island School of Design ID Curriculum 46

FIGURE 5: Savannah School of Art and Design ID Curriculum 49

FIGURE 6: University of Louisiana ID Curriculum 52

FIGURE 7: Created ID Curriculum 56

FIGURE 8: Fashion Design (FD), Design Process 66

FIGURE 9: Fashion Institute of Technology FD Curriculum 67

FIGURE 10: Kent State FD Curriculum 70

FIGURE 11: Parsons FD Curriculum 74

FIGURE 12: Rhode Island School of Design FD Curriculum 78

FIGURE 13: Created FD Curriculum 81

FIGURE 14: Technofashion Design (TFD), Curriculum 104

FIGURE 15: TFD, Design Process 121

FIGURE 16: TFD Systematic Tools 126

FIGURE 17: Preliminary Sketches 137

FIGURE 18: Silhouette Inspirations 138

FIGURE 19: Concept Explorations 140

FIGURE 20: Concepts 141

FIGURE 21: Refined Concepts 141

FIGURE 22: Draping 142

FIGURE 23: Flat Pattern 143

FIGURE 24: Initial Sewing 144

FIGURE 25: Initial Alterations 144

FIGURE 26: Basic Form Construction 145

FIGURE 27: Convertible Hoodie Detail 146

FIGURE 28: Final Silhouette 147

FIGURE 29: Compartment Detail 148

FIGURE 30: Hologram Detail 148

FIGURE 31: Garment Interface Detail 149

FIGURE 32: Interface Phases 151

FIGURE 33: Accessories Detail 152

FIGURE 34: Airo garment Signage 155

FIGURE 35: Final Garment 158

FIGURE 36: Modeled Garment and Advertisement 159

LIST OF IMAGES

IMAGE 1: Industrial Designers on Fashion 4

IMAGE 2: Fashion Designers on Technology 4

LIST OF TABLES

TABLE 1: Comparative Product Analyses 156

TABLE 2: Performance Criterion 156

TABLE 3: Interaction Matrix 157

LIST OF DIAGRAMS

DIAGRAM 1: Fashion and Industrial Design System 3

DIAGRAM 2: Hierarchical Delineation 30

DIAGRAM 3: Fashion and Industrial Design Paradigm 36

DIAGRAM 4: Curricula Evaluation 38

DIAGRAM 5: Blended FD and ID Curriculum 92

DIAGRAM 6: Interactions Model 94

DIAGRAM 7: Atlanta’s Hartsfield Airport Layout 130

DIAGRAM 8: Interaction Diagram 133

DIAGRAM 9: Needs Assessment 136

DIAGRAM 10: Systems Approach 153

Introduction

PROBLEM STATEMENT

Examinations of current fashion and technology apparel blends in the market suggest there are inherent problems that exist when trying to merge the worlds of Fashion and Industrial Design (see images 1 and 2). This fact has been argued and explicated by countless organizations including fashion industry analysis Marshall Cohen and wearable technologies giant Charmed Technology. The basis for such difficulty lays in the fact that "each genre, each school of thought, values something different" (Pryczynska, 2003, p.6). As a result of this lack of cohesive consensus, designers that try to fuse the two entities do so with little success. This inability to fuse has major implications for the future of apparel technology blends that promise to engulf both worlds in the near future. In essence, the future of fashion and wearable technologies depends on finding a medium between the two. For there to be an effective integration of Fashion and Industrial Design, a paradigm has to be set for understanding the needs and aesthetics of each and then merging them into something new and innovative that successfully meets the stipulations of both disciplines. A design process and curriculum would educate designers on how to evaluate what constraints, specifications and values must be upheld for an effective fusion of fashion and industrial design. As a result of the study, some forms of current Fashion Design will become obsolete along with other traditional apparel processes, techniques, and materials. Although this may have dire ramifications for the prospect of Haute couture, it will have even greater influence on Industrial Design as it becomes ever personalized and fitted to the human footprint.

NEED FOR STUDY

With the ever-decreasing size of technology, research and trend forecasting shows that wearable technologies promise to be the next wave of advanced science to consume the market. According to Marshal Cohen (2004), a chief fashion industry analyst, wearable technologies will account for about twenty-five percent of the fashion industry by year 2015 generating about 181 billion dollars in revenue. The main problem, as argued by Cohen, is that current designers do not know how and are not academically trained to effectively blend the worlds of technology and apparel in a manner that is marketable, functional, and aesthetically pleasing.

- There is a lack of consensus between Industrial and Fashion Designers as to what method of approach should be taken when creating interface between the two fields. The study will educate the design community on an effective manner of doing so and how to educate future designers.
- The few collections in production today that try to seamlessly integrate the two industries end up creating clunky cyborg or monstrosity-like aesthetics that are not practical and in most cases unmarketable to the mass consumer (see Images 1 and 2).
- The study is beneficial because it will distinguish how to make the transition from “technological” to “fashionable” in a manner that is superior to current trends and also meets the needs and aesthetic values of industrial and fashion designers alike (see Diagram 1).

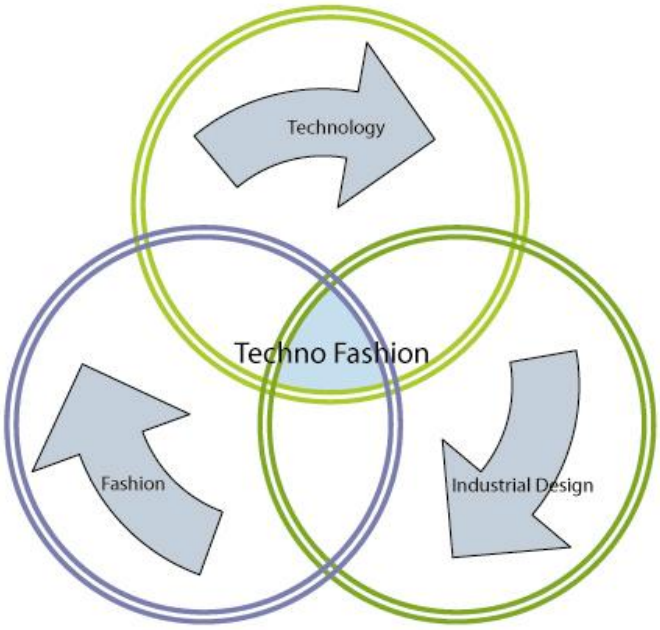

Diagram 1 Systems approach that incorporates Fashion and Industrial Design and technology, arrows depicts its circular nature that must merge into each other. Where all three entities intersect is the effective integration.

- A paradigm set for designers and a curriculum will allow the genre to prosper in both an economical and social way leading to greater personal footprint freedom, the ability to interact with others and the environment and an overall increase in well-being through individualized technology that is fashion conscience and functional for the user.

Image 1 Examples of lines created by Industrial Designers trying to merge fashion and technology. Designers Hussein Chalayan's *Remote Control* line and Charmed Technology's *Fashion of the Future* collection, respectively.

Image 2 Examples of lines created by Fashion designers trying to merge fashion and technology. Designers Diana Eng's *Silhouette* collection and Amanda Parkee's *Nomad Pneumatics* line, respectively.

Literature Review

Through the modern advancements of science and technology, for the first time man has the ability to manipulate the body and human footprint by incorporating technology into clothing. The main problem realized by houses and consumers alike, however, is the lack of effective integration between the world of industrially designed technologies and that of fashion apparel. Many designers including Charmed Technology, Hussein Chalayan and Alexander McQueen have tried to fill this gap but have been unsuccessful, creating unrealistic and unmarketable aesthetics. Their innovative "techno fashion" lines are characterized as non-functional and ridiculous by fashion critics, and even deemed "grotesque, and unpractical" (as cited in *French Vogue*, 1999). Their inability to successfully merge these two seemingly divergent industries has nothing to do with mere good design and methodology because, as this thesis will prove, when designing across disciplines, a multitude of factors must be taken into consideration on both sides of the paradigm. When genres collide there are psychological implications that determine and influence overall integration, questioning the closely held ideals and tenants of each field. Of the greatest factors facing designers in the industrial and apparel fields is the psychological theory and mundane occurrence of "selective attention." Much research has been done on varying aspects of the pervading theory and most findings have correlated its overt effect to be directly attributed to learned knowledge and predisposition to certain information (Shapiro, 2001).

Selective Attention

Throughout the history of psychological evaluation, researchers have always noted the extreme and sometimes unconscious effect that selective attention has on the mammal population. Research has narrowed the theory of selective attention to suggest that individuals have a tendency to "orient themselves toward or process information from only one part of the environment, with the exclusion of other parts according to regained knowledge" (Shapiro, 2001, p. 86). While the main influences of selective attention remain to be debated, most researchers have concluded that selective attention is driven by an innate urge for gratification and satisfaction, which is tied to previous exposure, education, and knowledge. From a Darwinian research perspective, this arousal increase is necessary for survival because it focuses on the basic instinctual needs of humanity (Cofer, 1972). Neurological research has explained that this phenomenon stems from our need to simplify the constant stream of stimuli that bombard our personal environments. The capacity model research theory of psychology proposes that mammals have a limited amount of mental capacity and temporal constraint of information processing (Shapiro, 2001) that is allocated to various tasks at a given time; as a result, we categorize stimuli from our environment to process, focusing on a limited number of stimuli ignoring what is considered overtly less important in view of information already known (Knudsen, 1962). Further research into the Theory of Direct Perception states that there is a constant detached amount of information in the environment mediated between it and the perceiver demanding a response. These channels are subjective and objective environments, fixating

on life confirming (Knundsen, 1962) or life denying factors (Kirwan, 1999) depending on orientation. This unconscious selective attribute leads to tunnel vision with codes of personal experience that affect stimuli chosen to attend. As a result, individuals will only address stimuli that originate from some original teaching, exposures, or education (Norman, 1988).

Propensity and Learned Knowledge

Studies conducted on Selective Attention have all reached one consensus that knowledge is at the core of environmental evaluation, motivation, perception, and ultimately, attention. This move towards known knowledge and perceived context clues are both automatic (Kirwan, 1999) and deliberate (Knundsen, 1962), reared from sense organs affected by past stimulation and experience, thus affecting the readiness to respond to said stimuli due to internal motivation and emotion. In following, each individual schema is independent and personal. Experimentation shows there are two primary systems involved in the biological mechanisms of learned knowledge: the reticular activating system and the autonomic nervous system. Depending on how we interpret an environment or stimuli, we experience an increase in arousal both cortical and autonomic because both a positive and negative stimuli elicit the same psychological reaction (Crozier, 1994). In general, such arousal is produced by an interruption in the sequence of cognitive processes, of what we know and expect of the world, and that mismatch with reality. Such urges function within the mind because one associates things as complex or familiar, seeking out things that give physiological arousal, which is increased by familiarity (Crozier, 1994). Overall, selective attention and stored information in the brain are a circular pattern, arousal allowing information to be received by picking the stimuli

threshold necessary for recognition, while the selective filter of information relies on aspects of cognitive-make to choose attention. Much research has been dedicated to behavioral efficiency that varies with arousal levels. Humans on average respond to familiarity because of the incentive arousal mechanism and anticipation- invigoration psychological mechanism first identified by Gestalt psychology (see Glossary). These mechanisms cause individuals to do things that have been successful or learned in the past, including symbolic stimuli, capable of instigating arousal based on pure learning (Cofer, 1972). This theory has been opposed by psychologist Ray Crozier, who believing that some predetermined knowledge is innate, argues that there is a consistency in arousal responses among people of different societies and even across different species. Crozier argues that no matter what one is taught, individuals will think and respond the same in the same situation with the same stimuli. No matter where these arousals stem from, it has been justified that they are all initially reared from the psychological preoccupation with familiarity, safety, and that which causes gratification in some manner, entities that rear attention through their ability to captivate biological and psychological processes (Knudsen 1962).

Learned Knowledge

The main reason predisposition to information and education creates a bias is the effective stimuli rate versus actual arousal. Individuals act on this arousal by using learned knowledge to predict the outcome of particular behavior (Cofer, 1972). There is a level of arousal that is optimal for behavioral efficiency, one between extremes of drowsiness and excitement, happiness and sadness, but these levels are not the peaks of optimal satisfaction and pleasure arousal; those are found at the peaks of great “arousal”

(Cofer 1972). Thus the instinctual urge to satisfy desire is only truly met at heights of stimuli response. Sigmund Freud believed that organisms seek, through pleasure, the termination of internal stimulation, another way to automatically satisfy arousal. In conjunction with selective attention, success and achievement as perceived by the mind comes from a selective perception, governed by knowledge that is also aware of what it excludes, only existing in this act of comparative exclusion (Kirwan, 1999). Selective attention in this manner is extremely influential during the educational process, in essence setting a base of knowledge that will reflect future actions, reactions, and behavior in the future (Healy, 1990). The human mind seems to morph the stimulations and the responses as a coping mechanism (Kirwan, 1999). By choosing stimuli that is familiar, attention can evoke two states of perfection: inevitability and impossibility. The Gestalt physiological studies also show a similar human tendency in perception towards achieving beauty, a guiding factor in what determines successful design and an overall aesthetic as deemed by education (Swearingen, Cutting-Gray, 2002).

Propensities Effect on Industrial Design

Industrial design is one of the few art forms that have research and problem solving at the core of its intentions. As a result, some designers are apt to focus on particular problems at the exclusion of others (Cofer, 1972). This activity is the result of the pattern matching system associated with selective attention that forces design solutions to be analogous to past experiences and our satisfying designer needs. Research shows that designers become supersaturated with their own designs and processes to the point they can no longer relate to the regular customer (Norman, 1988). Often designers rationalize their design process after the fact not realizing outside psychological influences. An example of this occurs

when designers are rewarded for creating beautiful products that are aesthetically pleasing, no matter their function ability or practicality. As a result, some designers subconsciously design products that give achievement or accolades, overlooking the real design challenge (Norman, 1988). The basic premise of Industrial Design keeps designers' minds in a state of tension heightening and tension reducing, striving for the simplest form that addresses the problem within the constraints. Empirical evidence shows that the goal is to simplify the form with clean symmetry; less is more in the postmodern movement of minimalism that has become the rule of Industrial and Architectural Design (Cofer, 1972). Researchers account for this simplistic ideal from the initial ideas of beauty and its opposition as taught to industrial designers early in their design concept development (Crozier, 1994). Ideals of successful design are both characterized and ingrained in concepts of order, unity, line, and symmetry to starve the senses from what is not essential. This approach to minimalism seems almost impoverished when observed from a sensual point, "negatively sublime, a deathliness or an anti-aesthetic," but to the design world this movement is seen as beautiful because its ideals are taught and ingrained in students (Swearingen, Cutting-Gray, 2002, p.40). By definition Industrial Design's fundamental function implies a set problem by which "means of the form is attempted to solve in conformity with only the functional expressionistic claims inherent to said problem" (Knudsen, 1962 p. 120). Precedent is also a key reason some designs or archetypes prevail throughout design history. These archetypes are correlated to episodic memory, our experiences--favorable or not--effect the outcome of final design drawing from what we know and not what we see (Lawson, 2004). Being that Industrial Design is more solution and fewer problems focused, practicality and effortlessness overrule artistic flare and individuality (Lawson, 2004). The combination of

simplicity and technology is an unconscious attempt to glamorize design without the excesses of formal beauty. Design education, especially for industrial designers, hinge on learned knowledge, innate sensibility, precedent, and in turn selective attention (Swearingen, Cutting-Gray, 2002).

Propensities Effect on Fashion Design

The fashion world as it stands today has been through many renovations that continue to evolve season after season. Reasons for this constant evolution rest in the belief that fashion must change with every passing generation to remain chic-- an overall belief that "what is new" should be preserved no matter the cost. Fashion mimics its time and vice-versa looking to all aspects of sensation for inspiration, with sensory overload optimal. Evidence suggests that "style" in this manner is the sum of life experiences and your reaction to certain stimuli, and thus pre-known knowledge. This notion has been shown through the early 1900s into the mid 2000s with movements of direct opposition and contrast (Stipleman, 2005). The minimalism movement never caught on as a major, singular style, falling every season in the name of refined excess. "Beauty" arousal in this sense is expressed through rich materials, elaborate cuts and large silhouettes, while death is reflected in minimalist deconstructed cuts, material, and confined silhouettes (Charta, 2000). The industry is inherently focused on beauty as a "good gestalt" (Crozier, 1994) and delivering awe with arousal of the senses, with clothes being essential and fulfilling primal instinct. These are tenants taught at an academic level and mimicked in the industry by designers that follow suit (Swearingen, Cutting-Gray, 2002).

Haute couture and apparel design in general work on "incomplete silhouettes;" from these simplistic ideas they add, change and exaggerate to create (Lawson, 2004). Its

fundamental function implies “a problem set by designer himself, regarding its treatment or solution for some target out come” (Knudsen, p. 65, 1962). Innovative designs characteristic of the 1920’s through the 1980’s are mixed with elements from various eras and cultures provoking sharp contrasts that verge on predetermined notions of what constitutes fashion and ingrained notions learned (Pryczynska, 2003). For the fashion world, the whole is more than the sum of its parts; the final impact and expression has its own organization and dynamic properties that cannot be found within or reduced to its parts (Crozier, 1994). Attention is paid to known success; thus, Fashion Designers try to break up the classical ambiguity of design, a need to search for something absolutely different within the constraints of learned knowledge and not completely specified in its own authentic form.

Literature Review Evaluation

By evaluating the differing research into each aspect of thesis, one finds that the main problem which hinders the effective integration between industrially designed technologies and fashion apparel is the fact that each genre, each school of thought values something different. For either field to effectively incorporate the other, they must strive to reinvent something beyond themselves, to question their goals, and the way they go about achieving them. The role of selective attention is immense because it is the main medium that dictates what stimuli is paid attention to and ultimately what values and notions are held by each industry. These particular stimuli -response mandates are driven by arousal, a need to fulfill the instinctual physiological propensity to that which most closely reflects known information and inclined knowledge. As each field values certain stimuli, so do they value the differing aspects of design, calling into question the inherent

differences between the industrial and fashion apparel fields. For the effective and seamless blend of each, a consensus between both designers must be met, reaching and fulfilling attributes appreciated by both genres. The solution relies on creating a new design process, methodology, and curriculum that goes beyond mere Industrial or Fashion Design.

Objectives of Study

- Research the direct effect of Selective Attention on the specific selection of certain problem/solution, solution/problem design stimuli.
- Determine the role stimuli selection plays in the design processes of Industrial and Fashion Design.
- Identify the major factors that differ between the two design genres and develop a hypothesis as to why and how they affect each aesthetic and ultimately their blending.
- Do a comparative analysis and evaluation of Industrial and Fashion Design curricula and different approaches to curriculum creation to ascertain a holistic curriculum that facilitates ideals and education of each.
- Conduct interviews with department heads of Industrial and Fashion Design schools to determine disciplines methodologies and rationales.
- Create a template of steps from hypothesis for an integral design process that incorporates the ideals of both fashion and product design in a manner that meets the needs, objectives, and design aesthetics of both fields.
- Create a curriculum module system that effectively merges the educational tenants of both Industrial and Fashion Design.

- Develop a Technofashion curriculum and apparel that effectively incorporates the tenants of Industrial and Fashion Design using technology and fashion to benefit a user in an effective and tangible manner. The definitive concepts will create a seamless, functional, and marketable interface between fashion and technology.

Assumptions

With ever increasing micro-technologies, the prospect of wearable technologies promises to be the wave of the future. The idea of on-body technology will increase mobility, communication, interaction with others and the environment, and improve overall quality of life in a progressively introverted society. Design process and curriculum will aid in educating designers how to facilitate this new market effectively. Selective attention is the major determinate of what stimuli in a given environment is noticed, acknowledged, and attended to:

- Selective Attention Theory states that individuals have a tendency to orient or process information only in selected parts, driven by an innate urge towards that which is familiar or pre-learned.
- Stimuli attention can come from several determining factors that can be immediate, ingrained or potential.
- Attention can be evoked in the human body both physically and psychologically on a multitude of conscious and unconscious levels.

There is an inherent difference in the way Industrial and Fashion Designers approach design problems:

- Industrial and Fashion Designers are taught different design philosophies and methodologies shaping the ideals practiced and values of method, aesthetic, and function.
- In following, selective attention and stimuli selection is dually influenced because attention varies depending on perceived notions of beauty as held by Industrial and Fashion Designers and their communities.

- Both fields plant firm bases in archetype designs that influence their further extrapolation or depravity to a design solution (i.e. solution-problem vs. problem solution, where one is the main focus).
- Curricula for each field emphasize different aspects of design and place value on them in a hierarchical manner. These belief systems influence how the process of design occurs.

Current trends in technology and fashion blends have proven unsuccessful within the mass market:

- To date no major Technofashion lines have made major shows in the consumer market due to clunky and unpractical aesthetics that are not functional or marketable.
- Current attempts to blend the two fields have proven a true need in the market and inadvertently shown what needs to be corrected within the industry.

Scope and Limitations

- Research will individually examine Industrial and Fashion Design fields, understanding each on a multitude of levels.
- Study will examine the neurological aspects of selective attention and information processing limited to stimuli selection method and arbitrator influence only.
- Psychological and physical arousal will be researched as it pertains to selective attention and stimuli selection solely.
- School curricula will be limited to those selected; only reflecting a small segment of both public and private institutions' Industrial and Fashion Design departments.

- Psychological notions of predisposed knowledge will be looked at only when dealing with its influence on arousal rates, to what degree and what aspects of these ideals are held as “beautiful” by Industrial and Fashion Designers and why.
- Gestalt Theory of beauty, order, and attention will be applied just for aesthetic value interpretations and reasoning behind them; following theories of Gestalt Theory will be considered but not fully examined within the study.
- All inter-industry movements will be studied as pertaining to direct correlation with thesis excluding other arterial implications or industries.
- Research will only study wearable technologies and intelligent fashion excluding Technofashion genres of surveillance, transformable, and advanced textiles.
- The current study excludes the markets of freelance, niche and haute couture.
- Status quo will be the decision criterion for overall effectiveness of line, with mass marketing, practicality, functionality, and identifiable or relatable aesthetics the final goals. Preceding “techie” fashion trends not in compliance will be precluded from the final evaluation.
- Design paradigm set forth will focus on creating a new school of thought for merging the worlds of Fashion and Industrial Design, calling for the absolute debunking of current ineffective trends.
- Curriculum created and module set will be inherently constructivist and meant for institutional application portraying skills essential for education of a designer to effectively blend fashion and technology.

Procedure and Methodology

Determine the adverse effects of Selective Attention Theory on stimuli selection:

- Research case studies on selective attention and the limitations of human information processing with particular attention on sources of stimulation and bias towards particular elements.
- Incorporate problem/solution, solution/problem investigation into later studies

Identify aspects of knowledge that are major contributors to arousal and thus selective attention:

- Research the main focuses of attention with particular emphasis on perceived notions and education.
- Understand aspects or values deemed effective by Industrial and Fashion Designers.
- Categorize valued portions and create a comparative analysis that is arbitrary for each discipline.

Determine a prevailing paradigm of inherent differences between Industrial and Fashion Design:

- Evaluate design principles, methodology, and curriculums for both genres.
- Compile base line data to understand what specific design ethics, aesthetics, and ideals are preferred for each field and why.

Administer questionnaire to department heads of Industrial and Fashion Design to ascertain differing idealisms:

- Questionnaire will investigate the two fields including approach, construction, design process, aesthetics, what factors where considered, why, and priority level and finally overall effectiveness of design.
- Research will show differences and similarities between the two genres and point out opportunities for creating a cohesive framework for the effective integration of both.

Conduct market research to determine mass consumer appeal:

- Conduct research on current fashions that incorporate technology to see effectiveness and which designs are valued or deemed marketable.
- Compiling information and formulating hypothesis from research and studies; a paradigm should begin to emerge as to what needs to be incorporated not only for the effective blend of the two fields but for a curriculum and a final product line to be marketable.
- Examine what specific knowledge rules selective attention for each independent field and then as a whole, so that calculating their influence can be determined and gauged throughout the design process.
- Create final hypothesis and paradigm framework:
- Redefine a template for designing that involves Industrial and Fashion Design in a bilateral context.
- Incorporate the aesthetic values of both genres in a manner that meets the needs, objectives, design aesthetics, and the eventual effective commingling of each.
- Create a blended constructivist curriculum that encompasses both disciplines holistically and effectively.

Formulation of effective concepts and ideation that exemplifies hypothesis and initial findings:

- Conduct further research as indicated by survey and study findings to help support final designs.
- Look to the world of high fashion and industrial design to start successful ideation and conceptual drawings and models that reflect these findings in a new way.
- Research materials, processes, functions, related technologies, and techniques that lend towards the overall objective of the study and help convey the principles of the Technofashion merge process.
- Create renderings, draped pattern forms, sketches, and physical models that explore the guidelines, human factors, and findings of thesis.
- Finalization of hypothesis, paradigm, and explanatory clothing line:
- Create final design framework and curriculum for the effective integration of industrial and fashion designed clothing and use it as the paradigm for the final collection.
- Manufacture final piece that effectively incorporates the tenants of both fields by fusing learned knowledge through selective attention re-education.

Final products should confirm study findings and exhibit expectations of the created curriculum in a way that creates a seamless, aesthetically pleasing, functional, and marketable interface between fashion and industrial design.

Anticipated Outcome

Final outcome will be a working pervasive guideline and curriculum for the effective integration of Fashion and Industrial Design:

- Paradigm created from thesis will make the transition from industrially designed technologies to wearable fashion in a seamless manner that meets the needs, objectives, and design aesthetics of each field.
- The effective integration of both will allow for an increase in wearable technologies that already promise to be the next wave of the future, but now there will be guidelines and a curriculum to help create designers that effectively merge the two disciplines.
- Validate hypothesis by proving that there are inherent differences between Industrial and Fashion Designers, particularly on specific stimuli selection in design approach and then on each genre's educational foundation.
- The design process will benefit both fields of design by allowing for interdisciplinary discourse that is functional, aesthetically pleasing, and marketable to mass consumers.

Tangible Technofashion prototype collection will explicate effectiveness of paradigm:

- Piece will demonstrate how incorporating the positive aspects of both Fashion and Industrial Design can create a seamless integration of the two fields that is effective, user conscious, appealing to the masses, and most importantly, functional.

- Piece will highlight new wearable technologies that will shape the face of fashion technology in the future and will aid individuals in effective living.
- The final piece/collection will portray how the guideline stipulations, curriculum and design aesthetic can be applied to the worlds of haute couture, apparel, wearable technology and product design all with the aim of effective creation of Technofashion.

Long-range consequences will have contrasting ramifications and implications for Industrial and Fashion Design:

- Individuals will be able to incorporate their technologies on the body making daily tasks easier, communication faster and the possibility of interacting with others and the environment through wearable technology apparel that meets the objective of designers and needs of users.
- With the multitude of technologies used on a daily basis, Technofashion that incorporates needs and wants into apparel on person will decrease personal footprint and make ultimate ease of egress at all levels.
- Guideline will help technologically advanced fashion to become mainstream by assimilating to trends and new technologies through inconspicuous yet successful design.
- An increase in wearable technologies may lead to dehumanization of society with people becoming increasingly introverted through technology and ever dependent on the advancements of science.
- New technologies may make haute couture and current fashion and industrial movements, techniques, materials, processes, products and applications obsolete,

replaced with new technologies that polarize both fashion and industrial design communities.

- A new curriculum that blends both fashion and technology could lead to a decline or eradication of either discipline attempting to incorporate the other solely.
- New designers who have successfully completed the modular curriculum will be at the forefront of designing wearable technologies in the near future.

Chapter One

MANUFACTURED PLEASURES

Psychology of Selective Attention

Selective attention is the neurological process and psychological theory by which items within a given environment or situation is selected for the purpose of classifying them as target or non-target (Shapiro, 2001). In essence, these mechanisms actively choose particular stimuli, with exclusion of other components, to attend to. Reasons for certain stimuli selection is governored by a plethora of internal and external factors that affect selection, attention, and understanding. Selection motives for stimuli selection can be transparent and opaque, affected by a multitude of underlying factors that can include the entire gambit of human understanding, emotion, thought, and biological stirrings.

For designers these selections stem from previous teachings, predisposition and learned knowledge. Subjective experience is projected as an objective comparison through some theory of influence, diffusion or past. There is a process of working from a psychological association to a historical one; it is to assert that similarity and contiguity have a casual effect. Thus for selective attention and the learning process, comparison appears to be more a matter of memory than a product of inquiry; it is more “impressionistic than methodical” (Smith, 1982, p. 22). Our visual environment, coupled with active motor behavior, provides a dynamic visual array that is peppered with frequent, abrupt changes in the retinal image (Shapiro, 2001). Our perceptual experience, however, is characterized by continuity and stability rather than visual chaos.

To achieve this, the brain uses numerous low and high-level mechanisms to ensure that our conscious visual world and internal understanding does not emulate the blurred temporal transients that characterize the retinal images one sees by selectively choosing segments to concentrate and process. The ways one reacts to stimuli selected in these given situations are based on a multitude of differing factors. Discussions in current cognitive neuroscience typically share a number of basic assumptions that explain each individual influence. In particular, they assume a hierarchical relationship between a top-down control processing system which is not directly stimulus-driven or event-driven, and a lower set of processing systems, which are by contrast relatively passively activated by ongoing stimuli, events, and predisposition, and learned behavior or ideals (Shapiro, 2001). According to this interpretation, the top-down control systems are able to set the lower-level systems in advance to certain states of processing readiness, corresponding to the effective facilitation or enablement of some processing pathways and the suppression or disablement of others. This disablement is determined by drives toward satisfaction and entities that secure gratification and attention. Tendency toward anticipatory task preparation and stimuli that is deemed important by the brain is reconciled with the assumption that prior knowledge or teaching can effect the pertinence of attention weighting of task-relevant versus irrelevant attributes, or to the selective enabling/disabling of task-processing pathways. These actions are directly stimulus–driven by devices that cause both psychological and physical activation. These selections can be serial and parallel in nature at the same time, basically meaning the processing of singular and multiple stimuli at once. Within the domain of this visual selection there are at least two specific areas that require serial processing: the whole and its parts.

Neuroscientists Ray Treisman and Rachael Gelade have argued that to process the features of an object or environment, the selection of individual objects is necessary and that the recognition during search has to have some serial or holistic nature to it. Figure 1 displays one of simplest needs for serial selection when searching for a conjunction target. While it is easy to detect the black square in panels A and B, it is difficult to do so in panel C. This, according to Treisman, is because the black square is defined with regard to its distracters on the basis of a singular feature in each of the two upper displays, but only by the conjunction of features in the lower display. Therefore according to the theory, attention must be separately allocated to each individual feature to detect the black square as a black square (Shapiro, 2001). At a theoretical level, object recognition, like the conjunction of features is affected by many underlying factors. To recognize an object, it is necessary to form some connection between the visual representation of that object and its representation in memory, conscious, and unconscious. This conjecture explains why when industrial designers try to create fashion the end results are creations that are unpractical and ineffective due to differing object recognitions in the brain that shape how designers evaluate the use, placement, and treatment of their designs and materials (Cross, 1984).

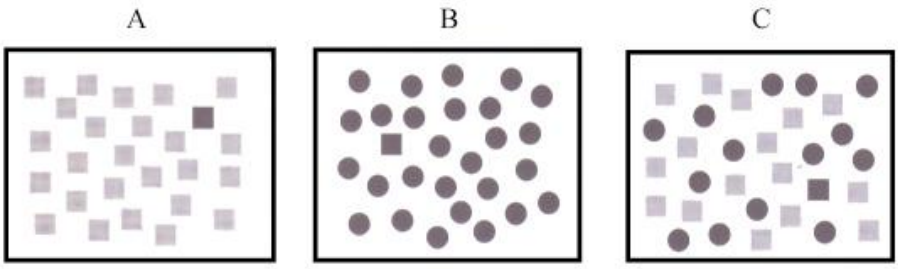

Figure 1 An example of a standard selective attention conjunction search. In all panels the target is a black square. It is easy to find the black squares in A and B. It is difficult to find the black square in panel C, where familiarity is low, and the target differs from the distracters only on the basis of a conjunction of features. Treisman argued that predisposition to knowledge affected the features required to allocate attention to individual objects.

Selective Attention and Education

Selective Attention regulates information processing and in turn, educational capacity. Theorists have shown the paramount effect prior experience, expectation, and purpose have on man's capacity to perceive evidence and judge hypotheses. Over time "man has developed an agile machinery for filtering out, from the hail of signals with which his senses are bombarded during every waking moment, those few which are significant at a given time" (Cross, 1984, p. 77). In essence, the observer contributes from his own experience and past education, by either subtraction or addition, to his perception of phenomenon before him. While these happenings are convenient for mundane activities, when it comes to designing, it can have major implications as to what particular aspects are investigated and valued by designers due to prior predisposition. The theory behind this notion is Feature Integration Theory (FIT), which holds that a limited set of visual search tasks can be performed at any given time and that segments of reality and the simple features of complex stimuli are the things chosen to create a whole interpretation or understanding of an environment, similar to a assembly line (Shapiro, 2001).

It is in this item-by-item engagement processing that stimuli is classified as target or non-target, selected for further investigation by the mind. Internal thought processes parses a scene into sets of objects and uses these perceptual units to construct awareness during the education process. Our sensory systems evolved to enable the identification and location of physical objects so that we can react to and interact with them. Since visually we are only able to interact with a limited number of objects at a time, the primary goal is to render an accurate representation of only current actionable items or those relevant to the task at the hand. A problem arises when fundamental factors influence the accuracy at which the representation of an environment or object is presented to the mind.

FIT demonstrates the effect prior experience, expectation, and purpose have on one's capacity to perceive and judge stimuli; thus what we see or seem is based upon complex collections of previous experiences and expectations, fulfilled or disappointed. This is an interstitial place, an in between phase, a creation phase, where the brain makes decisions based on inadequate palettes of references; the inadequacy is answered between memory and creation (Smith, 1982). For designers, due to differing values placed on each segment, only certain aspects are presented in the final representation, a representation that is unique and singular determined by its observer (Cross, 1984). Selective attention in its basic state is this set of neural mechanisms acting on perception that facilitates such processing of task-relevant objects and inhibits processing of task irrelevant objects. Representations of attended objects are more likely to be made available to awareness, to direct responding, and "to be used later to contribute to memory and learning, and for many designers depending on their teachings, to the design process, methodology, and final design" (Cross, 1984, p. 200).

As Cross (1984, p. 205) further expresses, “the common misconception among those ignorant of the creative process is that it begins in clarity and order, systematic understanding and proceeds in logical advances and under pressure of will to the development of a foreseen, or at least partially known system or product.” Actually most of all design begins in obscurity, be it a new light fixture or evening gown, and in some degree of confusion; thus selective attention at its basis is a means to spur insight from past experience, selection, and particular examination to create order in the mind. As a designer from a particular discipline, you are biased by learned knowledge and behavior. When receiving new information through our senses of selective attention, our mind tries to match that selection into the mental templates created within, rejecting new ways of thinking, observing, and examining. This notion is best displayed by the ideas of archetypes and precedent. Many designers on both sides of the conundrum use precedent to establish a jumping off point for good design. It is considered such a vital part of design education that is a crucial feature of the design process and college curriculums for industrial and fashion design (Lawson, 2004). Precedent and archetypes in this light refer to intrinsic design forms and ideals or instances where other designers have done styling or creations similar. These are symbols for objects that are inherent within the brain and are designs that are naturally associated with particular problems and solutions. Psychologists Alexie Csikszentmihalyi and Elise Rochberg-Halton tried in their studies to categorize how such archetypes and predisposed knowledge rank in a hierarchical and categorical delineation. Diagram 2 exposes the findings of ingrained knowledge, selective attention, and the learning process (Crozier, 1994).

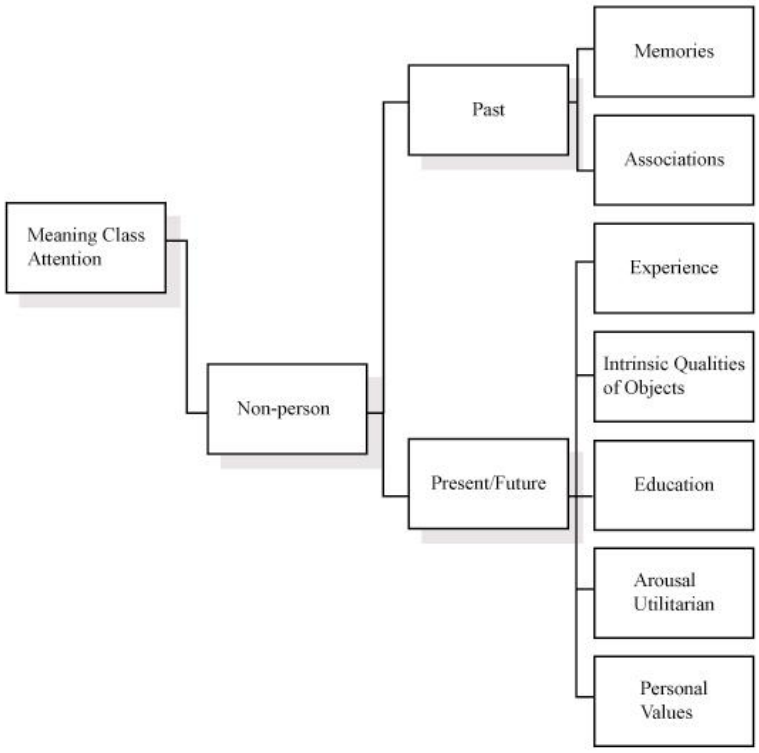

Diagram 2 Hierarchical delineation scheme for the meanings of objects based on the study by psychologists Csikszentmihalyi and Rochberg-Haltn (1981) accounts for selective attention search.

Clothing design, as product design, has long been influenced by precedent and current representations in the market that are recently done from basic inherent archetype silhouettes and natural forms. The problem, however, is that these precedents make it impossible for singular evolution of one design mentality into another because it is a recapitulating cycle that exists for all design fields. In its isolation, independent design departments feed off of themselves branching off into other disciplines but always returning to its base premise in whichever school of thought practiced. Each relies on their own experience, which in many cases, are devoid of heuristic evaluations.

For there to be an effective merger between the worlds of industrially-designed products and fashion-designed garments it has to go beyond mere aesthetical or guideline sets because the very essence of each field hinges on differing teachings, views, and evaluations that have shaped each field's designers selective attention over time. The only way to successfully merge the two disciplines is by changing learned knowledge and how it is obtained. There is a mutual and reciprocal catalyst of thought that occurs when knowledge is being both experienced and perceived once both the meaning and the design are united through the designer's physical and internal language. By effecting predisposition through guidelines and curriculum, it is possible to influence selective attention (Brandt, 2000) in a manner that will make integrating both fashion and industrial design easier, more effective and cohesive as designers are being educated; it is thus a process of teaching, a new way of thinking, designing, and evaluating stimuli.

Chapter Two

FACILITATING A MERGE

Intro to Wearable Technologies

Smart clothing, wearables, and wearable computing are somewhat equivocal terms describing a genre of clothing that functions as a new, revolutionary interface between contemporary fashion and technology. The future of wearable technologies will have profound implications for our experiences of body and mind, our communication abilities, health care, and lifestyle. As Marshall Cohen, industry analyst said to *USA Today* in 2005, "We live in a world where apparel competes with electronics for a share of consumers' wallets. If apparel and other products are not doing more than just sitting there looking nice, it is not good enough." Fashion as an essential component of everyday life provides ideal means for information technologies to be constantly accessible and widely relied upon as they become indistinguishable from clothing. Capable of processing information on the moving body, this field of interest stems from computing research begun in the late 1960s, but which gained momentum with the miniaturization of components in the 1980s and 1990s. Glorified by fashion designers Yves Saint Laurent, Andre Courreges, and Pac Rabanne, designers used these new ideas to create unreal "techie" looks that projected a future that was avant-garde, intelligent, progressive, and thoroughly modern, a look still equated with "futuristic" design today. Steve Mann, an early pioneer of wearable computing at Massachusetts Institute of Technology and sub-subsequently at the University of Toronto, paved the way for a generation of researchers keen to transform elements of the personal desktop computer into something that could be worn and operated on the body. The term wearables generally relate to hard

computing components that clip onto belts or that is worn around the body in pockets or slings. Despite the name wearable, they are mostly not wearable and often feature a digital display over the eye that superimposes virtual information in a type of augmented reality. Since the 1970s, efforts have been focused on taking the electronics housed within computers and finding ways to distribute them around the body as efficiently as possible, while solving problems of viewing data, interface design, connectivity, and powering. These efforts, however, overlook the humanistic aspects of design and focus on soft wear and then wear and contemporary efforts have seen the limitations of this method that lacks comfort, washability and user friendliness. The approach for the future must be in a bottom–up direction making the clothes itself compute and may even one day be separated into an approach that incorporates both ideas and renders two very different products. The question is how designers might make a user's experience of technology more intuitive, less invasive and more human centric. In 1988, Mark Weise, then head of the Computer Science Laboratory at Xerox PARC, invented the term ubiquitous computing to describe a future where invisible computers would be embedded in everyday objects. The pursuit of pervasive computing is described by electronics giant Phillips as ambient intelligence. Wireless and Bluetooth technologies of today enable devices to communicate with one another without being physically connected and may even allow for clothing and accessories to become part of a smart environment that can be tailored to an individual's requirements, all operating autonomously via radio waves. In 2000, Phillips published a book entitled *New Nomads*, which mapped the company's vision for their research in wearable electronics.

The discussion centered on the revolutionary convergence of two disparate industries, fashion and electronics, giving a potential to equip the body with new skills and augment existing ones: a dynamic interface between the body, its physical capabilities, and its environment. Contrary to prior research, which has tried to force technology onto clothing often with awkward results, Phillips realizes the need to understand fashion and work with fashion design in this new and unprecedented way. According to the CEO of Phillips Design, Stefano Marzano (2005, p. 46), "What we are talking about is a new lifestyle and business revolution, one that will require the electronics industry to 'think emotionally.' To guarantee human-focused solutions. We cannot expect the fashion industry to adapt itself to technology. Rather the technology industry will have to learn to deal with fashion. We will have to cultivate new designers some way."

Creating a Paradigm

In creating an effective morph of Industrial and Fashion Design a paradigm has to be established that manipulates selective attention from only recognizing particular stimuli and referencing preconceived knowledge, to choosing stimuli that is in conjunction with the whole of industrial and fashion design idealisms. For an effective merger to occur, care must be taken, both in data analysis and in hypotheses seeking to counterbalance the perceptual filter of selective attention, which hinders a holistic approach. The articulation of this design process must be in a coherent set of principles and curriculum that transcends any one project in one discipline but sees each as equally important to the final solution. Ideologies must be conductive for the complex and delicate internalization of skills to occur in its totality. In following, a curriculum that attempts to educate on both areas must also consider aspects of each discipline and realize what must be added,

subtracted, or supplemented to create an effective knowledge base (Brandt, 2000) for designers of this new Technofashion discipline. The guiding principles need to represent not only the ideals and values of the designer but a growing and authoritative body of knowledge about how to realize these principles through design. In turn this set of principles are clearly framing the development of precedent into a new discipline of techno fashion that tries to illustrate with vivid clarity the aspects of industrial and fashion design which make them effective. The principles should act as a major filter that in turn permits the selection of material through selective attention and archetypes for the body of precedent gathered and used by the designer in design problems. The paradigm can be seen as a largely self-supporting and self-reinforcing process perpetually driving the designer towards something new and cohesive; a new way of thinking and designing that takes new factors into consideration on both sides of the gambit, more profound than any one discipline alone. A combined design process interacts with the problem situation by recognizing solution rather than recognizing the problem through focused cognitive strategies that bypass predetermined solutions or prior known problems. Designers of blended Fashion and Industrial Design must also be able to recognize and understand not only existing situations but also ones that might exist if and when a garment is constructed that utilizes both qualities; in an infinitely regressive world that shifts each time a change is made to the design. This world lies somewhere between logical analysis and creative thought. Before any design that employees industrially designed technology and fashion designed garments can be undertaken, three main procedures must take place: analysis, synthesis, and evaluation. Analysis lists the design requirements and the reduction of these into a complete set of logically related

performance specifications that take into consideration the industrial needs of the technology used and the humanistic needs of the garment worn. Psychologists tell us that most human work is aimed at stabilizing the environment, similar to the way humans build shelter, but with the increasing advancements in technology and the move towards ultimate mobility, we now carry our shelters with us, constantly on the go yet retaining the need for comfort, ownership, safety, and communication (Cross, 1984). Thus, a garment that is fitted with technology must consider the whole system of which it is a part, it is not self-contained or an extension of the human footprint but it must become part of the body helping to facilitate it in some desirable, unobtrusive, inconspicuous way.

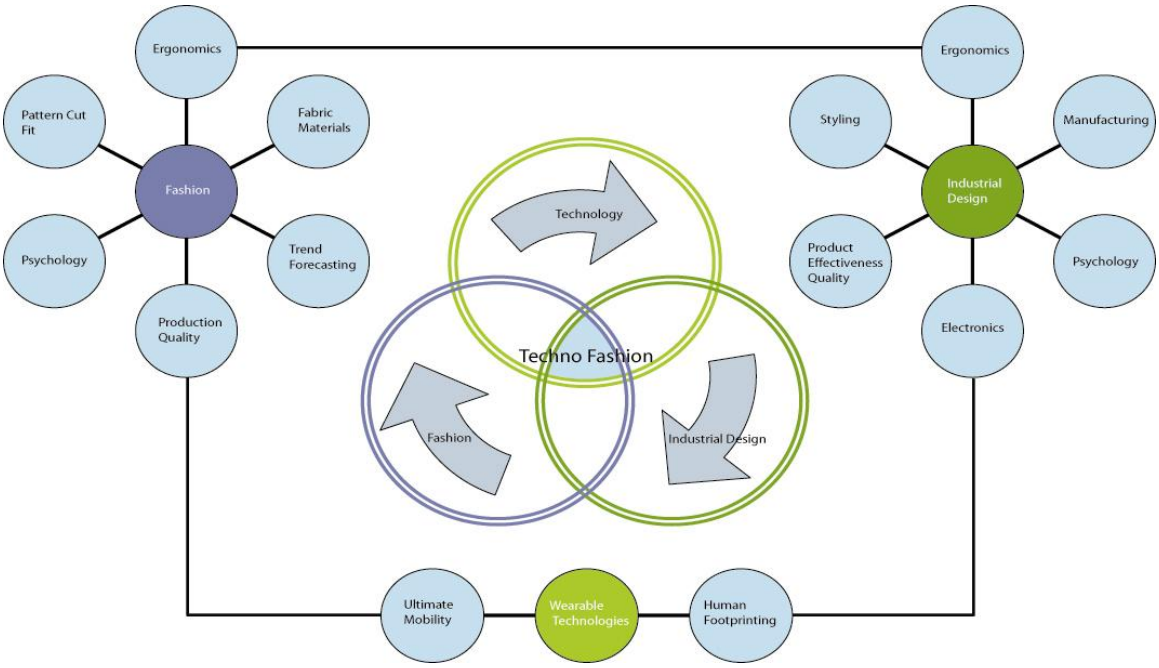

Diagram 3 Paradigm shift between Fashion and Industrial Design as seen from a Systems Approach. Lines delineate the relationships that are inherently related.

Synthesis is the point where designers find possible solutions for each individual performance specification and builds for these without compromise. Design, in this sense, begins with a need and it is through accommodating this need that functionality is found. The garment should allow for greater interaction with others and the environment, creating a continuing system between man, garment, action, and environment. Such solutions must look at draping, cut, sewing techniques, forecasting as well as technology, construction, and placement, and overall consequences for the user. The initial evaluation is a continuous cycle that looks at the accuracy with which the design or alternative designs fulfill performance requirements for operation, manufacture, aesthetics, wearability, and marketability before the final design is created with evidence of user needs and market demand. The worlds of Industrial Design and Fashion Design, alone, have two contrasting styles of operation: the problem focused Industrial Designer who aims to learn as much as possible about the structure of the problem before attempting a solution, and the Fashion Designer whose solution focus tries a solution and then sees where it went wrong. The considerations involved in each three parts of the analysis, synthesis, and evaluation tries to solve each and can be related to solution-problem, problem solution in the basic human factors of motivation, ergonomics, aesthetics and technical factors of function, mechanism, and structure. For haute-tech fashion to become part of our lives, it will have to transcend functionality, be invisible, intuitive, and enhance our experiences. This cohesion cannot be achieved, however, without the creative engagement of Fashion and Industrial Designers.

Chapter Three

EVALUATING CURRICULA

In order to ascertain a holistic curriculum, an evaluation of both Industrial and Fashion Design curricula were necessary. School curricula selected for evaluation were chosen on both academic and merit-based qualifications for public and private schools. Criterion included but was not limited to peer assessment, student selectivity, accolades for design departments, faculty resources, graduation and retention rate, financial resources, alumni, job placement after graduation and graduation overall performance rate. A criterion was applied for both art, public, and private institutions. The final selection of curriculums, for evaluation and comparative analysis, for each discipline represent some of the best universities in the nation for their particular design field, demonstrating both public and private tutelage as reported by *U.S. News and World Report* of *America's Best Colleges 2006*.

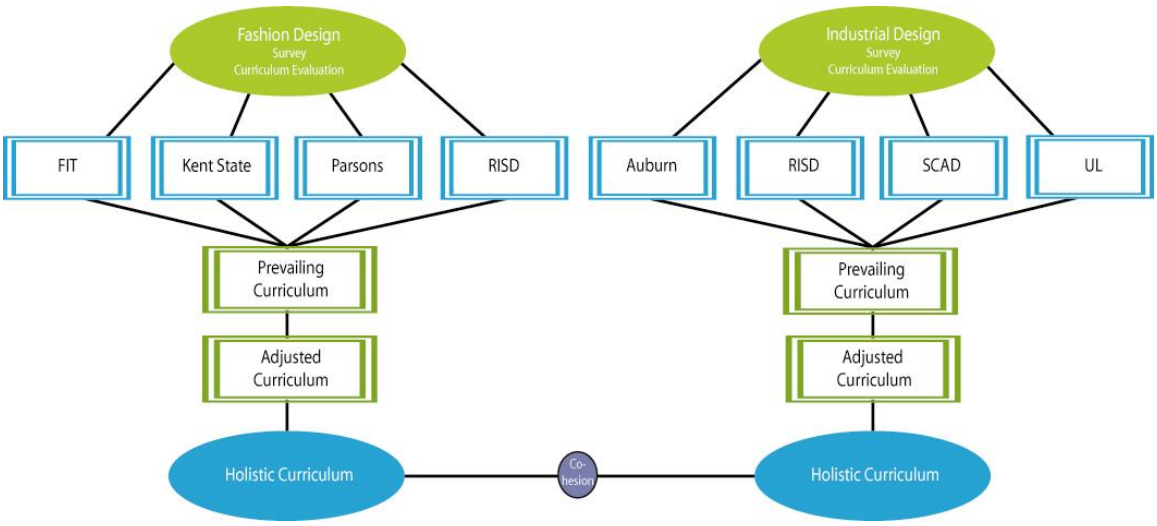

Diagram 4 Curricula Evaluation Delineation Showing the Investigation Process

Industrial Design

There are currently 29,770 Industrial Designers in the United States as of 2006 according to the United States Department of Labor, earning a median wage of $56,350 dollars annually. Industrial design is defined as consumer-centered, user-oriented design, an attempt to solve a problem through technical and artistic means. According to Industrial Designers Society of America, Industrial Design (ID) is the professional service of creating and developing concepts and specifications that optimize the function, value and appearance of products and systems for the mutual benefit of both user and manufacturer. Industrial Designers develop these concepts and specifications through collection, analysis, and synthesis of data guided by the special requirements of the client or manufacturer. They are trained to prepare clear and concise recommendations through drawings, models, and verbal descriptions. Industrial Design services are often provided within the context of cooperative working relationships with other members of a development group. Typical groups include management, marketing, engineering, and manufacturing specialists. The Industrial Designer expresses concepts that embody all relevant design criteria determined by the group. The Industrial Designer's unique contribution places emphasis on those aspects of the product or system that relate most directly to human characteristics, needs, and interests. This contribution requires specialized understanding of visual, tactile, safety, and convenience criteria with concern for the user. Education and experience in anticipating psychological, physiological, and sociological factors that influence and are perceived by the user are essential Industrial design resources. Industrial Designers also maintain a practical concern for technical processes and requirements for manufacture; marketing opportunities and economic

constraints, and distribution sales and servicing processes. They work to ensure that design recommendations use materials and technology effectively, and comply with all legal and regulatory requirements. In addition to supplying concepts for products and systems, industrial designers are often retained for consultation on a variety of problems that have to do with a client's image. Such assignments include product and organization identity systems, development of communication systems, interior space planning and exhibit design, advertising devices and packaging, and other related services. Their expertise is sought in a wide variety of administrative arenas to assist in developing industrial standards, regulatory guidelines, and quality control procedures to improve manufacturing operations and products. Industrial Designers, as professionals, are guided by their awareness of obligations to fulfill contractual responsibilities to clients, to protect the public safety and well being, to respect the environment, and to observe ethical business practice.

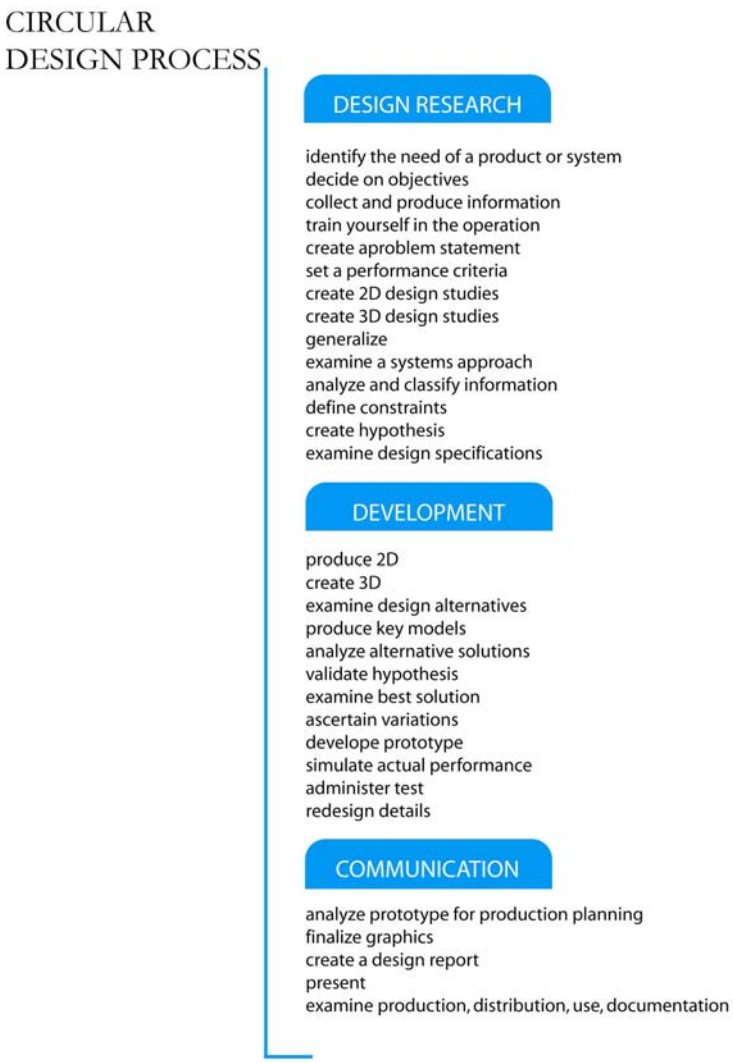

Figure 2 A Sample of an Industrial Design Circular Design Process

Auburn University, Auburn, Alabama

The Department of Industrial Design offers a program of rigorous study encompassing multiple facets of consumer and specialty product design within a given cultural and economic context. Completion of the bachelor's degree enables students to assume leadership roles in industry. Graduate work culminating in the master's degree prepares students for careers in industry and education. As a Department of Industrial Design located within a state-supported land grant institution, it is incumbent upon its programs

to support the university mission to serve the educational, research, and extension needs of the state and region. Through this service, opportunities are created for students, professional, and industry to engage in a rich exchange of ideas and resources that influence and inform the regional, national, and global arenas.

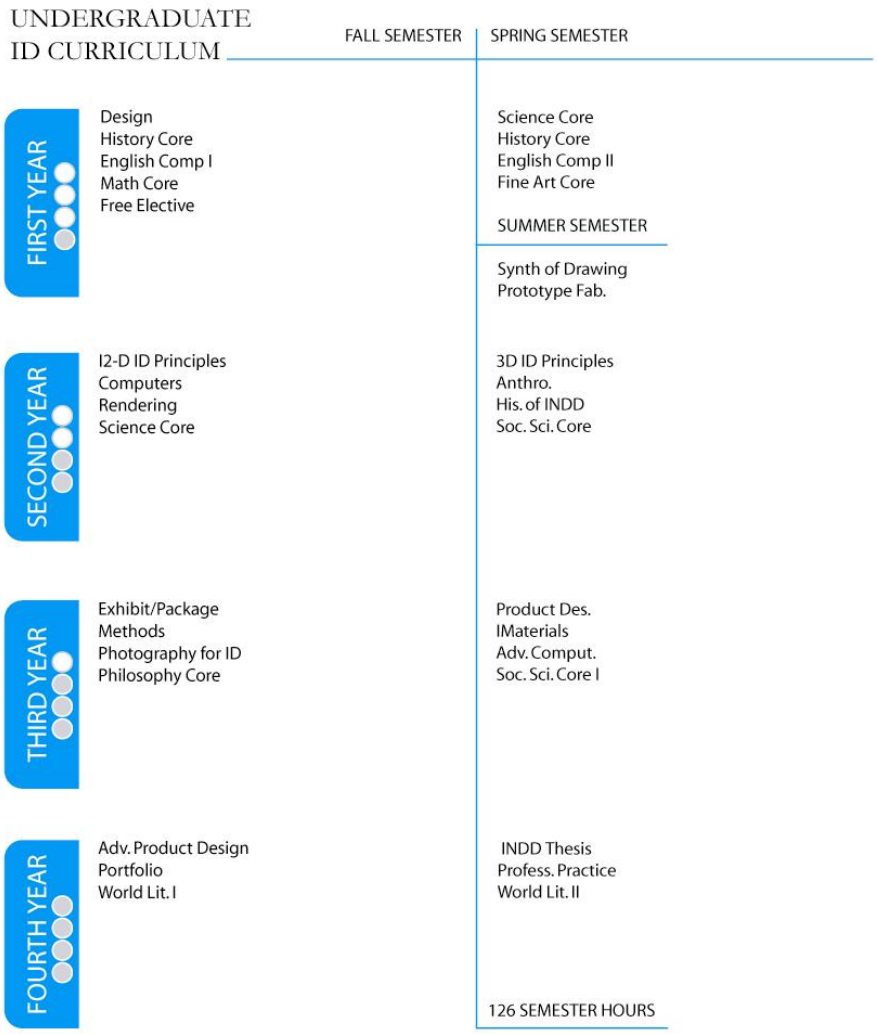

Figure 3 Undergraduate Industrial Design Curriculum, Auburn University

Interview Transcript with ID Department Head

Clark Lundell, February 13, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. Motivation;, a thirst for what's offered. That is what makes a difference in the industry. A real desire to learn; take advantage of the opportunities, same attributes employers look for. Self-Motivation.

2Q. What is the prevailing design theory or idealism of your school- is it more artistic or technical based?

A. Professionalism, our primary objective is to prepare students to be viable and productive in an industry-based situation, some theory and art and engineering; we are trying to produce professionals not theorist or engineers.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. If it already exists, I would be curious how it places itself in the market place, which is the competition. Comparative product analysis, you would be reinventing the wheel if you didn't know what was already out there, a critical first step is to inform yourself about the different types, its presence in the marketplace, technology used in fabrication. If it is new, innovation, see what are the generic categories, the best position for the product category and go from there. Trying to discover what is already in the market place, you can see the preconceptions the buyer has for what the product should be.

4Q. When creating a product, what would you consider being the most important step in the design process, from a curriculum standpoint?

A. Same response, student to know and fully understand the market the product exists in and then let innovation carry you forward.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. Similarities are that both have anatomical interfaces, human anatomy, positions of marketing, where that product category is in the marketplace, both subject to the market place.

The differences are that fashion is more dynamic in its time frame, basically a 12 month cycle, constantly trying to create a new strategy to be produced in 12 months, where as industrial products have more time.

6Q. In your particular design world, what is beauty? How is it defined by your field of study and by you?

A. Everyone brings their own personal preferences to that question but beauty is a fine line between accommodating a functional need and being visually enriched by the outcome of that accommodation. It has to satisfy on so many levels; it has to have a utilitarian function accommodating the needs you set out to accommodate but in a visually satisfying way, which are all subliminal and intuitive judgments, factors that are personal, ever changing depending on its viewer.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what would be the most important aspects or ideals you feel should be incorporated and not lost?

A. What's great about industrial design is that it is one of the few design curriculums where you try to develop an innovative idea but you also have responsibility to fabricate that idea. In fashion design it is critical if you have an idea or sketch but that until you have your hands on the fabric, attempt to join the fabric, drape that fabric on the human anatomy, you really don't know what you are doing.

It's a value system that is very important. The other issue is marketing; subtext of everything we do in ID is marketing. It's the same with fashion you have to know what's out there, know what's hot in the market place; you can't come with something beyond the spectrum of acceptance.

Rhode Island School of Design (RISD), Province, Rhode Island

It is the goal of the RISD Industrial Design Department to educate students to identify and resolve design problems — innovatively and with sensitivity to the social, physical, and ecological environment. Students learn the traditional values of industrial design and, while building an awareness of materials, gain an in-depth understanding of visual and three-dimensional vocabulary. CAD and other digital media programs are taught using laptop computers that the department requires all incoming students to purchase. Using this language, they analyze and solve diverse design problems from technical, aesthetic, social, and ecological viewpoints. In the studio, students progress from developmental drawings, through three-dimensional mock-ups and models, to working drawings and construction with manufacturing considerations. The curriculum is structured so the skills of drawing, presentation, and model making are taught as an integral part of the design studios. Fully equipped wood, metal, and model shops provide in-depth construction experience, allowing students to see their designs develop from concept to finished product, under technical and creative guidance.

Figure 4 Undergraduate Industrial Design Curriculum, RISD

Interview Transcript with ID Department Head

Mitchell Ackerman, February 18, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. Creativity, we have students who have the drive and the want but if you lack creativity you will just become a reflection of those around you with nothing new, nothing to say. Here we want something new and innovative.

2Q. What is the prevailing design theory or idealism of your school-- is it more artistic or technical based?

A. We try to foster an environment that is both. Our love is art, being an art school but Industrial design requires more: more skills, more research more academic bases, measures. As a department we want it to be equally researched and arbitrated and new, innovative and artistic.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. First you must understand the context you are working under: who, what, when, where, why, things like that. The marketing of a product can make it or break it so you have to understand where it is coming from in order to know where it's going. Research, research, research-- that must come first.

4Q. When creating a product, what would you consider to be the most important step in the design process, from a curriculum standpoint?

A. I think students must realize that these products they create must be functional and meet the needs of its users; good research and comprehension skills must be instilled early on in their education. At the end of the day it has to meet needs and you understand those needs through research.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. I think they both must take the user into consideration at all levels of construction and conceptualization. They are more alike than not; we see a multitude of projects here and in the market that need the blending of the two disciplines. It really is its own entity, I guess, if you look at it that way.

6Q. In your particular design world, what is beauty? How is it defined by your field of study and by you?

A. Ok, that's tough, only because it can be so many things or it can be nothing. There is beauty for me in simplicity. It's elegant and unassuming. Real beauty comes, however, if that product helps its user in some real way or if some product makes you feel something or react in a profound manner. I mean beauty is fleeting.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what are the most important aspects or ideals you feel should be incorporated and not lost?

A. Research, being user centered, and remembering to solve the problem and not compound it with unneeded extrapolations. The integrity of what we do and its importance should remain in tact, our attention to detail and the purpose.

Savannah School of Art and Design (SCAD), Savannah, Georgia

The industrial design program at SCAD is focused on developing highly motivated students of design who create, articulate, and communicate innovative solutions that enhance user experience. Students develop methodologies that emphasize cognitive thinking, design inquiry and creative problem solving, and are prepared to work with products, services, and ideas. In the undergraduate program, students gain an understanding of the user-centered design process, including anthropometrics and human factors, as well as theories of cognition, emotional design, and user experience. To understand the development of form, students learn how line, weight, composition, and other design principles can be translated into three dimensions.

The program addresses materials and manufacturing processes, communication and presentation, including verbal and written expression of concepts, and the business of design.

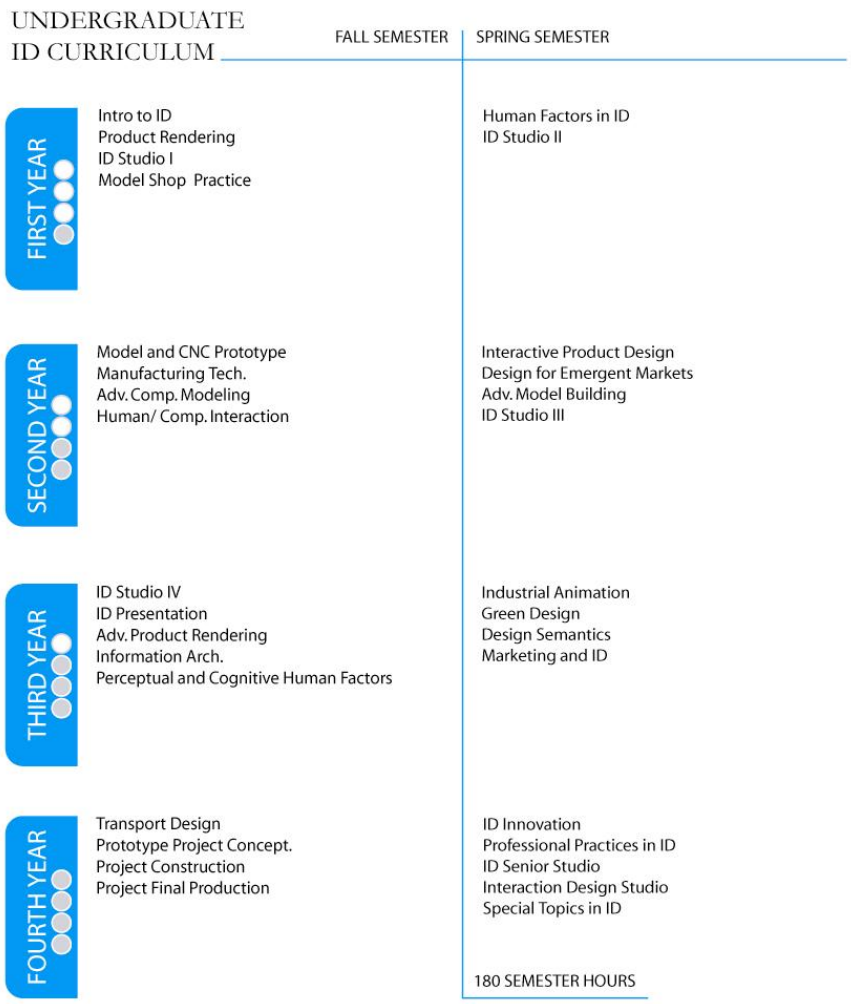

Figure 5 Undergraduate Industrial Design Curriculum, SCAD

Interview Transcript with ID Department Head

Heather Bailey, February 11, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. A need for achievement, I find that when a student has this inner urge to succeed and to achieve they have all the motivation and energy to do so. With this hunger comes a desire to do your best, to be the best, to be innovative and creative in a powerful way not only for yourself but also for others.

2Q. What is the prevailing design theory or idealism of your school- is it more artistic or technical based?

A. We, as a whole are more artistic based, but we try through our curriculum, to present the technical skills needed to function in the corporate world of ID. There really needs to be a good blend of the two; it is a shame to see hundreds of products that look exactly the same, same aesthetic, same problems and I believe that is where art steps in and gives that innovation and right to be different and buck the system in a meaningful way that benefits the user and designer.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. You should first come at any challenge with a new aesthetic, styling but understanding your user at the same time. You must know the needs, wants, and purpose before you blindly begin to design. That is one of the major aspects, especially from a systems standpoint that differs us from Architecture. We stand back and understand, so we can move forward.

4Q. When creating a product, what would you consider to be the most important step in the design process from a curriculum standpoint?

A. Research, user centered information, you must know your market, your user, and the purpose.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. I think they are one in the same, all aspects the same, just maybe different in time frame but we have the same issues to address, in the same ways.

6Q. In your particular design world, what is beauty? How is it defined by your field of study and by you?

A. That depends on what you are referring to. It changes depending on your point of view, your vantage point. It changes for everyone. You know it when you see it.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what would be the most important aspects or ideals you feel should be incorporated and not lost?

A. They are so similar already that I would think the transition would be seamless. I wonder, however, if the marketing aspects may play a different role, especially when trying to give purpose, and need to some garments that have no such advent.

University of Louisiana, Lafayette, Louisiana

The four-year professional program offers a curriculum designed to prepare students for successful practice in the field of Industrial Design. The program focuses on global product design and emphasizes sustainable cycle design. It also examines the industrial designer's unique contribution to the aspects of product design and production systems that relate most directly to human characteristics, requirements, and interests. The University of Louisiana is art based but also employs technical skills to create effective, unique, and innovative solutions. Innovation and inspiration through observation is a key

motto for their user-centered design process. This is the only degree-granting program in ID in Louisiana; students receive a Bachelor of Industrial Design upon graduation.

Figure 6 Undergraduate Industrial Design Curriculum, University of Louisiana

Interview Transcript with ID Department Head

Jerry Malinowski, February 17, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. Communication skills at all levels. Not only does the student have to have certain technical skills, and there are a multitude of those because you can be extremely skilled, but if you cannot communicate with people, you have an inherent problem. You need communication skills from visual and verbal standpoints.

2Q. What is the prevailing design theory or idealism of your school-- is it more artistic or technical based?

A. It is a combination of both: the more we progress as a department, the more technical advances we gain, but our artistic part is the most important. We are a college of the arts, not engineering or business school. We have an artistic genesis out of the college of the arts-- our field employs technology in that genesis.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. You have to study not only the product but also the use: without knowing whom the user is in terms of the market, where the market place is for that product, you are just spinning your wheels.

4Q. When creating a product, what would you consider to be the most important step in the design process from a curriculum standpoint?

A. It goes back to basic skills, having drawing skills, to ideate; if you cannot ideate visually, it is hard to communicate and communication is at the basis of design, one of the most important factors of being a designer.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. Similarities are that they fulfill a basic human need for clothing or protection or artifacts, tools. A lot of it goes into how you even define fashion; you have to be cautious because at points they are truly one and the same.

6Q. In your particular design world what is beauty? How is it defined by your field of study and by you?

A. Beauty in a product exists when there is integrity about the design, the form and the function or function of that form. Nothing frivolous, when the functionality is so extremely effective, there is a type of beauty in that, an inspiration for the senses. There is such a thing as pure styling but that doesn't reflect any type of functionality and performance of functionality. You can design something that looks fast and styled but it may have bad aerodynamics and that cancels out the idea of beauty. You have to take function into consideration. If you look at fashion, the things that reflect the most beauty are those that have a high functionality and aesthetic pleasure.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what would be the most important aspects or ideals you feel should be incorporated and not lost?

A. It has to do with ideas that reflect beauty in the aesthetics but also reflect a high degree of functionality. The term fashion in general has a tendency to reflect things that have no high degree of functionality because it is in the mere trend of today's fashion. You have to merge the ideals of functionality and user with good fashion sense and aesthetics.

Objective of Industrial Design Holistic Model

The goal of the merged Industrial Design curriculum is to take the best curriculum classes that each selected ID school has to offer and merge them into one cohesive and holistic curriculum that typifies singular strengths supported by the strengths of other schools' curriculum courses. As a whole, the curriculum works best from a systems approach that gives students information and knowledge in a manner and time period that allows them to make full use of their capabilities while fostering their own design ideology, philosophy, and design process. It is important that the curriculum be implemented with a university's core curriculum in order to create a well-blended education and well-adjusted designer. In this context, the overall model ID curriculum should offer a superb intermingling of the technical and the artistic and a compelling permutation of the academic and the designer. The curriculum is broken down into a four year, eight module set equaling eighty four collective hours and 128 when taken with a college core curriculum.

Figure 7 Created Undergraduate Holistic Industrial Design Curriculum

Holistic Module Course Descriptions

Year One, Fall Semester

Industrial Design Orientation- Introduction to design ideas and philosophies of Industrial Design. This course includes the definition of design, its categorization among art and science, differences in design practices, and the defining of ID themes, techniques and

tools. Concepts such as product, client, and community of use, function, form, material, style, craft, and mass production as understood and used by designers.

This class includes central issues in design studies, including gender and diversity, ethics and politics, and the role of design and designers in society. Provides an overview of what industrial design is, past, present, and future, explicating the ideas behind the programs of the design department.

Studio I Design Drawing- Course exposes students to various drawing techniques that aid in design communication and development. Methods of sketching, drafting, drawing, representation, communication, idea generation, and form development are reinforced by sequential approaches to understanding structure, form, space, line weight, texture, light, and tone. Drawing in this context is taught as a means of design thinking with emphasis placed on the analysis and interpretation of existing man-made and organic forms. Final project and presentation required.

English I Rhetoric and Composition - core

College Algebra - core

*Arts Elective (*Drawing, Technical, Drawing, Painting, Sculpturing, Drafting, Printmaking, Jewelry, Making, Ceramics)

Year One, Spring Semester

Design History- Provides an overview of design and art history from 1700 to present with emphasis on movements, genera, and schools of thought that were critical for the formation and development of design and design professions. The goals are to provide an understanding of the role that design has played in the evolution of the competitive free market system at national and global levels. The second goal is to demonstrate how

design emerged as a powerful tool for corporate and cultural identity and finally to understand some of the basic influences on the formation of design theory and practice reinforcing precedent in design.

Studio I Rendering- Students are taught to communicate design ideas in a concise, attractive and efficient manner through use of pastels, markers, color pencils, airbrush, oil colors, and ink on dry media. The importance of accurate perspective and clear rendering of form is stressed as well as the ability to efficiently communicate design ideas in a convincing manner using perspective, color, value, and lighting to define form. Final project and presentation required.

English II Rhetoric and Composition - core

Geometry and Trigonometry – core

Arts Elective (Drawing, Technical, Drawing, Painting, Sculpturing, Drafting, Printmaking, Jewelry, Making, Ceramics)

Year Two, Fall Semester

Materials and Processes I- A hands-on course introducing the student to the nature of materials used in industrial products and the various processes by which they are formed. Films, lectures, and field trips familiarize students with traditional processing of wood, metal, and plastic materials as well as emerging developments in advanced fabrication processes such as injection molding, vacuum press, laser cutting, three dimensioning, (3D), printing, Computer Numerical Control (CNC), manual mill, and stereo lithography. Emphasis is on the study of material characteristics and the appropriate use of manufacturing methods. The course includes an introduction to technical information,

research, design specification writing, Auto Computer-Aided Design (CAD), and professional communications.

Human Factors- Introduction to the general field of applied human factors. Centers on anthropometrics, perception, and human-machine interaction, and provides an introduction to the practice and roots of ergonomics, focus groups, market research, and special considerations. Over the course of the semester, the focus shifts from the application and use of existing factors and data to the generation of new studies and data.

Studio II 3D Ideation- Studio concentrates on teaching model-making skills, including equipment, materials, processes, and finishes. This course explores product aesthetics and form issues as they pertain to design communication and ID. It integrates the principles of 3D design, drawing, and prototyping as they apply to the generation of product form from gesture, volumetric, form studies, and working models to final conceptualization and ideation. Emphasis is placed on issues that dictate the form of products and their creation. Students develop basic prototyping, conceptual drawing, and presentation skills for the purpose of exploring, analyzing, refining, and communicating design concepts. Final product and presentation required.

Intro to Photography- Students learn basic documentation skills and how to make slide portfolios of their two dimensional (2D) and 3D creations. In addition, students are exposed to composition, different types of photographic imagery including documentary, advertising, and scientific and fine art and also learn how to process and manipulate photography to effectively evoke emotion and communicate information. Final project and presentation required

Principles of Marketing - core

Physics I - core

Year Two, Spring Semester

Materials and Processes II- A continuation of fall semester. This is a hands-on course introducing the student to the nature of materials used in industrial products and the various processes by which they are formed. Films, lectures, and field trips familiarize students with traditional processing of wood, metal, and plastic materials as well as emerging developments in advanced fabrication processes such as metal working, injection molding, vacuum press, laser cutting, 3D printing, CNC manual mill and stereo lithography. Emphasis is on the study of material characteristics and the appropriate use of manufacturing methods. The course includes an introduction to technical information, research, design specification writing, Auto CAD and professional communications.

Art and the Computer- Course teaches basic techniques of Adobe programs, Photoshop, Illustrator and Image Ready through assignments and tutorials. Emphasis is placed on photo manipulation and layout/graphic design skills with a final project due which incorporates all skills learned. Students explore fundamental principles of typography and explore issues of composition, structure, meaning, hierarchy, and design process.

Studio II Solution Design- Course focuses on creative problem-solving techniques using drawing, sketch modeling, and basic shop skills. Students are exposed to a wide choice of materials that Industrial Designers use to move their projects forward. Students will document their projects for their professor and presentation purposes. Emphasis is placed on the improvement of craftsmanship and solving some real-world product problem in final solution. Final product and presentation required.

Computer Modeling- Course teaches Rhinoceros and Flamingo or other dominant 3D modeling program. Emphasis is on learning techniques to demonstrate design in computer-generated imagery through the use of plug-ins, projects, and tutorials. Exhibition of final models concludes course.

Physics II - core

Sociology - core

Year Three, Fall Semester

Contemporary Design- Course presents issues, ideas, trends, and movements in modern design. Objective is to encourage an active exchange of ideas and information which broaden concepts of design, develop a clearer understanding of the relationship of design to society and contemporary culture, strengthen critical and creative thinking skills, and gain greater familiarity with a wide range of contemporary design work and related design issues.

Studio III Innovative Design- Attention is focused on creating something new and innovative derived from understanding consumer behavior, needs and wants, and expressing that in graphic, logo, marketing, and final product. Emphasis is placed on user needs, ease of use, and inventiveness of product culture and market placement without ignoring the practicalities imposed by manufacturer's markets, manufacturing process constraints, and investment concerns. Students build on skills learned and begin to control the process of design to develop meaningful concepts that employ appropriate technology for their eventual realization. Final product and presentation required.

Students are also introduced to Senior Thesis Studio that requires student to select a thesis topic and begin conducting research and formation of three-person committee that will evaluate final thesis and help in design process.

Communications, Public Speaking and Presentation - core

Psychology - core

History - core

Year Three, Spring Semester

Professional Practice- Course reinforces design management skills providing working information regarding the establishment of various business organizations, financing, codes, contractual agreements, and taxes, marketing, patent and copyrighting. Real world applications and professionals will supply supporting information and opportunities including case studies, and sample situations to assist students in understanding designer client relationships, design protection, business operations, financial management, and personal marketing in the form of cover letters, mock interviews, presentations, resumes, business cards, and business etiquette.

Studio III Collaboration Design- Course projects are chosen to give students an opportunity to work in teams using their creative, technical and theoretical skills in a business application. Emphasis is on the use of a systematic process for the design and development of products that are useful, usable, desirable, and feasible. Attention is also given to group dynamics, and interaction with engineers and engineering students, marketing and graphic design students, and other professionals who influence product development process.

Portfolio- Students receive guidance in the creation of their professional portfolio both physical and electronic with emphasis on creating a branding package including resume, cover letter, business cards, website, teaser and presentation portfolio. Presentation techniques such as illustration, photography, typography, and layout are taught with consideration of intent, syntax, and problem definition.

Free Elective

English Elective

Year Four, Fall Semester

Studio IV Sponsored Corporate- Sponsored studio deals with working for an external company or business. Course gives students an opportunity for interdisciplinary teamwork with a real entity that has real financial specification, market and time constraints. Individually defined projects allow for self-directed in-depth study and analysis. Students are encouraged to do one individually defined project for the company and one dictated by the client. The course gives real world experience in a real world environment. Final products and presentation to clients are required.

Sustainable Design- Course exposes students to sustainable practices in design including green design, renewable resources, product lifecycle, and cradle-to-cradle design philosophy. Emphasis is placed on man and technology's diverging relationship and the social/ethical duties and responsibilities of Industrial Designers. Final sustainable product proposal and journal with daily entries required.

Free Elective

Publishing Elective- Web design and Computer Animation (Flash, Shockwave etc.) Advanced Illustrator, Advanced Photoshop, In Design, Aftereffects/Premiere, Maya

Year Four, Spring Semester

Studio IV Senior Thesis- A self-directed studio that allows students to explore areas of interest. Students should have been collecting information and research since the beginning of third year and are required to have a three-person committee including two ID faculties and one industry person to help in the design process and final evaluation. Committees must meet three times before the project's conclusion. The final product, 40 x 40 board, and portfolio explicating research, and design process are displayed at the Annual Senior Exhibition at University Art Museum displaying the senior work of Architecture, Graphic, Interior and Fashion Design students. Project should be the culmination of everything learned in ID program.

Free Elective

Computer Modeling Elective (Adv. Rhinoceros (Flamingo, Penguin, etc.) Studio Max, Solid Edge, VIZ, Auto CAD 3D,Sketchup, Alias, Wacom training)

Fashion Design

There are currently 13,190 registered Fashion Designers in the United States as of 2006 according to the United States Department of Labor, earning a median wage of $68,430 dollars annually. Fashion Design, (FD), is the applied art dedicated to the design of clothing and lifestyle accessories. It incorporates trends, forecasting, research, and design to create garments for specific clientele and mass production. Modern Fashion Design is roughly divided into two categories, haute couture, and ready-to-wear. A designer's Haute couture collection is meant exclusively for private customers and is custom-sized, cut and sewn. To qualify as an official "haute couture" house, a designer or company must belong to the Syndical Chamber for Haute Couture, a Paris-based body of designers

governed by the French Department of Industry that includes American, Italian, Japanese, and other nationalities. An Haute couture house must show collections twice yearly with at least 35 separate outfits in each show. It is often shown on the catwalk and in private salons. Ready-to-wear collections are not custom-made. They are standard-sized which makes them more suitable for larger productions. Ready-to-wear collections can also be divided into designers/createur collections and confection collections. Designer/createur collections have a high quality, a superb finish, and a unique cut and design. These collections are the most trend-setting compared to haute couture and confection. Designer/createurs ready-to-wear collections often contain concept items that represent a certain philosophy or theory. Most Fashion Designers trained in design are also trained as pattern making and draping. A typical design team is made up of one or more designers, pattern maker/modelers, sample makers, buyers and salespeople. Fashion Design encompasses a wide array of social, economic, and cultural values that portray social class, status, and personal beliefs. The role of a responsible designer is to take an active and conscious role in the creation of wear that represents their consumers and in essence our society.

Figure 8 Fashion Design Linear Design Process, FIT

Fashion Institute of Technology (FIT), New York, New York

The FIT focus on fashion since the college's founding in 1944 has distinguished it among professional design institutions. The variety of course offerings, unique areas of specialization, and state-of-the-art facilities that today's Fashion Design majors find here reflect the sophistication and diversity of the industry. Faculty members and guest lecturers are successful working designers bringing years of experience into the

classroom. Field trips, internships, and practices with top design firms and companies give students real hands-on experience.

Figure 9 Undergraduate Fashion Design Curriculum, FIT

Interview Transcript with FD Department Head

Leonard Bess, February 20, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. I would say that it is drive, but on the same note you need to have a critical eye and good design skills. If you cannot create something that inspires or that is new, you are

wasting your time. Fashion is about what's new, unique; it's all about expression, you know. You have to have drive but also a drive for new ideas.

2Q. What is the prevailing design theory or idealism of your school-- is it more artistic or technical based?

A. We are a combination of both. I think we would be a little more technical because at our core we are trying to create technical professionals, tailors, seamstresses, pattern makers, drapers. It takes something special in a person and student to be an essential designer. You have to be artistic and be able to come up with something new but also have immaculate sewing, draping, and construction skills; you really need a lot of both.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. First, you need to understand your patron; who is this person? What statements do they make or feel? Where is the garment to be worn? You have to have a good understanding of the human form and how to best clothe that person or focus group in a flattering aesthetically pleasing manner.

4Q. When creating a product, what would you consider to be the most important step in the design process from a curriculum standpoint?

A. The most important would be ideation and execution. If a garment is beautifully designed and poorly sewn, you have a lemon. If it is poorly designed but well constructed, it can still fly but will not be successful. I guess the most important part from a curriculum standpoint is the drive towards perfection in design and construction-- these are the two greatest factors.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. We deal with both marketing and satisfying a customer. We strive to constantly reinvent. Fashion encapsulates the body much like product design holds electronics. Fashion is much more body-conscious and a little less function driven. We do take function into consideration and the body, but unique and beautiful design is more important.

6Q. In your particular design world, what is beauty? How is it defined by your field of study and by you?

A. Wow, that's tough. To me, beauty is when all parts are situated in a manner that nothing more could be added or taken away. It can be found in sweeping silhouettes and rich fabrics. Everyone sees beauty as something different for them. Clean elegancy is beautiful; it has to be classic and transcend time. To be timeless is to be beautiful; it should make you feel different or think different.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what would be the most important aspects or ideals you feel should be incorporated and not lost?

A. I think it is the idea of beauty and of the user. The body is very important and clothing it takes a lot of factors into consideration. The garment should not wear the person; the person should wear it in a way that helps them in some way- not hinder or call attention to. Fashion is about expression, what's new and "beautiful." You should not lose that.

Kent State University (KSU), Kent, Ohio

It is the objective of the Kent State School of Fashion to provide students with a global vision that combines the design excellence of Europe with the energy of the United States and the technology of Asia. The School of Fashion has developed a strong curriculum in

design, merchandising, textiles and knitwear providing opportunities for graduates worldwide. The Fashion Design major prepares students to design apparel for the various markets by emphasizing both the technical and creative aspects of the industry. Professional viewpoints are fostered by field trips, museum study, and consultations with designers who serve as critics. The department's faculty members, who are all active in the fashion field, encourage professionalism.

Figure 10 Undergraduate Fashion Design Curriculum, KSU

Interview Transcript with FD Department Head

Elizabeth Rhodes, February 22, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. The ability to ask questions and want answers. In fashion you have to draw from other's knowledge to better your craft. You have to be able to want more, to know more, to learn how; this drive, you have to be able to ask questions and truly listen and learn.

2Q. What is the prevailing design theory or idealism of your school-- it more artistic or technical based?

A. It is a fusion of both. You must be able to come up with new unique and artistic approaches to preexisting silhouettes, and you must also have impeccable construction skills. One without the other does not make a fashion designer; you can be a pattern maker and a fashion sketcher but when you have both skills and each are equally stellar, you are a fashion designer.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. You must know your intended market or theme. The theme of your collection or the market focused on must be cohesive with the final design and fit. You have to know whom you are designing for and why; otherwise, your piece has no real function or meaning. You need to have a clear objective first.

4Q. When creating a product, what would you consider to be the most important step in the design process from a curriculum standpoint?

A. It's all about presentation. We teach to equally worry about final production as initial design. You have to be able to create awesome designs but also create awe-inspiring final garments.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. Similarities are that we deal mainly in marketing and creating something that fulfills the basic needs of man. The differences I would think is Industrial Design is more function- orientated and computer- based and in many real ways forgets about the human form and fitting technology to the human form instead of vice versa. We create tangible figure conscious applications.

6Q. In your particular design world what is beauty? How is it defined by your field of study and by you?

A. I think it is different for everyone depending on teachings, culture, and social standings. But overall it is something that is indescribable but the eye knows when it sees it. It is a blend of materials, function, and construction. When each is proportional in awe and quality, that is beauty.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what would be the most important aspects or ideals you feel should be incorporated and not lost?

A. We mustn't lose the attention to the human form and body. It is the basis fashion works from and on, also the ideas of actually manufacturing the garment.

We design but we must also create it in a satisfactory way. It's about final presentation and selling not only yourself but also your designs.

Parsons New School of Design, New York, New York

Since its launch in 1906, the Parsons Department of Fashion Design has been on the leading edge of American fashion. From Claire McCardell to Donna Karan, Tom Ford, and Narciso Rodriguez, the alumni have been responsible for the highest level of clothing design in the last century. Along the way, they've revolutionized societal traditions and the industry itself. Today graduates are joining the ranks of twenty-first century fashion leaders. At Parsons, students confront the challenges of the real world of the fashion industry while cultivating their own personal vision. Through courses in concept development, studio methods, fashion drawing, and fashion digital studio, students take part in each stage of the design process. They learn to solve problems for a range of markets. And through the Designer Critic Program and the annual Fashion Show, they interact with a diverse cross-section of industry professionals.

Figure 11 Undergraduate Fashion Design Curriculum, Parsons

Interview Transcript with FD Department Head

Timothy Gunn, February 11, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. You have to be committed. Our program has grown so much over the past decades that I think if you want to do your best and be unique, you have to be committed, no matter the cost. It is in this commitment that you find the discipline to continue; it is also this

commitment that gives you the drive, the motivation, the want to do great things, in great ways.

2Q. What is the prevailing design theory or idealism of your school-- is it more artistic or technical based?

A. We are truly a blend of the two, I would say. We strive for excellence in our craftsmanship, a level of professionalism that many fashion schools lack. We are in a competitive market in a competitive city where your career can literally be destroyed before it ever begins, so here is an immediate need for great technical skill. At the same time, we want our students to be highly creative and artistic because at the end of the day, fashion is about what's new and hot, innovation. You have to have your own aesthetic and style that is approachable but undeniably yours. My hope is that we convey a curriculum and inspire designers that are equally technical as they are artistic.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. I always say you need inspiration. Who is wearing the garment, what, and where is he or she going? I guess your client, a muse, must inspire you because it is in knowing your subject that you can design for them in an effective way. I have seen many morose students that become lost because they have no initial concept; there is no research or creativity there. You must know your client and then you can move on to designing, the objective; you have to make it work.

4Q. When creating a product, what would you consider to be the most important step in the design process from a curriculum standpoint?

A. It is all about the design; does it work? If not, fix it. Without a great design it is difficult to have a successful garment. There is a certain degree of know-how, an innate

sense of what should be going on within the design. You must have a definitive objective, focus and reason. If you cannot defend it, it fails because you have to have a firm bases. Self-editing.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. I find our department working so close with our product development that they are extremely similar. We have the same constraints if you think about it, just different in shallow areas. I appreciate what industrial design is about, but am uncertain if I could ever do that, as I am sure they couldn't design an evening gown right.

6Q. In your particular design world, what is beauty? How is it defined by your field of study and by you?

A. What a fun question. Beauty is what you make it; it is all around us. From a garment standpoint, it has to be designed well, appealing, and technically flawless. It should make you feel some emotion that is unique, captivating the eye and your breath for a moment.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what would be the most important aspects or ideals you feel should be incorporated and not lost?

A. Craftsmanship, and maybe this notion of beauty, the whimsy of fashion. It's so new and fresh because it is so misty. Here in a moment and gone. Keep it new.

Rhode Island School of Design (RISD), Province, Rhode Island

The Department of Apparel Design prepares students to meet the highest requirements of the fashion industry. Based on the philosophy that design and technical skills are mutually enhancing, the program is structured to take a student through all aspects of

apparel design and construction, from functional to experimental clothing. Technical classes proceed from basic to advanced drafting, draping, and construction, and incorporate the use of computers as a tool for designing and rendering apparel. Through a broad range of studio projects, students discover new areas and develop an individual style. At the end of each semester, pupils present coursework to a panel of faculty members and visiting designers, who have included such fashion industry professionals as Tom and Linda Platt, Eric Gaskins, and Nicole Miller. These professionals select the best student work from the year for inclusion in Collection, the department's annual spring fashion show. As a student in the department you also visit New York's fashion district and as a senior are given an opportunity to intern for six weeks at a major fashion house.

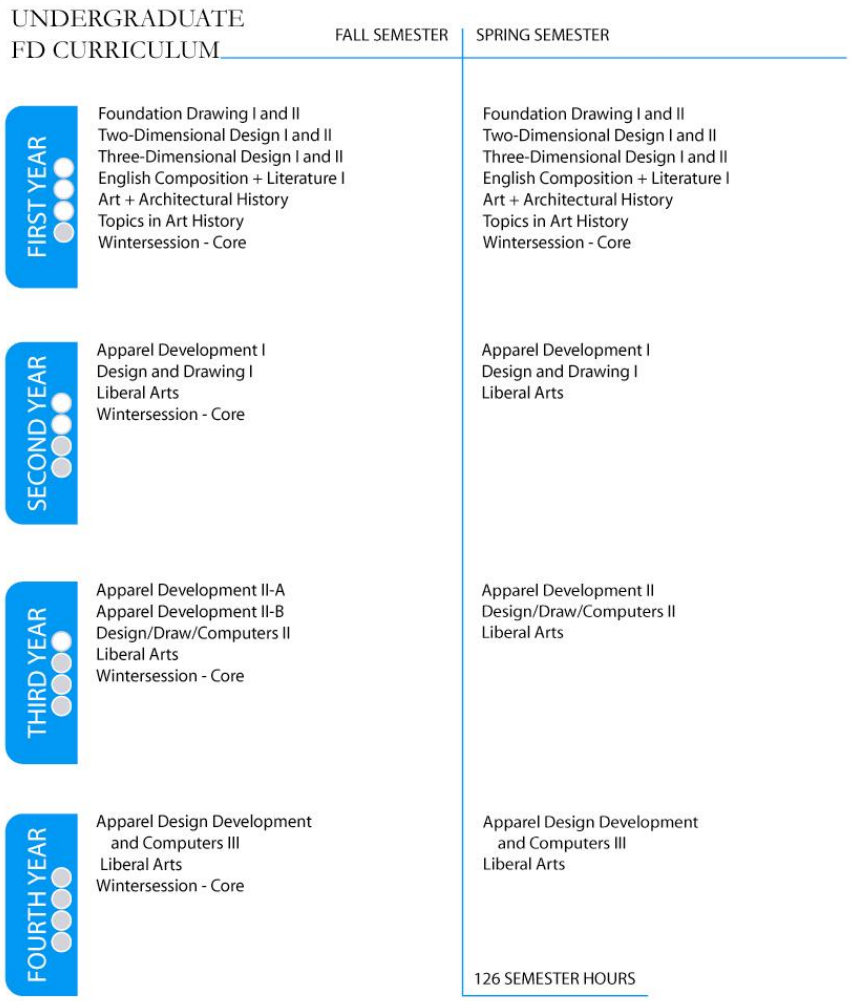

Figure 12 Undergraduate Fashion Design Curriculum, RISD

Interview Transcript with FD Department Head

Mary Kawenski, February 15, 2006

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

A. You know, you have to be studious, willing to go the extra mile, to learn for the sake of learning. You need to have the skill set and ability to come here ready to work, to learn.

To be professional also, in manner that helps in the process of designing and being creative.

2Q. What is the prevailing design theory or idealism of your school-- is it more artistic or technical based?

A. At RISD we really try to find a happy medium between the two worlds. You have to have the artistic skills so that you can be creative. You really must have them both, not one without the other. I would say that overall, from a department standpoint, we are more open to avant-garde design and haute couture, traditionally more artistic segments of the fashion industry. Our ready-to- wear is extremely technical and I feel we flourish at that, too. I would say we lean more to the artistic side, but are a combination of them both.

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

A. Market research and understanding your client. You have to determine its purpose or the function of the garment. I like to understand these measures before proceeding with a design, especially for specific clients. We instill this in the students.

4Q. When creating a product what would you consider to be the most important step in the design process from a curriculum standpoint?

A. Its all about research, good solid design, and craftsmanship.

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

A. They both deal with anthropomorphic and pleasing the user. Marketing is key in both and in the identity and image branding. The two are different in that, at their cores, they are intrinsically different. One shelters the body, the other electronics. In that way,

product designers are not as body, user-conscious as we as fashion designers must be. There is also a gap in innovation and the "newness" of a garment that isn't really felt by product designers; we evolve on a monthly base.

6Q. In your particular design world, what is beauty? How is it defined by your field of study and by you?

A. This is an interesting question because it has so many different meanings and interpretations. For RISD we find beauty in innovation and creativity; there is something so beautiful about the design process, a type of magic that transcends paper into something tangible.

7Q. If there were a curriculum that tried to merge the worlds of Industrial and Fashion Design, what would be the most important aspects or ideals you feel should be incorporated and not lost?

A. Creativity. In a way we really don't have constraints in the conceptualization of our design; the students are pushed to do their best in new ways. I am unsure if product design allows for such freedom- so many considerations and preexisting notions about what makes a product appealing. I ponder on the idea of them taking the best of each and bettering the other by adding the substance the other lacks.

Objective of Fashion Design Holistic Model

The goal of the merged Fashion Design curriculum is to take the best curriculum classes that each selected FD school has to offer and merge them into one cohesive and holistic curriculum that typifies individual strengths supported by the strengths of other schools' curriculum courses. As a whole, the curriculum works best from a systems approach that gives students the technical abilities in a manner that coincides with their knowledge of

Fashion Design past, present, and future. It is this blend that allows students to cultivate their own design sensibilities while staying true to the profession, market, and themselves. The importance of artistic ability and innovation is imperative for a field dominated by the moment and what is new. In this context, the overall model FD curriculum should offer a stellar intermingle of the technical and the artistic, a balanced blend between the craftsman and the innovative designer.

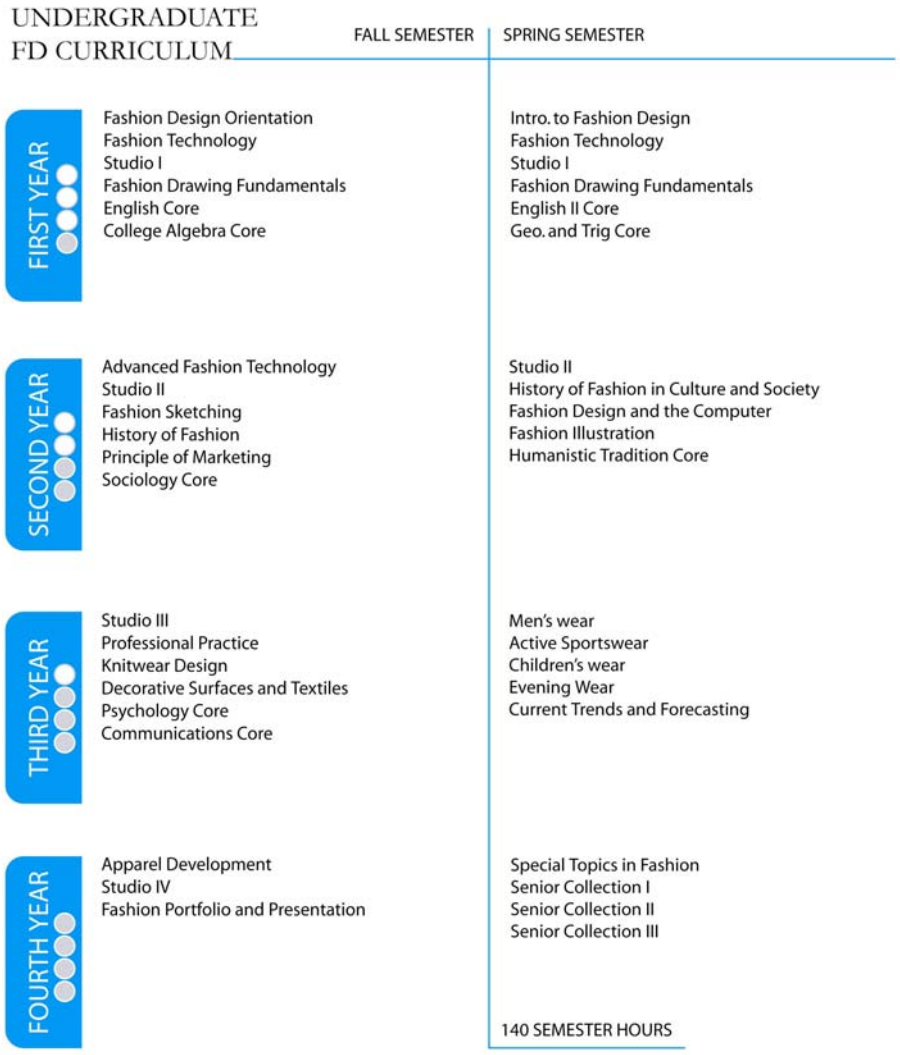

Figure 13 Created Undergraduate Holistic Fashion Design Curriculum

Holistic Module Course Descriptions

Year One, Fall Semester

Fashion Design Orientation- Introduction to design ideas and philosophies of Fashion Design. Course includes definition of fashion design, its categorization among art and science, differences in design practices, and the defining of FD themes, techniques and tools. Concepts such as product, client, and community of use, function, form, material, style, craft, and mass production as understood and used by designers. Assignments introduce the design processes of trend and fabric research, storyboard compiling, color story, design innovation, and the 2D to 3D development of creative ideas.

Fashion Technology- Students are introduced to professional standard sewing machines techniques and apparel construction through assignments; the techniques are applied to produce finished garments. Emphasis is placed on the creative aspects of design and innovation. Students gain a tangible grasp on what is expected and how the creation of a garment occurs conceptually.

Studio I Processes (5 credits)- Studio focuses on teaching skills of flat pattern making and draping. Development of basic and torso muslin and slopers are taught with attention to patterning and construction techniques. This project teaches bodice, sleeve, collar, and skirt variation as bases for future knowledge.

Fashion Drawing Fundamentals I- Course teaches the basics of drawing with attention to the figure and fabric rendering. Emphasis on lighting, fabric, and texture draping allows use of multimedia. Course exposes students to various drawing techniques that aid in design communication and development. Methods of sketching, drafting, drawing, representation, communication, idea generation, and form development are reinforced by

sequential approaches to understanding structure, form, space, line weight, texture, light, and tone.

English - core

College Algebra - core

Year One, Spring Semester

Fashion Design Orientation- Introduction to design ideas and philosophies of Fashion Design. This course includes definition of Fashion Design, its categorization among art and science, differences in design practices, and the defining of FD themes, techniques and tools. Concepts such as product, client, and community of use, function, form, material, style, craft, and mass production as understood and used by designers. Assignments introduce the design processes of trend and fabric research, storyboard compiling, color story, design innovation, and the 2D to 3D development of creative ideas. Course is a continuation of fall semester.

Fashion Technology- Students are introduced to professional standard sewing machine techniques and apparel construction. Through assignments, the techniques are applied to produce finished garments. Emphasis is placed on the creative aspects of design and innovation. Students gain tangible grasp on what is expected and how the creation of a garment occurs conceptually. Course is a continuation of fall semester.

Studio I Processes and Applications (5 credits) - Studio focuses on teaching skills of flat pattern making and draping. Development of basic and torso muslin and slopers are taught with attention to patterning and construction techniques. Draping, bodice contouring, and one-piece sleeve variations are applied in a real world garment project. Final garment and presentation required.

Fashion Drawing Fundamentals II- Course teaches the basics of drawing with attention to the figure and fabric rendering. Emphasis on lighting, fabric, and texture draping allows use of multimedia. Course exposes students to various drawing techniques that aid in design communication and development. Methods of sketching, drafting, drawing, representation, communication, idea generation, and form development are reinforced by sequential approaches to understanding structure, form, space, line weight, texture, light, and tone. Course is a continuation of fall semester.

English - core

College Algebra - core

Year Two, Fall Semester

Advanced Fashion Technology- Course explores the application of advanced sewing technology across a range of fashion products. Emphasis is placed on producing a reference sample book by using various fashion materials. The course reinforces understanding of textiles, fabric, selection etc.

Studio II Apparel Development (5 credits) - Course explores the development of basic level apparel through draping principles on the 3D dress form. Students are given objectives and project constraints/objectives. Students study the process of designing through creating their own garment. Final garment and presentation required.

Fashion Sketching- Course introduces fashion drawing techniques to communicate ideas; explicates garments by visually interpreting fashion apparel, including the body proportions, clothing, and line weight; and loose drawing. Drawing techniques integrate the use of croquis and the concept of flat pattern drawing and developing croquis bodies

for individual portfolios. Students are expected to develop their own unique style and flat pattern skills.

History of Fashion- Course presents a visual history of fashion from ancient Egypt to the present with particular emphasis on recent history from the mid nineteenth through the early twenty-first centuries. Students analyze historical periods and their influence on contemporary fashion, culture, and society.

Principles of Marketing - core

Sociology - core

Year Two, Spring Semester

Studio II Apparel Development (5 credits) - Explores the development of intermediate level apparel styling and pattern drafting principles. Students draft and execute professional standard pattern methods, measurements, and advanced rub- offs. Students are given objectives and project constraints / objectives. Students study the process of designing through creating their own garment. Final garment and presentation required.

History of Fashion- Course presents a visual history of fashion from ancient Egypt to the present with particular emphasis on recent history from the mid nineteenth through the early twenty-first centuries. Students analyze historical periods and their influence on contemporary fashion, culture and society. Course is a continuation of fall semester.

Fashion Design and the Computer- Provides opportunity for students to integrate fashion design and computer-aided systems. Course includes Photoshop, Illustrator and pattern / flat pattern making on CAD. Students have access to 3D body scanner and other computer-based applications. Emphasis is also placed on concept development and methods of presentation and processing information.

Fashion Illustration- Course explores many aspects of fashion illustration and rendering, from basic frame applications to fully finished spreads, windows, and professional advertisements in color. Course addresses fashion illustration of both designers and fashion illustrators and examines the role of fashion drawings and renderings in all areas of the fashion industry.

Humanistic Tradition – core

Year Three, Fall Semester

Studio III Apparel Development (5 credits) - Explores the development of advanced level apparel styling and pattern drafting and draping principles. Students draft and execute professional standard pattern methods, measurements, and advanced rub-offs. Students are given objectives and project constraints/objectives. Students study the process of designing through creating their own garment. Final garment and presentation required.

Professional Practice- Course is directed toward the commercial and professional elements of fashion design business including management, finances, and legal aspects. Students are expected to analyze all aspects of merchandising and marketing of clothing and themselves. Class helps create professional practices and self-promotion with resume, business card, and cover letter workshops.

Knitwear Design- Students are introduced to the processes of creating full-fashioned knitwear. As a requirement, students develop a knitwear sample book and explore various techniques and tools needed to create finished knit apparel.

Decorative Surfaces and Textiles- Course examines textile, not only in selection, but also in use, manufacturing, and processing. It also studies fabric, and students learn to

manipulate fabrics and textures to produce special detailed fashion apparel at all levels of the marketplace.

Psychology - core

Communications – core

Year Three, Spring Semester

Men's wear Design- Course explores the fashion men's wear market. Focus is trend identity, market placement, styling, portfolio presentation of trend boards, and design development.

Active Sportswear Design- Introduces students to working with stretch fabrics, particularly Lycra and Spandex, and developing lines, including flats, patterns, and illustrations, for the active wear market. Emphasis is placed on developing the technical skills to successfully produce garments in Lycra fabric.

Children's wear Design- This course addresses the unique considerations in designing and manufacturing children's wear, including identification of children's wear construction, pattern components and apparel sizing. Students develop pattern blocks from which advanced children's wear designs are executed.

Eveningwear Design- Students learn the skills and discipline of the specialized area of eveningwear. Researching occasions for the different applications of formalwear, students develop a series of designs suitable to tailoring techniques and select fabrics that explore color, texture, and pattern. In consultation with a visiting industry professional, students execute a collection of suitable evening garments for professional review. Results may range from the traditional to the avant-garde.

Current Trends and Forecasting- Focus is placed on current fashion trends in the international market. Through group discussion and analysis of current videos and published fashion materials, students produce reports on their own observations of the trends and how these trends relate to personal design developments.

Year Four, Fall Semester

Apparel Development: Advanced Pattern Drafting (5 credits) - Course addresses advanced pattern cutting techniques. Building on the knowledge gained in Apparel Development II and Apparel Development III, students tackle technically demanding assignments from men's and women's tailored garments to bias cut and lingerie. The course culminates in the design and creation of garments. This course is highly recommended for undergraduate students preparing for their senior projects and for graduate students who want to augment their pattern-making skills. Final garment required.

Studio IV Exercises in Draping (5 credits) - This course presents the skills necessary to create advanced shapes and designs directly on the dress stand rather than by using basic blocks or slopers. Students work with three different fabric types to learn the use and manipulation of fabric and three different models to learn the variations in fitting procedures. They then develop the pattern from which the final garments are made. This course is highly recommended for undergraduate students preparing for their senior projects and for graduate students who want to augment their pattern-making skills. Final garment and presentation required.

Fashion Portfolio and Presentation- Portfolio workshop gives students the opportunity to develop a personal portfolio of creative work. Students identify their specified career

goals and prepare their portfolios accordingly. Emphasis is placed on market placement, layout, content, and composition. Students are also assisted with business etiquette lessons.

Year Four, Spring Semester

Special Topics in Fashion- The topic of this course varies from quarter to quarter. Each seminar focuses on various issues in the field of fashion and allows students an opportunity to examine issues that effect designer such as ethics, sustainability, green design, design philosophies and ideology, current events and modern movements. Goal of class is to create socially responsible and conscious students.

Senior Collection I (4 credits)- The first in a three-quarter sequence of courses in which the student focuses on conceptualizing an original 2D collection specializing in a major area of design, a type of Senior Thesis. Students explore identifying customer profiles, researching major areas of specialization, sources of inspiration, and fabrication selection. The student will develop portfolio-ready technical sketches, illustrations, flats, storyboards, color storyboards, and fabric swatches.

Senior Collection II (4 credits) - Students in this course develop skills necessary to create advanced sample garments. The emphasis is on the production of the first sample muslin or prototype through the application of advanced draping and pattern drafting techniques. Students work with fit models to learn the various fitting procedures used in the industry. Pattern alterations and manipulations are demonstrated in class to show how alterations are processed and corrected on the paper pattern. Presentations of final muslins are critiqued prior to the development of final garments.

Senior Collection III (4 credits)- This course is the final in a sequence of three that permits advanced fashion students the opportunity to produce a senior collection of first sample garments in the selected fabrics. Industry standard construction techniques are applied in the execution of the student's final collection. The collection should be the culmination of everything learned in the FD program. Portfolio quality presentation boards support the collection and are all displayed at the Senior Exhibition held at University Art Museum Fashion Show, showcasing senior work.

Chapter Four

PEDAGOGY DELIBERATION

Curriculum Creation

The goal for the final curriculum is to promote integrated cognitive development through both quantitative and qualitative instruction methods, ones that address deficiencies in the current pedagogy of Industrial and Fashion Design singular curricula in a profound manner. It is about activating, exploring, and stretching the transformative capacity of two design disciplines as didactics, process, and practice. According to Jerome Bruner, teaching someone is not about getting them to commit results to the mind but about "teaching him to participate in the process that makes possible the establishment of knowledge… [It is] to get a student to think for himself, to consider matters as [a designer] does, to take part in the process of knowledge getting. Knowing is a process not a product" (Bruner, 1966, p. 235). Thus, in the creation of the initial curriculum many factors had to be taken into consideration.

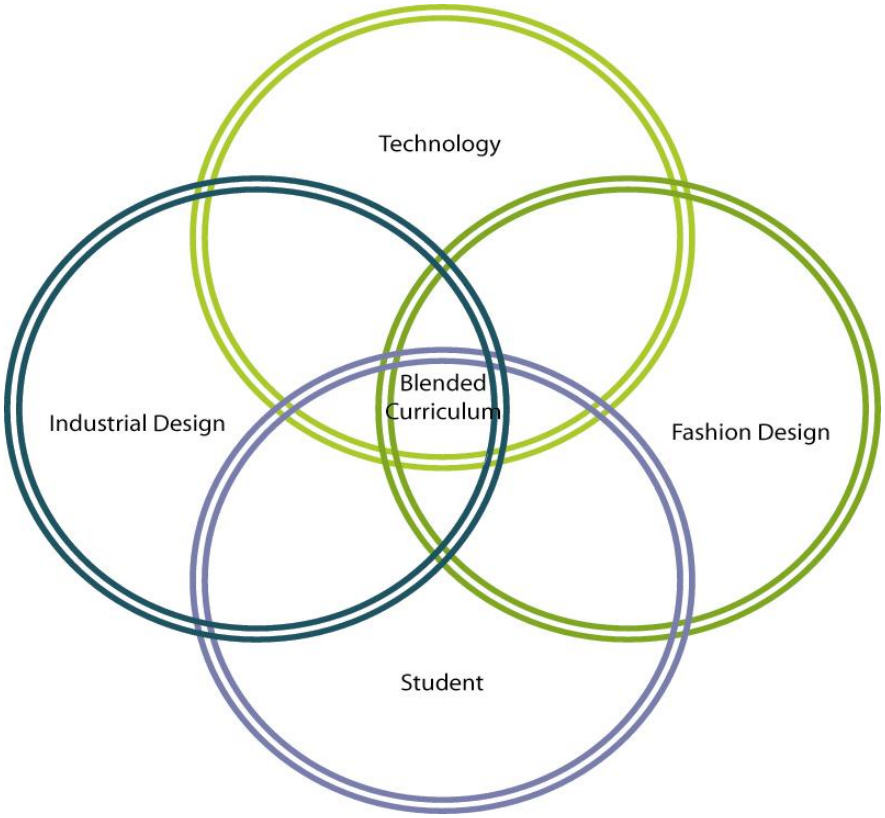

Diagram 5 Illustrates the differing factors involved in creating a blended Industrial and Fashion Design curriculum that is effective from an academic and real world perspective. Where Industrial and Fashion Design and the student and technology meet is where the Technofashion curriculum is created.

Among these considerations was the theory of selective attention because of its immense and persuasive effect on learning, and more importantly, the psychological theory's ability to shape perception and the design process. The curriculum model needs to integrate different areas of knowledge and learning that function within the brain allowing for thought to occur and memory to persist. In order to compensate, according to Marzano (1998) there are four elements of human thought operating that the model must tackle: the self-system, the meta cognitive system, the cognitive system, and knowledge. These differing elements are enacted at a given stimuli time when presented with a new task and information (see Diagram 6). The self-system contains a network of

interrelated beliefs and goals that help us decide whether to begin a new task. It is also a prime determiner in how much motivation we have for a task, usually governed by selective attention. If a stimuli or task is deemed important and the end result successful, positive affect is generated and the individual is motivated to engage. If deemed to be low relevance or low probability of success, negative affect is generated, and motivation is low. In this latter case, compensatory activities are selected, one of which might be to continue the status quo (Marzano, 1998). In addition to determining the level of motivation for a specific task, the self-system also determines the emotion associated with almost every element of knowledge or skill in long-term memory; that is the beliefs and assumptions within the self-system tell us whether information, old or new, is to be associated with specific emotions. The metacognitive system is engaged regardless of whether a new task or a compensatory activity is selected. This system processes information about the nature and importance of plans, timelines, resources, and their interactions. It is responsible for designing strategies to accomplish a given goal and is thus the best means to manipulate stimuli selection of selective attention and response because the metacognitive system continually interacts with the cognitive system throughout education, information getting and situational response, and interaction (Marzano, 1998). The cognitive system processes information essential to completing a task and acquiring information and new knowledge. If a task requires solving a problem, the cognitive system is responsible for executing the steps involved in problem solving. If the task requires generating new ideas, it is this mechanism that does so, making this process for designers an extremely paramount deliberation in the design process and problem solving methodology. Finally, the amount of knowledge acquired about a task

dictates how successfully one can complete the task, understand its problem and process its information. For a curriculum to effectively use selective attention, it must be one that "incorporates a wide base of knowledge that generates the thought process of a student individually" (Marzano, 1998, p. 100). These four elements are important to pedagogy because each and their components are necessary for effective learning, arousing and engaging the intellectual and creative process in students.

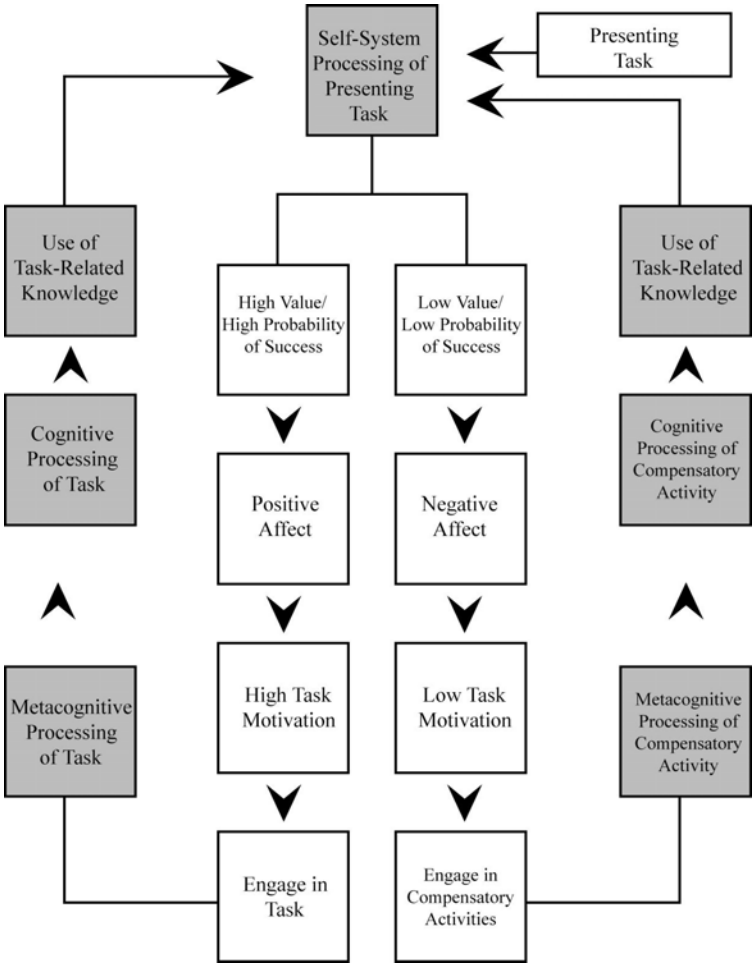

Diagram 6 A model showing interaction among knowledge, system, and self-system (Marzano, 1998, p. 88)

Constructivist Curriculum

In order to effectively merge the two disciplines of Industrial and Fashion Design, a curriculum structure that encompasses all areas of both cognitive and educational consideration had to be determined. After examination of several curriculum models that met the initial needs of this particular curriculum including Total Quality Education, Outcome-based, Constructivist, and Standards-Based (see Glossary), the Constructivist curriculum model was chosen as the base model for the module curriculum because it fulfilled needs and effectively advocated the amalgamation of not only the four elements of human thought operation but of selective attention and the integrated curriculum. The Constructivism curriculum as a foundation can be classified as having a cognitive processes orientation where learners in essence construct knowledge. Based on the findings of cognitive psychology and building on earlier work on thinking skills, constructivism emphasizes the learner as a meaning maker. Formalization of the theory of constructivism is usually associated with theorist Jean Piaget (1950) who identified mechanisms of *accommodation* and *assimilation* as means for knowledge attainment and thus individuals construct new knowledge from their experiences and prior knowledge. Assimilation occurs when individuals' experiences are aligned with their internal representation of the world. They assimilate the new experience into an already existing framework. Accommodation is the process of reframing one's mental representation of the external world to fit new experiences and knowledge (Brandt, 2000). As a curriculum it emphasizes depth, not coverage; poses a contextualized and complex problem for students; ensures that students have a sound knowledge base for solving the problem; and

sees the teacher's role as a problem structurer and a scaffold. Leveraging the Constructivist theory as a curriculum model is best designed for design disciplines because it reinforces an integrated curriculum by which students learn new information presented by building upon knowledge already possessed, an attribute imperative to the design process and creation of individual design principles and methodologies.

Structure of Constructivist Curriculum Characteristics

The structure of the curriculum denotes the organizational features of the blended Industrial and Fashion Design curriculum. The following contrasts the structural features of the new curriculum to those of traditional curricula as examined and noted by the curriculum evaluation in chapter three of both Industrial and Fashion Design. The following are the curriculum's key points:

- Greater depth and less superficial coverage. Depth of knowledge leads to power. Studies have concluded that focusing in-depth on a smaller number of skills and concepts will lead to greater understanding and retention and will also support efforts to teach problem-solving and critical thinking (Brandt 2000 and Healy 1990).
- Focus on problem solving that requires using learning strategies. Solving complex and situational problems lies at the heart of studio structure and embedded in the problem solving are learning strategies. Skills and learning strategies are better learned and retained when imbedded in problem-solving units dealing with complex meaningful problems, situated in context.

- Emphasize both skill and knowledge. Generative knowledge is key. There should be no dysfunctional dichotomy between primacy of content or process they should be one.
- Provide for individual needs. Use varied modes of representation, different ways to transfer knowledge that may suit student's individual future goals or aptitude to certain mediums. The curriculum should allow teachers to provide high structure through cues at the beginning of education during freshman and sophomore years and then let students solve problems on their own developing their own design sensibilities as they mature into designers in junior and senior years. This systematic variation is called scaffolding.
- Common core to all students. In responding to individual differences, curriculum leaders should be sure that the curriculum does not lead to defragmentation of student body. It should be at the beginning a centripetal curriculum that educates all on the same level, presenting a strong and equal base and then though progression into latter years, a centrifugal one that allows students to explore individual interests, needs, and wants.
- Coordinates closely. Curriculum coordinated related subjects that blend together seamlessly. Various levels of the curriculum in a given subject should be coordinated and build upon itself each semester and each year. Multiyear sequential curriculum will have great influence and be more beneficial to the learning process, making collective and developmental sense.
- Emphasizes learned curriculum. Concerned with results and learned knowledge over a period of time, accumulative and accountable. Objectives are clearly

delineated and less attention is given to mindless activities. The ability to articulate a common objective while soliciting faculty to add and improve upon curricular achievement.

- Pays greater attention to personal relevance, while drawing from wider spectrum. Restore balance in the content, making education highly personal yet understanding world and other disciplinary attributes. The structure of the discipline receives adequate attention; students use cognitive processes to problem solve; a technological approach to skill, techniques and tools are used and the overall curriculum gives students the skills needed to evolve as designers and become great designers in this particular field on personal, industry and market levels.

Introduction to Blended Curriculum

The United States Bureau of Labor expects an increase through 2012 of new job emphasis on technologically advanced garments with an estimated increase of forty-one percent creating some 25,000 new jobs annually. The goal of this study is to create a curriculum that blends the disciplines of Industrial and Fashion Design in a way that makes full use of each field's principles, design process and methodology. The hope for the ending curriculum is that it will help to bridge the gap that exists when trying to merge these two diverging disciplines. The thesis's intent and objective is to create a beneficial curriculum and discipline that will help bring the world of Wearable Technologies to the mass market in a real, effective, and conscious way by creating conscientious, well-informed, and technically trained students and designers. This new discipline, Technofashion Design, is not an elimination of any field of study but an

example of how the merging of two can have even greater advantages and implications for technology, consumers, and the future of communication and mobility than any one discipline alone.

Technofashion Defined

Consumer and environment centered, user orientated design, an attempt to solve a problem through technical, technological and artistic means. TFD is the professional service of creating and developing concepts and specifications that optimize the function, fashion, value and appearance of garments and systems by merging technology with apparel for the mutual benefit of user, manufacturer, technology and environment. Techofashion designers develop these concepts and specifications through collection, analysis, synthesis and evaluation of data guided by the special requirements of the client or manufacturer. The unique contribution places emphasis on wearable technologies and those aspects of the product or system that relate most directly to human characteristics, needs and interest. This contribution requires specialized understanding of visual, tactile, safety and convenience criteria, with concern for the user, taking fit, function and fashion into consideration. Education and experience in anticipating psychological, physiological, and sociological factors that influence and are perceived by the user and environment are essential. Its main focus is on seamlessly integrating technology into a garment in a manner that advocates utmost mobility and communication. Technology should be under the control of the user and aestheticized in a marketable, practical and effective way. Technofashion Designers also maintain a practical concern for technical processes and requirements for manufacture; marketing opportunities and economic constraints; and distribution sales and servicing processes.

Philosophy and Rationale

The curriculum created for the effective integration of Industrial and Fashion Design transforms itself into an entirely new genera and discipline known as Techno fashion Design. Technofashion's goal is to bring technologically laden garments to the masses in a marketable and affordable way, made aesthetically pleasing by design skills, technologically advanced through scientific know-how, innovative through artistic ability, and skillfully crafted through tailor precision. As our society progresses towards a complete technocracy, we are presented with ever-increasing science and technology that threatens every aspect of our humanity. This new discipline, if implemented, will help the transition in a manner that preserves through conscientious design. The main philosophy behind Technofashion is that it finds its effectiveness and beauty in its ability to fulfill a purpose or function in a way that is cohesive with its apparel blend. It must have the practical purpose of enhancing and managing modern life that is helpful and beneficial to its user. Extrapolating clothing in the name of technology for no true purpose leads to faulty design that is unmarketable and impractical. In its essence it is both art and commodity, creating not just fashion or technology but a vision of humanity in the future. The ultimate goal for Technofashion is that people will consider electronics a part of the everyday wardrobe, containing elements that add value to individuals and their environment, a synergy between fashion and technology. The ultimate hope for the curriculum is that it creates designers that will meet those needs and fulfill those goals.

Needs Assessment

Supplements:

- *Intelligent fashion* takes clothing to its very limit integrating software, communication devices, sensors, and speech- recognition systems into garments. New research and developments in technology not only indicate groundbreaking possibilities and future directions for these and related industries, but also question the future of fashion itself.

  Fashion has not been chosen as a vehicle for technology because until now, technology and its applications have not been of a size or continuity to do so realistically. As a medium fashion is versatile, mobile, universal and adaptable: the perfect home for traveling technologies that increase man's ability to communicate with others and their environment and encourage egress at all levels of existence. Computerized clothing could think, receive, and transmit data, and in essence, blend fashion, design and style with technological advancement and utmost performance.
- *Wearables* and *smart clothing* are equivocal terms describing electronic clothing. Capable of processing information on the moving body, this field stems from computing research begun in the late 1960s and has gained momentum recently with the miniaturization of technology which continues to grow. The most profound technologies are those that unobtrusively and inconspicuously disappear into clothing.
- *Ambient technology* is the next wave of going wireless. These technologies explore how we may live and work in the future in smart clothing, that through wireless and Bluetooth technologies, enable devices to communicate with one another without being physically connected. Clothing and accessories become

part of a smart environment tailored to needs and requirements all operating autonomously via radio waves.

- *E-textiles* also offer a way of hiding technology through electric textile like fibers, yarns, ribbons, and fabrics that conduct electricity. These fabrics can sense when and how they are being touched, acting as sensors, switches, transistors, power cables, antenna, and displays. These technologies promise to revolutionize the apparel industry with fabrics that can sense and respond to its user, powered through photovoltaic fabric, microchip, and fiber optics. The advancements in science and technology show that the vision of the future and technology is found in the humble garments that shelter the body.

Course Considerations

In evaluating the fields of Industrial and Fashion Design there are inherent differences that must be addressed to make a cohesive and effective blend of the two into Technofashion Design. From a fundamentals standpoint the two genres operate under typical design applications, techniques, and tools. Incorporating the basic skills will be invaluable in creating a well-balanced curriculum. Specific skills, classes, and methodologies used in each discipline are incorporated into the Technofashion Design curriculum. By combining courses and broadening their perspective scopes, it will be possible to successfully merge the two prevailing disciplines' ideologies seamlessly. Information gained from interviews with department heads gave valuable insight into the themes and guidelines that both Industrial and Fashion Design function under, helping set forth a clearer definition and criterion for a blended curriculum's goals. Courses will also be tinged with Technofashion Design education and background information to set

proper precedent from a curriculum standpoint. It is through this precedent that solvency may be reached as to the final outcome of the study's success and applicability. Revision of the curriculum will not be a complete restructuring of any one discipline but a tweaking and sublimation of courses that will benefit in the objectives final mission to create a curriculum that makes full use of each genre's characteristics, ideology, and design process to create something beyond themselves that is superior to each individually when creating garments that use both technology and fashion to benefit a user in any way. The vision is now one that encompasses the technical and artistic as well as the academic and the innovative, at levels that eclipse Fashion and Industrial Design as they exist today. The created curriculum of Technofashion Design (TFD), is a permutation into a new discipline and specialized subset.

Assessment and Evaluation

Student assessment and evaluation is an important part of teaching as it allows the teacher to plan and adapt instruction to meet the specific needs of each student. It also allows the teacher to discuss the current successes and challenges with students and report progression. Evaluation throughout the Technofashion courses should be based upon learning objectives outlined in the course of study. It is also important that there is a variety of assessment strategies to ensure accurate evaluation of knowledge gain on cognitive levels of selective attention, learning and problem solving abilities that are both technical and ingrained. The design of an evaluation matrix should reflect the amount of time devoted to each of the modules taught in the course. Regular program evaluation should include students, faculty, administration, and employers to determine program effectiveness and need for change. Three main types of student evaluations should be

employed: formative, summative, and diagnostic. Formative evaluation is an on-going classroom process that keeps students and educators informed of student progress. Summative evaluation occurs most often at the end of a module, or course, to determine what has been learned over a period of time, not just superficially but to see if the thinking process is expanding. Diagnostic evaluation should usually occur at the beginning of the school year or before a module of instruction to identify prior knowledge, skills, or interest in the subject area; it is particularly important for shaping selective attention.

Figure 14 Undergraduate Technofashion Design Curriculum

Constructivist Curriculum Overview

Module 1

Year One, Fall Semester

Technofashion Design Orientation (2 credits)- Introduction to design ideas and philosophies of Technofashion Design. Includes definition of Technofashion Design, its categorization among art and science, differences in design practices and the defining of TFD themes, techniques and tools. Course expresses goal of TFD, which is to effectively integrate technology with fashion to benefit the user. This use is purely function based, reinforcing the idea that form follows function and technology, becoming an active part of the body and garment, not an extension or appendage. Concepts are learned such as product, client, and community of use, function, form, material, style, craft, and mass production as understood and used by designers. Includes central issues in design studies, including gender and diversity, ethics and politics, and role of design and designers in society. Provides an overview of what Technofashion Design is past, present and future, explicating the ideas behind the programs of the design department.

Design Fundamentals (3 credits)- Course exposes students to various design techniques that aid in design communication and development. Methods of sketching, drafting, drawing, representation, communication, idea generation, and form development are reinforced by sequential approaches to understanding structure, form, space, color, line weight, texture, light and tone. Course teaches the basics of drawing with attention to the figure and fabric rendering also. Emphasis on lighting, fabric, and texture draping allows use of multimedia. Drawing in this context is also taught as a means of design thinking with emphasis placed on the analysis and interpretation of existing man-made and organic forms. Final project and presentation required.

Studio I Processes (4 credits) - Studio focuses on teaching skills of flat pattern making and draping. Development of basic and torso muslin and slopers are taught with attention to patterning and construction techniques. This project teaches bodice, sleeve, collar, and skirt variation as bases for future knowledge. Attention is placed on incorporating technology into garments in effective and inconspicuous ways. Students are encouraged to test limitation between fashion and technology.

English I Rhetoric and Composition – core

College Algebra –core

Module 2

First Year, Spring Semester

History of Design (3credits)- Provides an overview of design and art history from 1700 to present with emphasis on movements, generas, and schools of thought that were critical for the formation and development of design and design professions. The goals are to provide an understanding of the role that design has played in the evolution of the competitive free market system at national and global levels. The second goal is to demonstrate how design emerged as a powerful tool for corporate and cultural identity and finally to understand some of the basic influences on the formation of design theory and practice reinforcing precedent in design. Second half of the course presents a visual history of fashion from ancient Egypt to the present with particular emphasis on recent history from the mid nineteenth through the early twenty-first centuries. Students analyze historical periods and their influence on contemporary fashion, culture, and society.

Studio I Processes and Applications (4 credits) - Studio focuses on teaching skills of flat pattern making and draping for incorporating electronics and technology. Development

of basic and torso muslin and slopers are taught with attention to patterning and construction techniques. Draping, bodice contouring, and one-piece sleeve variations are applied in a real world garment project for new technologies. Final garment and presentation required.

Fashion Technology (3 credits)- Students are introduced to professional standard sewing machines techniques and apparel construction.

Through assignments, the techniques are applied to produce finished garments. Emphasis is placed on the creative aspects of design and innovation. Students gain tangible grasp on what is expected and how the creation of a garment occurs conceptually. Course is a continuation of fall semester.

English II Rhetoric and Composition - core

Geometry and Trigonometry – core

Module 3

Second Year, Fall Semester

Materials and Processes I (3 credits)- Hands-on course introducing the student to the nature of materials used in industrial and fashion products and the various processes by which they are formed. Films, lectures, and field trips familiarize students with traditional processing of fabric, wood, metal, and plastic materials as well as emerging developments in advanced fabrication processes such as injection molding, vacuum press, sewing machines, irons, laser cutting, 3D printing, 3D body scanning, CNC, manual mill and stereo lithography. Emphasis is on the study of material characteristics and the appropriate use of manufacturing methods. The course includes an introduction to

technical information, research, design specification writing, Auto CAD, and professional communications.

Studio II 3D Ideation and Development (4 credits) - Course explores the development of basic level apparel through draping principles on the 3D dress form. Students are given objectives and project constraints/objectives. Students study the process of designing through creating their own garment. Studio also concentrates on teaching model-making skills, including equipment, materials, processes and finishes, and how to incorporate them into the garment. Course explores product aesthetics and form issues as they pertain to design communication. It integrates the principles of 3D design, drawing, and prototyping as they apply to the generation of product form from gesture, volumetric, form studies, and working models to final conceptualization and ideation. Emphasis is placed on issues that dictate the form of garments and their creation. Final product and presentation required.

Human Factors (3 credits)- Introduction to the general field of applied human factors. Centers on anthropometrics, perception, and human-machine interaction, and provides an introduction to the practice and roots of ergonomics, focus groups, market research, and special considerations. Over the course of the semester, the focus shifts from the application and use of existing factors and data to the generation of new studies and data.

Fashion Illustration (2 credits)- Course explores many aspects of fashion illustration and rendering, from basic frame applications to fully finished spreads, windows, and professional advertisements in color. Course addresses fashion illustration of both designers and of fashion illustrators and examines the role of fashion drawings and

renderings in all areas of the fashion and industrial design industry. Second half of course examines photography, layout, and effectively capturing garments in slide portfolios.

Principles of Marketing – core

Module 4

Second Year, Spring Semester

Materials and Processes II (3 credits)- Class is a hands-on course introducing the student to the nature of materials used in industrial and fashion products and the various processes by which they are formed. Films, lectures, and field trips familiarize students with traditional processing of fabric, wood, metal, and plastic materials as well as emerging developments in advanced fabrication processes such as injection molding, vacuum press, sewing machines, irons, laser cutting, 3D printing, 3D body scanning CNC, manual mill and stereo lithography. Course emphasis is on the study of material characteristics and the appropriate use of manufacturing methods. The course includes an introduction to technical information, research, design specification writing, Auto CAD and professional communications. Course is a continuation from fall semester.

Studio II Solution Design (4 credits) - Course focuses on creative problem-solving techniques using drawing, sketch modeling, and basic shop skills. Students are exposed to a wide choice of materials that Technofashion Designers use to move their projects forward. Students will document their projects for their professor and presentation purposes. Emphasis is placed on the improvement of craftsmanship and solving some real-world product problem in final solution. Second half explores the development of intermediate level apparel styling and pattern drafting principles. Students draft and execute professional standard pattern methods, measurements, and advanced rub-offs.

Students are given objectives and project constraints/objectives. Students study the process of designing through creating their own garment. Final garment and presentation required.

Design and the Computer (2 credits)- Course teaches basic techniques of Adobe programs, Photoshop, pattern / flat pattern making on CAD, Illustrator and Image Ready through assignments and tutorials. Emphasis is places on photo manipulation and layout/graphic design skills with a final project due which incorporates all skills learned. Students explore fundamental principles of typography and explore issues of composition, structure, meaning, hierarchy, and design process. Students have access to 3D body scanner and other computer-based applications. Emphasis is also placed on concept development and methods of presentation and processing information.

Computer Modeling (2 credits)- Course teaches Rhinoceros and Flamingo or other dominant 3D modeling program. Emphasis is on learning techniques to demonstrate design in computer generates images through the use of plug-ins, projects and tutorials. Exhibition of final models concludes course.

Wearable Technologies (3credits)- Course introduces students to the world of both hard and soft wearable technologies. Students are given bases in understanding function and workings of leading and emerging wearable technologies. Emphasis is placed on incorporating technologies into garment design and conceptualization.

Module 5

Year Three, Fall Semester

Studio III Innovative Design (4 credits) - Explores the development of advanced level apparel styling and pattern drafting and draping principles. Students draft and execute

professional standard pattern methods, measurements, and advanced rub-offs. Attention is focused on creating something new and innovative, derived from understanding consumer behavior, needs and wants, and expressing that in graphic, logo, marketing, and final product. Emphasis is placed on user needs, ease of use, inventiveness and product culture, and market placement without ignoring the practicalities imposed by manufacturer's markets, manufacturing process constraints, and investment concerns. Students build on skills learned and begin to control the process of design to develop meaningful concepts that employ appropriate technology for their eventual realization. Final product and presentation required.

Electronic Textiles (2 credits)- Course introduces students to electronic textile and advanced fabrics. Course examines the function, processing and manipulations of fabrics treated or coated with electronic wiring and circuitry. Fabrics can act as transmitters, panels, screens, batteries, sensors, and an array of other applications; students are taught the proper use and production of each.

Contemporary Design (2 credits)- Course examines cultural anthropology as a history exploring presents issues, ideas, trends and movements in modern design. Objective is to encourage an active exchange of ideas and information which broaden concepts of design, develop a clearer understanding of the relationship of design to society and contemporary culture, strengthen critical and creative thinking skills and gain greater familiarity with a wide range of contemporary design work and related design issues.

Communications, Public Speaking and Presentation – core

Psychology or Sociology – core

Module 6

Year Three, Spring Semester

Ambient Technology (2 credits)- Course introduces students to wireless technologies for garment application and pervasive computing. Focus is on wireless and Blue tooth technologies that aid in disconnecting any constraints that are attached to wearable technologies. Assignments encourage students to seek solutions that promote ultimate mobility by incorporating technologies into clothing that are themselves woven into fabric of everyday life until they become indistinguishable from it. Project proposal required at conclusion.

Studio III Collaboration Design (4 credits) - Course projects are chosen to give students an opportunity to work in teams using their creative, technical, and theoretical skills in a business application. Course explores the development of advanced level apparel styling and pattern drafting and draping principles. Students draft and execute professional standard pattern methods, measurements, and advanced rub-offs. Students are given objectives and project constraints/objectives. Students study the process of designing through creating their own garment. Emphasis is on the use of a systematic process for the design and development of products that are useful, usable, desirable, and feasible. Attention is also given to group dynamics, methodology and interaction with engineers and engineering students, marketing and graphic design students, and other professionals who influence product development process.

Professional Practice (3 credits)- Course reinforces design management skills providing working information regarding the establishment of various business organizations, financing, codes, contractual agreements, and taxes, marketing, patent and copyrighting. Real world applications and professionals will supply supporting information and

opportunities including case studies and sample situations to assist students in understanding designer client relationships, design protection, business operations, financial management, and personal marketing in the form of cover letters, mock interviews, presentations, resumes, business cards, and business etiquette.

Current Trends and Forecasting (2 credits)- Focus is placed on current fashion and technology trends in the international market. Through group discussion and analysis of current videos and published fashion and technology materials, students produce reports on their own observations of the trends and how these trends relate to personal design developments.

Professional Portfolio(3 credits)- Students receive guidance in the creation of their professional portfolio with emphasis on creating a branding package including resume, cover letter, business cards, website, teaser and presentation portfolio, both physical and electronic. Students identify their specified career goals and prepare their portfolios accordingly. Presentation techniques such as illustration, photography, typography, and layout are taught with consideration of intent, syntax, and problem definition.

Module 7

Year Four, Fall Semester

Sustainable Design (1 credit)- Course exposes students to sustainable practices in design including green design, renewable resources, product lifecycle, and cradle-to-cradle design philosophy. Emphasis is placed on man and technologies diverging relationship and the social/ethical duties and responsibilities of Technofashion designers. Final sustainable product proposal and journal with daily entries required.

Studio IV Sponsored /Corporate (4 credits) - Sponsored studio deals with working for an external company or business. Course gives students an opportunity for interdisciplinary teamwork with a real entity that has real financial specification, market, and time constraints. Presents the skills necessary to create advanced shapes and designs directly on the dress stand rather than by using basic blocks or slopers. Students work with three different fabric types to learn the use and manipulation of fabric and three different models to learn the variations in fitting procedures. They then develop the pattern from which the final garments are made. This course is highly recommended for undergraduate students preparing for their senior projects. Individually defined projects allows for self-directed in-depth study and analysis. Students are encouraged to do one individually defined project for the company and one dictated by the client. The course gives real world experience in a real world environment. Final products and presentation to clients are required.

Arts Elective (Drawing, Technical, Drawing, Painting, Sculpturing, Drafting, Printmaking, Jewelry, Making, Ceramics)

Publishing Elective- Web design and Computer Animation (Flash, Shockwave etc.) Advanced Illustrator

Module 8

Year Four, Spring Semester

Special Topics in Technofashion Design (1 credit)- The topic of this course varies from quarter to quarter. Each seminar focuses on various issues in the field of fashion and technology and allows students an opportunity to examine issues that effect designers such as ethics, sustainability, green design, design philosophies and ideology, current

events, and modern movements. Attention is placed on the implications of technology on man and vice versa with effects of technology on culture and social structure, basically the consequences of integrating technology into fashion. Goal of class is to create socially responsible and conscious students.

Senior Thesis I (3 credits)- The first in a three-quarter sequence of courses in which the student focuses on conceptualizing an original 2D collection specializing in a major area of design, a type of Senior Thesis. Students explore identifying customer profiles and technologies, researching major areas of specialization, sources of inspiration, and fabrication selection. The student will develop portfolio-ready technical sketches, illustrations, flats, storyboards, color storyboards and fabric swatches.

Senior Thesis II (3 credits) - Students in this course develop skills necessary to create advanced sample garments and technology specifications and function. The emphasis is on the production of the first sample muslin or prototype through the application of advanced draping and pattern drafting techniques. Students work with fit models to learn the various fitting procedures used in the industry. Pattern alterations, technologies, and manipulations are demonstrated in class to show how alterations are processed and corrected on the paper pattern. Presentations of final muslins are critiqued prior to the development of final garments.

Senior Thesis III (3 credits)- This course is the final in a sequence of three that permits advanced fashion students the opportunity to produce a senior collection of first sample garments in the selected fabrics. Industry standard construction techniques are applied in the execution of the student's final collection. The collection should be the culmination of everything learned in the TFD program. Portfolio quality presentation boards support the

collection and are all displayed at the Senior Exhibition held at University Art Museum Fashion Show, showcasing senior work.

Computer Modeling Elective - Advanced Rhinoceros (Flamingo, Penguin, etc.) Studio Max, Solid Edge

Technical Approaches and Subset

Technofashion Design can be defined into differing techniques and subsets that encompass the broad spectrum of this particular design field. Each of these subsets may be chosen by students for further investigation or independent degree focus. While techniques may differ, they all represent and advocate the effective merge of fashion and technology.

Intelligent Fashion- Intelligent Fashion main category of Technofashion that deals with integrating technology into clothing, intelligent wears.

Electric Textiles- textiles that blend technology into weave for functional purposes can act as switches, screens, power sources, and transmitters. Electric textiles are a main part of main Technofashion discipline and Intelligent Fashion.

Fashion and Environment- fashion that becomes or interacts with the environment in some way or form twentieth-first century bodies deals with altering the physical body with technology, internally and externally.

Surveillance- garments meant for data collection or observation; includes garments that increase isolation and alienation.

Transformables- clothing that transforms into other objects or serves multiple purposes.

Sportswear- sports clothing that uses unique weave, finishes and treatments on garments to heighten performance, lifespan and maintenance, seamless, non-wrinkle, spill-proof, etc.

The Design Process, Three Parts

The main tenants for the Techno fashion design process focuses on the function of the apparel and technology blend. It is in the effective use, function, and intent of a garment that the effective integration of fashion and industrial design occurs. The garment should engage with the human body in a comfortable and aestheticized form that benefits the user, the environment, and technology. The curriculum should present these guidelines and design process in a manner that exemplify inherent mobility and communicative ability and use the rubric of science to amplify these, bringing technology under the control of the wearer. A designer using the circular design process and systematic tools should note fashion trends in the current market as learned through modular academic career, taking both fit and function into consideration.

Design Research

1. Identify the need for the garment or the specific function desired of the garment. Decipher between needs and wants of the consumer or hirer. The designer must consider the user, the garment, technology and the environment.
2. Decide on objectives for technology and garment blend, a needs assessment and evaluation. Set goals and limitations on a design with emphasis on design strategies.

3. Collect and produce research on wearable technologies that are applicable or necessary to garment specifications. Patent research, questionnaires, market studios and competitor's products.
4. Train yourself in the operation or environment of technologies and the user, including sewing, technical approaches and other techniques.
5. Create a problem statement with clear objectives, needs, and considerations.
6. Create a performance criterion in order to justify use and complete an assessment of garment success. Set these objectives with relevance to human, technical and production functions.
7. Create two-dimensional design studies including gesture, thumbnail, sketches and flat patterns.
8. Create three-dimensional design studies including model, draping, flat patterns and mockups. Models should be quick, more detailed, appearance and finally a prototype.
9. Generalize anticipated needs, constraints, and setbacks. Break down the product into its simplest form.
10. Address product and garment from a systems approach that encompasses the environment, user, and technology. Use of interaction diagrams and tables will clarify needs.
11. Analyze and classify all pertinent information in a manner that makes research congruent and orderly.
12. Define constraints as posed by user, environment, and technology. Set parameters.

13. Formulate a hypothesis of objectives and expected outcomes. Exhaust all ideas, concepts, and patterns, and create visual conception of the final garment.
14. Narrow design specifications that advocate the seamless blend of fashion and technology in a manner that facilitates the main objective.
15. Research patterns that further facilitate the objective of the garment that are new, innovative, and user-friendly. This includes trend forecasting, styling, and current market conditions.

Development

1. Two-dimensional conceptualization and ideation. Offers a quick way to portray ideas and convey intent. Quick fashion and technology illustrations.
2. Flat pattern making. Line drawings make development of garment practical and understandable, especially for mass-market conception.
3. Three-dimensional muslin draping, fitting and construction. Helps designers' vantage the validity of design changes and alternatives.
4. Draping of final patterns, cuts, and sections. Designer get an understanding of what processes and equipment will be needed.
5. Pattern forming to check volume, length and seam allowances.
6. Design alternatives to the design in form and function. Remember a combination of alternatives will lead to a cohesive solution.
7. Key models created in full-scale muslin help designer realize any aspects overlooked in the design process.
8. Analyze alternative solutions to see if goals are met and that concepts meet the performance criteria.

9. Validate hypothesis through sketches, models, draping and testing. Emphasis is on documentation and comparative analysis.
10. Evaluate best solutions. Test the best solution from prior models and illustrations
11. Cultivate variations. Consists of model fragments, models, sketches used in case one particular design may not be producible.
12. Prototyping. Original make of the garment with no substitutions or changes.
13. Simulate actual technological performance, environmental performance and user performance. Synthesis and evaluation.
14. Fittings.
15. Alterations of garment to specifications.
16. Testing of garment in actual use.
17. Redesign and refine details to perfect all visual, tactile and contextual details.

Communication

1. Croquis of design aesthetic.
2. Analyze prototype for production planning, communicate ideas for sewing while keeping design integrity.
3. Finalize graphics for flat patterns, production, labels, sales and use.
4. Finalize marketing strategies and trend forecasting.
5. Design report. Write up all aspects of work and files with all drawings and work. There are always signatures and dates on all documents.
6. Present findings both visually and orally. Idea is to sale the design through all means used and created.
7. Productions, distribution, use and final added documentation.

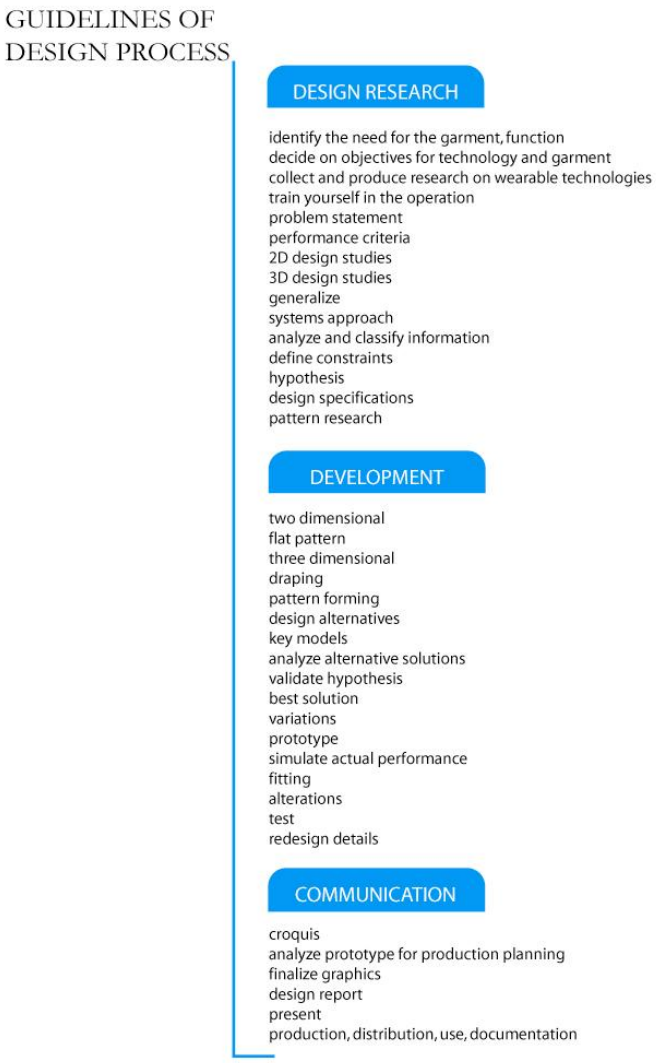

Figure 15 Technofashion Circular Design Process

Systematic Tools and Techniques

1. Preliminaries are an introduction to the desired needs as posed by a design house or company. It's specific and tailored to an individual project. The brief is defined as a form of communication that informs designers as to their duties and obligations, includes limits and goals. If enacted as a contract, it is enforceable by law and can be a letter of agreement, proposal contract, legal contract, flat fee/fixed fee, retainer, royalty and non-disclosure agreement.

2. Dossier is an introduction to the needs and wants as specified for the garment. It includes background information, trends, and particulars of a targeted consumer.
3. A function criterion includes the specific need or objective of technological advantage the garment poses. Technofashion is only effective when said garment has an outlined and specific application for technology.
4. Ideology and guidelines of Technofashion stipulate that garments include user, environment, and technology in a way that advocates mobility and communication. A review of these help designers remain focused on design parameters.
5. Design process includes the Circular Design Process employed in the creation of a technology-blended garment. Include design research, development and communication.
6. Croquis book is an explicated book of illustrations that capture the look and over all aesthetic of a particular design challenge. Includes the look, fashion illustrations, technologies, and fabric swatches.
7. Cost checklist includes the cost of specific tasks involved in a project. Allows for the assessment of time and money. An itemized checklist of activities to be done, the people who will be doing them, the rates to be paid and time expectancy.
8. Scheduling of steps to be taken and activities to be initiated. Schedule should be comprehensive and help the designer to plan, coordinate, and track time specific tasks. Examples are a Gantt and Pert chart.

9. A Performance Criterion refers to both qualitative and quantitative standards that solutions will be evaluated by. It should state what the solution should do and the characteristics that need to be addressed for the solution.
10. Technology research should include all wearable technologies and technology transfers that will facilitate in the garment creation. Research will be the foundation of the design creation.
11. Technology application and processing defines the specific functioning of technology, how it works, how it relates and how it will evolve in the future. Application and processing will help a systems approach explicate in a real manner.
12. Interaction Matrix is a chart that demonstrates how parts of a garment interact with other parts of the garment. Chart prioritizes the design sequence of the product.
13. Interaction table is a chart that tracks the interaction between the user and its environment. Should include the user, technology and environment.
14. A hierarchical tree structure allows designers to see how components and parts of a product are broken down.
15. Morphological matrix lays out main functions of an item that broaden ideas for possible solutions.
16. An analysis or evaluation checklist allows for viewing key factors required for the effective integration of fashion and technology.
17. Brainstorming is the generating of creative ideas as to solutions and possibilities. They can be blue-sky or refined ideations.

18. Flow charts show all of the possible paths that may occur during the completion of a product's operation.
19. A sequence of use chart delineates the operations and uses of a garment in the order they are required to occur. It can use images to illustrate these procedures.
20. Storyboarding included creating thumbnails of the product's use, expected use and interaction with its environment.
21. Draping includes draping muslin over a form in the creation of patterns for the final garment's making. Draping is the most important aspect of determining seams, allowances, and fit.
22. A questionnaire is a series of questions about a product that are administrated to understand a market's needs and wants.
23. A comparative product analysis is a comparison of products currently on the market that occupy a specific segment that is targeted by a particular design. Includes price, make and product information, and relevance.
24. Related technology analysis is similar to a comparative product analysis but it examines technologies that are currently serving in sectors that could be benefited or replaced by a technology fashion merge.
25. Flat pattern forming is the research and creation of a flat pattern for sewing and mass marketing purposes.
26. Production analysis of existing products examines the creation of current garments and also technologies that can be used in a garments specification. This step identifies designers with new technologies and processes that can be incorporated.

27. Fitting allows designers to refine the fit and proportion of a garment to ensure integrity of the garments overall aesthetic
28. Alternatives refer to other aspects or garment constructions that can alternated for production purposes.
29. Alterations are made when garments do not fit specific markets, ergonomics, needs, or aesthetics.
30. Multi patterning includes both flat and production patterns for garment constructions. These patterns should include croquis alternatives in CAD version.
31. Finishes examines finishes for garments including sewing, termination, stitch, fabric selection, and other technical applications.
32. Textile treatments refer to specific treatments in both color and texture that may be required for the completion or successful operation of a garment. These include conductive textile and other technological requirements.

Figure 16 Systematic Tools and Techniques

Chapter Five

APPLICATION OF A PARADIGM

Introduction to Using the Design Process

The use of the design process and tools work from a systematic standpoint that uses knowledge gained throughout a student's education under the Technofashion 4-year curriculum. The idealisms, methodologies, skills, and specific problem-solving skills should be incorporated when using the circular blended design process. For the purposes of this thesis a unique instance was chosen that would best demonstrate how the effective integration of fashion and industrial design could effectively benefit the user, experience, environment and use of wearable technology. To exemplify this best, the modern airport was chosen to hallmark how an effective merge of both industries could have real world benefits. The idea is to create a garment that will help a female between the ages of seventeen and thirty-five effectively navigate an airport expediently but effectively integrating fashion and technology design. A final garment created should be fashionable and marketable, using technology to heighten both mobility and communication. The reason this demographic was chosen is because, according to *Road and Travel Magazine's* 2006 female market research, women in this specific category influence 80% of all sales, comprise 40% of all air business travelers, and influence 80% of all luxury and family air travel. The ideals of the curriculum and the design process can be applied to any demographic for any instance, and the garment created will only reflect an example design for this specific sector. In following, a designer graduating in

Technofashion may design the same garment differently depending on their own cultivated design process. The curriculum is meant to act as a base of skills and design methodology that will aid a designer in creating a successful merge of Industrial and Fashion Design no matter the design problem, environment, user, or technology. There are multiple industries, organizations, and occupations that could benefit from said objective but for all intents and purposes, and for the efficient assessment and evaluation of this thesis's success, one field for inquiry was chosen. The process was used as the jumping off point for all design aspects for creating a garment that would help a user effectively and efficiently navigate the hectic world of air travel including processing, egress, identification expedience, and final departure and arrival. From a curriculum standpoint, all lessons and skills learned should be employed in the design process. The tools and techniques learned during in the Technofashion curriculum should be used to benefit the user and environment from a systems approach that takes all aspects of initial needs, considerations, and constraints into the design process.

Problem Definition

According to the Federal Aviation Administration (FAA), at a typical large airport in the United States over 100-million people can travel through in one year, creating logistical, egressional, personal, and environmental turmoil. As of 2006, Atlanta's Hartsfield International Airport, the busiest airport in the country besides Chicago's O'Hare International and Los Angeles International handles 2,400 flights every day (one flight every forty seconds, twenty-four hours a day). That adds up to 72 million domestic and 78 million international passengers passing through Hartsfield each year: 150 million annually. For purposes of thesis assessment and evaluation, Atlanta's Hartsfield

International Airport will be used as the sample environment for the Technofashion garment to be tested. Due to its size, occupancy load, and amount of traffic, this particular airport will serve as a determinate of the garment's effectiveness and thus the processes' ability to create an apparel blend that seamlessly merges the environment, user, technology, and fashion in a manner that benefits each.

To meet passengers' needs, an airport must:

- Be accessible by roadways and public transportation, including parking.
- Have areas for ticketing, check-in, and baggage handling.
- Keep the passengers and belongings safe.
- Offer food and other services.
- Maintain areas for the customs service, user experience and convenience.

A typical airport can be extremely difficult to navigate with processing sights, check-in, signage, transits, and a plethora of other happenings that make expedient navigation of an airport nearly impossible (see Diagram 7).

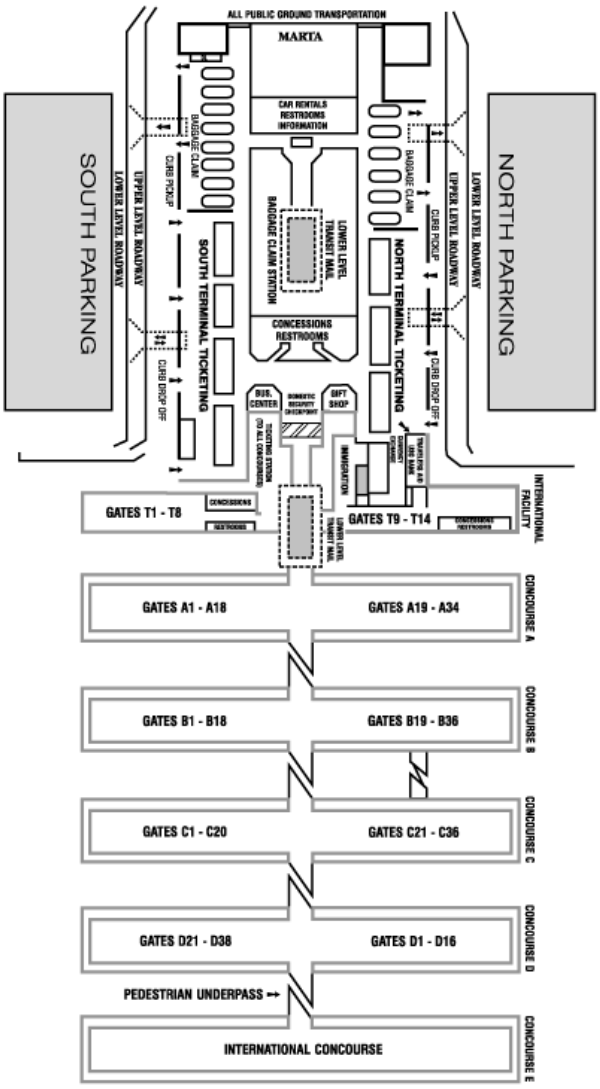

Diagram 7 Layout of Atlanta's Hartsfield International Airport

At Atlanta's Hartsfield International, 2,400 flights take off and land every day. That means every day perhaps as many as 300,000 people move through the airport and need certain services. These services occur at points of intersection throughout the concourses and terminals of the airport. Beginning in the 1970s terrorism has been a major initiator of airport security reform. In the aftermath of the September eleventh attacks on New York City and the Pentagon and the foiled attempt by terrorist to blow up ten American

flights from London, England to the United States, the FAA has had to change the policies and inner working of all airports. These changes have affected all aspects of the air transportation industry from where a patron can park to what an airline traveler can carry onto a plane (a complete listing can be viewed at www.tsa.gov). In a study done by FAA Enforcement Action in the face of modern terrorist risks, the amount of unruly passengers has gone from 146 in 1995 to 303 in 2005, mostly among women and has been attributed to heightened senses of fear and anxiety. Atlanta's Hartsfield Airport has 5.7 million square feet (529,547 square meters) of concourses and terminals-approximately 130 acres that must be secure, safe, and effectively help passengers reach their destinations successfully and without incident. According to new FAA regulations, concourse areas are accessible to the general public (passengers and non-passengers), but the gate areas are restricted by airport security to ticket-holding passengers only, especially during terrorist alerts. Airport security and/or customs lie between the concourse and the gates. It is in these particular areas of surveillance where the greatest time is consumed by the processing of passengers, tickets, and baggage. At Hartsfield's concourses, there are

- 75 food and beverage vendors (most of these are owned and staffed by private companies).
- 82 retail and convenience stores (also owned and staffed privately.)
- 21 airliner staffed service outlets.

With so many facilities, operations, and staff, it is imperative that passengers know exactly where they want to go, but more importantly where they need to be. On average, according to the FAA, it takes a passenger three hours to be processed at a given airport

with time allotted to parking, migration, processing of tickets, identification, security measures, baggage, and boarding. According to the Department of Homeland Security, 730 million people travel on passenger jets every year, while more than 700 million pieces of their baggage are screened for explosives and other dangerous items. Along with these measures, there are other aspects of airport security that must be evaluated to effectively ensure the safety of both passengers and airlines. The most important security measure at an airport is confirming the identity of travelers. Identifying passengers is done by checking a photo ID, such as a driver's license or other government-issued identification card, and if traveling internationally, a passport is required. Another key technological trend that promises to revolutionize airport travel and security is biometrics. Biometrics essentially means checking fingerprints, retinal scans, and facial patterns using complex computer systems to determine identity or if they match a list of people the government has determined to be potential terrorists. According to the FAA, a new system called CAPPS II could also help accomplish identification features. Computer Assisted Passenger Prescreening System, CAPPS II, will require more personal information from travelers when they book their flights, which will lead to a risk assessment of no risk, unknown risk, elevated risk, or high risk. Passengers considered to elevated or high-risk passengers classified accordingly will be further screened. Although the system has been delayed and is not yet in place, the Department of Homeland Security (DHS), predicts that CAPPS II, and the use of biometrics which uses physiological or behavioral characteristics to identify people, will make check-in faster for the average traveler by year 2015. Biometrics promises to aid the expedience of air-travel processing because it can recognize, face, fingerprints, hand-geometry,

handwriting, iris, retinal, vein, and, voice patterns. Another key feature of airport security is that all public access to an airport is channeled through the terminal, where every person must walk through a metal detector and all items must go through an X-ray machine, further detecting any suspicious items or hazardous materials.

Research Considerations

Investigation into solving this design dilemma was a three-pronged issue that incorporated the environment (airport), the user (passenger), and technology (wearables). In researching possible solutions, it was imperative to take each factor into consideration.

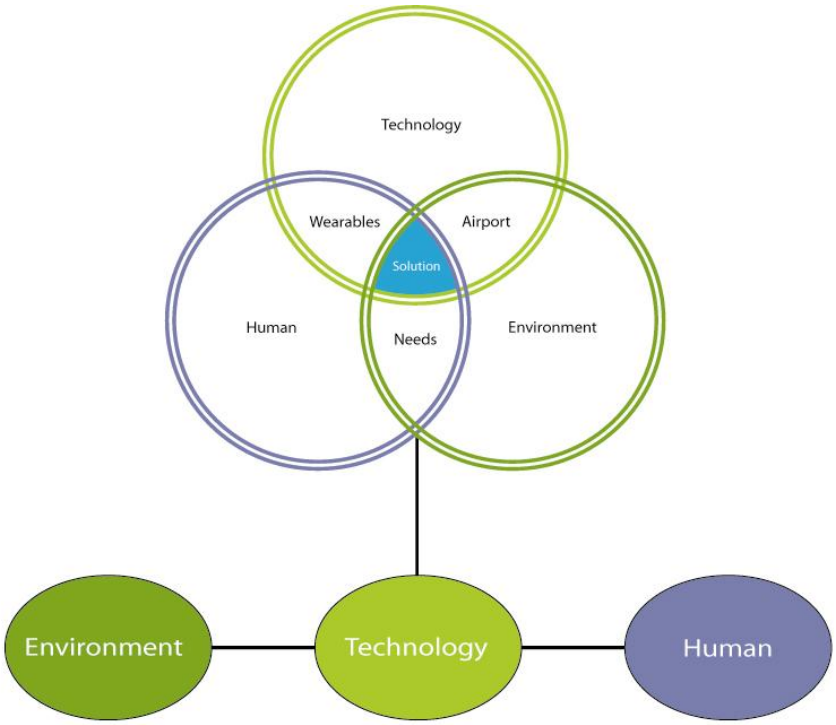

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Diagram 8 Interaction Diagram Between the Environment, Technology and the User. Where all circles meet is where the major solution is formulated, lines delineate prevailing relationships.

Considerations of the Environment

Arrival:

- Parking and transportation to terminal
- Navigation of terminal and concourse signage to specific airline check-in
- Baggage check rules (amount and weight)
- Timing regulation, ninety minutes prior to departure

Identification:

- Passenger identification and photo indication
- Ticket check-in (counter and curbside), e-ticketing, kiosk systems and credit card identification (six hours prior to flight time); Boarding pass and identification must be visible through out the security checkpoint
- Expedient processing of credentials, verification and boarding
- Carry-on stipulations (size and weight)
- Storage of personal belonging pre and post security checkpoint

Processing:

- Security checkpoint line
- Rules and regulations
- Presentation of identification
- Remove shoes (expedience and protocol)
- Remove outerwear (expedience and size)
- Place all items, carry-on, metal and electric in bins to be x-rayed and inspected
- Carry-on stipulations (no liquids, gels, lotions or similar; even if purchased after checkpoint, items cannot be brought onto the aircraft)

- Passenger inspection through metal detector
- Carry-on and belongings pickup

Migration:

- Transportation from security checkpoint to specific designations and gates
- Signage for navigation
- Internal subways, trams, and people movers

Considerations of the User

- Health concerns (germs, bacteria, equilibrium, etc.)
- Updated information on flights, gates, threats and changes
- Social and psychological affects
- Expedient egress, mobility
- Personal, identity, and baggage safety
- Introversion/extroversion of passenger
- Communication (internal and exterior)
- Anxiety and comfort (warmth, colors, etc.)
- Physical, emotional and perceived safety, and comfort
- Information access
- Status quo stylization, fit, and fashion
- Marketability

Considerations of Technology

- Washability
- Convenience
- User-friendly

- Increase mobility and communication
- Economical and durable
- Inconspicuous and attractive styling

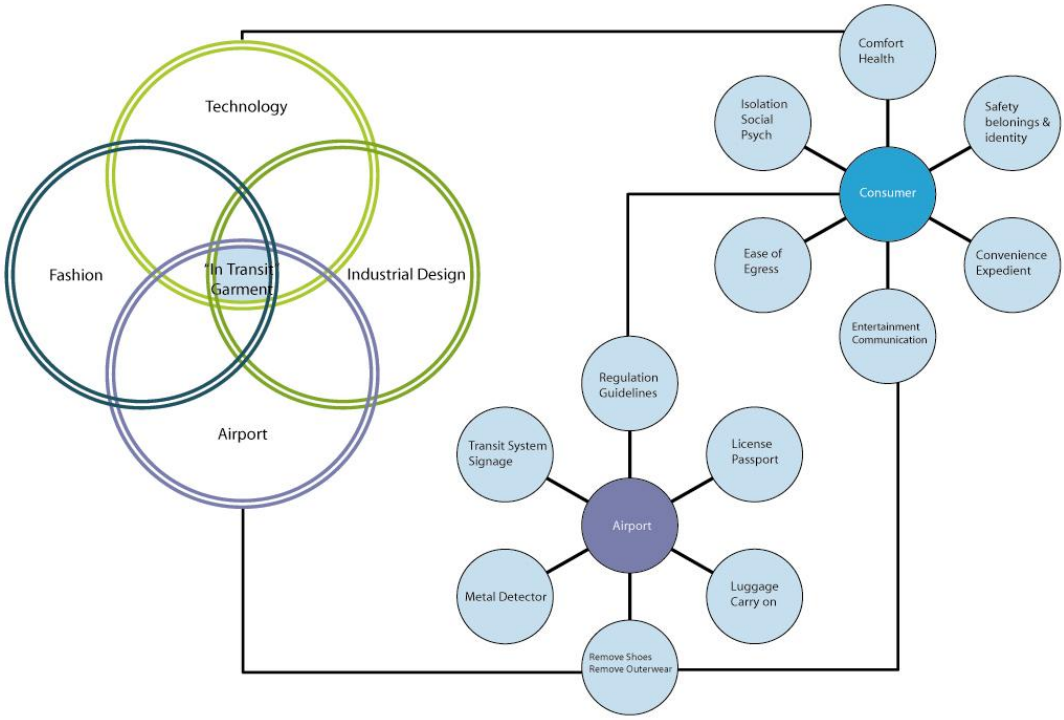

Diagram 9 Needs Assessment of User and Environment. Depicts the factors which influence each, lines delineate prevailing relationships and considerations.

Applying a Curriculum and Design Process

Conceptualization and Ideation

Figure 17 Preliminary Sketches

Figure 18 Silhouette Inspirations

The empire trumploid shift silhouette was chosen because of its ability to adapt to a multitude of female body shapes. This silhouette creates a perceived waistline that is

flattering and comfortable. Fashion forecasting and trend spotting suggest that this silhouette will be extremely popular within the next ten to twenty years. As a silhouette, it has had major fashion influence since the 1940s, transforming from flapper dress, to the drop waist of the 1950s into the infamous baby doll dress of the 1960s and 1970s. In the 1980s the silhouette shifted to high wasted pants and then robust belts and pockets in the 1990's. Today the silhouette is stronger than ever and has been hallmarked by the trumploid belt. The overall look is classic and clean yet modern and fashion forward. A shift empire waist also allowed for storage possibilities that would be inconspicuous and optimal especially for a traveler. Fabrics selected also reflected the idea of comfort and luxury with muted colors in fleece and canvas.

Figure 19 Concept Explorations

Figure 20 Concepts

Figure 21 Refined Concepts

Creation

In draping the initial pattern it was important to consider the user when creating the cuts and seam allowances. To ensure ultimate comfort most patterns cut are done on a bias fold to allow for movement and shifting. Having selected fleeced to work with it was important to use a straight stitch with a one half-inch tension. For the bottom, collar and cuff a roughed fleece with micro-elastic is used with a zigzag stitch to add support and structure while still allowing for movement and alteration. The final patterns are simplistic yet calculated making mass product easy but allowing the final product to look rich and expensive though its seam directions, structure and fabric selection. The patterns can be sized or altered to fit specific needs of individuals or a mass market.

Figure 22 Draping

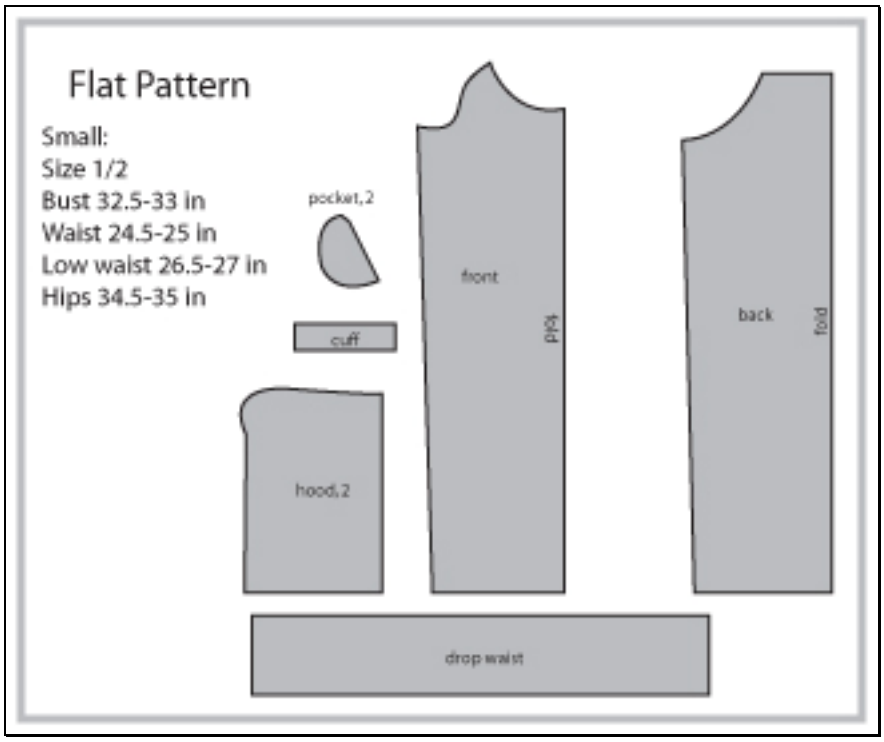

Figure 23 Flat Patterns

Figure 24 Initial Sewing

Figure 25 Initial Alterations

Figure 26 Basic Form Constructions

The construction of the pockets and hoodie are designed to cater to user needs and wants. The hoodie is exaggerated so that it may be folded up and snapped and act as a neck rest while also being functional as a hoodie when patrons want isolation. Pockets are sized and placed in a manner that helps passengers to carry an optimal amount of items in the most inconspicuous way. The measurements and color selection are all chosen to add in the psychological aspects of air travel to keep passengers comfortable, calm, and feeling in control, some of the key reasons individuals become unruly on airplanes. A muted steel gray in fleece with black accessories was selected for the final solution that exudes comfort, structure, softness, and warmth.

Figure 27 Convertible Hoodie Detail

Figure 28 Final Silhouettes: Shift Hoodie with Empire Trumploid Belt

Solvency

A key detail of the garment is its ability to hide items. The trumploid belt also functions as a compartment holder for necessary identification items, including fight ticket and itinerary, passport, credit card for kiosk check-in and government issued identification card for photo indications. The garment blends both technological advantages as well as tangible practical technologies. The FAA suggest that until 2015 physical evidence of identity will be required for flight travel, so the garment takes into consideration the immediate needs of navigating an airport while also solving and recognizing those in the near future.

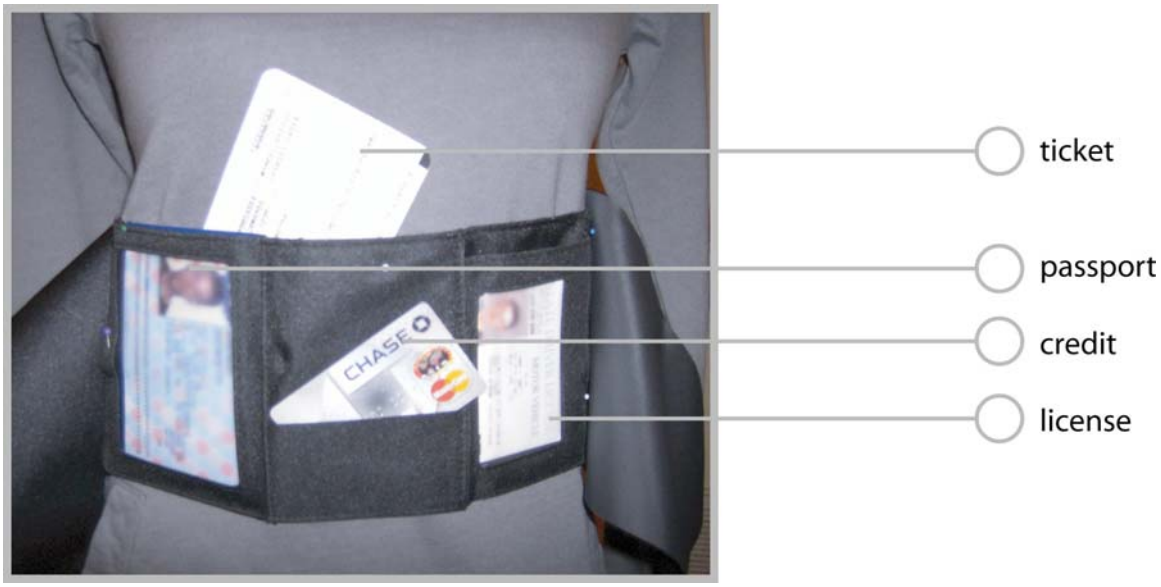

Figure 29 Compartment Detail

Figure 30 Hologram Detail

The hologram identification system automatically recognizes passengers and flight itineraries. This works through a wireless data retrieval system that is activated by individual light pattern interferences that are picked up by the ambient unit, this technology is currently being used for registering pilots and flight attendants and can easily be transferred to preferred customers. Upon entering the Airo garment-processing area the hologram is picked up by the blue tooth identification system, automatically logging you into the system. The hologram identification system makes checking in expedient, error proof, and convenient. A study conducted by the FAA estimates that check in takes an average passenger three hours, with the Airo garment processing time could be cut down to one hour or less.

Figure 31 Garment Interface Detail

The garment is outfitted with a personal data assistant, PDA, which is governed by Airo wireless server. Once in the Airo processing gate a passenger is issued a flash drive that connects to their wearable interface. The hard drive, interface and earpiece are connected through a conductive fabric track. Being a fabric controller, the screen is a small flexible organic light emitting diode screen that is powered by a small battery and is completely washable. The touch screen and buttons are a poly resin blend that is also washable. This technology has been developed by Burton Inc. and Apple and is currently being tested for its application into garments.

Figure 32 Interface Phases

The interface itself keeps passengers aware of their surroundings and schedules. A traveler can check their flight itinerary, times and if any changes have occurred. Included on the PDA is a map of the airport and points of interest. An inner terminal radio station can also be accessed that plays music and updates passengers on changes, updates or other pertinent information such as terrorist alerts or flight cancellations.

Figure 33 Accessories Detail of Earpiece and Gloves

An earpiece is connected to the PDA through a conductive ribbon and allows travels to listen with clarity to the Airo radio frequency but also be aware of their immediate environment and surroundings. Gloves are fitted with a thermal grip that helps users grip luggage and handles in the transit units that transport passengers at speeds up to thirty miles per hour from terminals to gates to concourses. Having hand protection is also

beneficial for negating the transfer or germs, disease and bacteria that may linger on airport equipment, kiosks or other furnishings.

Diagram 10 Needs Assessment of Airport and User as Within a Systems Approach. Blue areas denote Airo Processing areas and white circles indicate individual checkpoints. Green indicates an airport terminal with gates, security checkpoints, and points of interest. Images contained within gray squares are Airo garment Processing signage.

Methodology

The Airo garment works best when seen from a systems approach that incorporates technology and the environment. Once entering the Airo processing area passengers are directed to hard drive check in and/or garment purchasing and depository. After installation passengers may bypass security checkpoints as their hologram identification automatically enters them into the airport database. In the Airo processing gate passengers take booth retinal and fingerprint scans and are then allowed to move to their final departure gates. The process is streamline and efficient moving passengers through at a rate two thirds faster than conventional check in. When returning, passengers of Airo enjoy a separate baggage claim that is located adjacent to the hard drive drop off. The idea of navigating an airport expediently is a major incentive for purchasing, and using the garment, especially for the particular demographic selected for this design criterion. The system is one that advocates the efficient egress of an airport but also ensures ultimate security for the passenger, luggage, and the airport.

Figure 34 Airo garment Signage

Comparative Product Average Analysis	Travel belt	Hoodie	PDA	Headset	Instant Access Card	Gloves	Hologram ID
Product							
Price	$5-15	$20-35	$100-400	$15-30	$150-200	$10-40	$100-250
Placement	Common	Common	High end	Common	Exclusive	Common	Exclusive
Materials	Plastic, fabric, leather	Fabric, zipper, plastic	Plastic, metal, glass	Plastic, fabric, metal	Plastic, metal	Fabric, plastic, leather	Plastic, light interference pattern

Table 1 Comparative Product Analyses. Research done demonstrated the differing technologies included within the garment, showing how merging them has beneficial and economical benefits for the user and manufacturer.

Creating a Design Process and Curriculum for the Effective Integration of Fashion and Industrial Design		Parameter	Performance Criterion
Human Function	Practical Physiological	Production costs	40-50% of retail price
		Price	$50 added to ticketing price
		Size	Sizing varies on user
		Weight	Less than one pound
		Cut	Contour, Shift Hoodie
		Method of protection	Sewing
		Maintenance	Machine washing
	Cultural Aesthetics	Color of garment	Heathered grey
		Color of interface	Halographic
		Color of accents	Black
		Color of buttons	Clear
		Color of LCD readout display	Black, grey, blue
Technical Functional	Direct	Material for garment	Fleece, cotton
		Material for accessories	Neoprene
		Material for LCD Screen	Flexible, thin clear plastic, LCD panel
		Material for buttons	Resin
	Indirect	Durability of garment	Withstand 1000 washes
		Durability of interface	Withstand 1000 washes
		Duarability of accessories	Withstand 1000 washes
		Durability of buttons	Withstand 1000 washes and 10lbs of impact
Production Function	Manufacturing	Production of garment	Sewing
		Production of interface	Light interference pattern
		Production of buttons	Injection mold
		Production of accessories	Sewing
		Method of assembly	Assembly line sewing
		Optimun use of materials	Assembly line sewing, injection molding
	Planning	Market distribution	Limited world wide
		Bulk packaging method	Box containing 25 units
		Bulk packaging graphics	Images of product, environment and technology
		Primary advertising	Television, independent airport, internet

Table 2 Performance Criteria. Criterions may be changed depending on specific needs of a manufacturer or clientele depending on individual design and market trends.

	Environmental elements								Human elements					
Product elements	Airport	Pressure	Rain	Temperature	Air	Sun	Humidity	Score	Hand	Mouth	Body	Sweat	Oil	Score
Garment	O	O	O	O	O	O	O	7	O	O	O	O	O	5
Interface	O	O	O	O	O	O	O	7	O			O	O	3
Accessories	O	O	O	O	O	O	O	7	O					1
LCD Screen	O	O	O	O	O	O	O	7	O			O	O	3
Head set	O	O	O	O	O	O	O	7	O		O	O	O	4
Buttons	O	O	O	O	O	O	O	7	O			O	O	3
Harddrive	O	O		O	O		O	5	O		O	O	O	4
Circuit board	O	O		O	O		O	5	O				O	2
Battery	O	O		O	O		O	5	O			O	O	3

Table 3 Interaction Matrixes. Delineation demonstrates the interaction of various parts of the garment and its interaction with the environment and human. Diagram further investigates needs and considerations.

Finalization

Figure 35 Final Garment

Figure 36 Modeled Garment and Advertisement

Conclusion

In conclusion it was found that all the knowledge gained within the curriculum and design process could actively be incorporated when trying to solve a design problem that required the effective merge of Fashion and Industrial Design. All skills and knowledge that would have been in theory gained through the curriculum were employed and effectively advocated and facilitated in the seamless merge. The fields of Industrial and Fashion Design can not by themselves incorporate all of the knowledge and skills needed to effectively merge fashion and technology in a manner that is user, environmental and technologically considerate, functional, and fashionable. Thus, it is the conclusion of the study that the created discipline of Technofashion Design incorporates all the knowledge needed to effectively blend technology and fashion, creating designers and students that can meet the needs of a technology laden future that takes the needs and considerations of users, environments, technologies, markets, and manufactures into consideration.

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APPENDIX

Sample of questionnaire given to department heads of schools evaluated.

University Name

INTERVIEW
TRANSCRIPT

1

Date and Time
Dept. Head
University Dept. Head

1Q. What is the single most important attribute a student in your department needs in order to succeed in their field of study? Why?

2Q. What is the prevailing design theory or idealism of your school--is it more artistic or technical based?

3Q. If posed a design problem to create a new/redesigned product, what do you do first?

4Q. When creating a product, what would you consider to be the most important step in the design process, from a curriculum standpoint?

5Q. What do you think are the common threads that run through Industrial and Fashion Design? What are the similarities and differences in your opinion?

6Q. In your particular design world, what is beauty? How is it defined by your field of study and by you?

7Q. If there was a curriculum that tried to merge the worlds of Industrial and Fashion Design, what are the most important aspects or ideals you feel should be incorporated and not lost?

GLOSSARY

Archetype- thought pattern that finds worldwide parallels, either in cultures or individuals. Such images and ideas are stereotypes that reside in unconscious levels of the mind and are inherited.

Arousal- to awake the senses, stimulate to action or to psychological readiness, urge to gratification.

Avant Garde- a term for the most daring of experimentalist's movements, innovation of original and unconventional designs, ideas or techniques during a particular period.

Beauty- quality or aggregate of qualities in a person or thing that gives pleasure to senses and gratification on a physical and psychological level, associated with sex, immortality, perfection, achievement, and happiness.

Collection- manufacturer or designer’s group of garments that have continuity or main theme; a line accumulated for presentation comprises a collection.

Constructivist curriculum- cognitive processes orientated curriculum; based on findings of cognitive psychology, it emphasizes depth, not coverage.

Couture- the French word for fine sewing, used to describe high fashion.

Curriculum- a list of classes and course objectives, which are often expressed in terms of learning outcomes and normally, includes the assessment strategy for the program. These learning outcomes (and assessments) are often grouped into modules and the curriculum

therefore comprises a collection of such units, each specializing in a specific part of the curriculum.

Cyber "cyborg" Fashion- a term that refers to fashion and subcultures influenced by the concepts of futuristic, space age, industrial, and computer-based fashions (i.e. *The Matrix* fashions).

Fashion Cycle- a term that refers to the rise, popularization, and decline of a particular fashion.

Fashion Design- applied art profession dedicated to the creation and development of wearable apparel and lifestyle manufacturing.

Fashion Techies- individuals and organizations pioneering intelligent clothing; includes a range of researchers, scientists and technicians.

Feature Integration Theory- theory which states that complete environments are understood through item by item processing, an accessing of features to create the whole in the mind.

Footprint- surface space occupied by something, increases and decreases according to mass and can leave marks on environment that is both literal and metaphorical.

Genre- a particular category or characteristic form or technique that branches from a greater idea or institution, a kind or sort.

Gestalt Theory- study of perception and behavior from the standpoint of an individual's response to configurational wholes with stress on uniformity, order, disorder, beauty, and rejection analysis of stimuli, percept and response.

Glamour- the quality of fascinating, alluring and attracting the senses. Perceptions of glamour are shaped by a multitude of factors including exposure, culture, and ideology. Charm equated with beauty and ideals of perfection.

Haute Couture- high quality fashion design or construction, usually more expensive because items are one of a kind and tend to be more artistic and unique.

House- a specific retailer and/or label including all facets within the company system.

Industrial Design- professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both user and manufacture.

Interface- surface forming a common boundary of two entities; place at which independent and often unrelated systems meet and act on or communicate with each other.

Line- a collection of styles shown in a particular season.

Mass Fashion- production of goods in quantity, styles or designs that are widely accepted and that can be produced and sold in large quantities.

Motivation Theory- intention of achieving a goal leading to goal-directed behavior. An innate biological mechanism that determines organism's activity but can be modified by learning and experience. Motives serve to satisfy needs that are not directly tied to body requirements.

Nano- term used for art of manipulating materials on an atomic or molecular scale especially to build microscopic devices; small.

Outcome-based Curriculum- curriculum that delineates a linear process that moves from general educational goals to specific classroom behavior. Emphasized outcome over process (1985-1995).

Outré- stylization overdone, excessive, or exaggerated.

Pleasure Principle- psychological theory stating man is apt to seek out pleasure instead of pain. For biological, individual, and psychological reasons, man pursues gratification.

Prêt a Porter- ready-to-wear apparel as distinguished from couture clothing.

Retrofit-to furnish with new or modified parts or equipment not available or considered necessary at the time of manufacture.

Selective Attention Theory- theory suggesting that individuals have a tendency to orient themselves toward or process information from only one part of the environment with the exclusion of other parts. Stimuli selection is effected by a multitude of factors, the greatest being arousal and propensity towards “beauty.”

Silhouette- outline of shape created by a particular clothing style. It is suggested fashion designers work from archetypes or precedent silhouettes.

Standards-based Curriculum- Academic rationalism focused on reaching particular and mandated content standards (1992-present).

Techno fashion- effective interface between contemporary fashion and technology, lines that successfully merge the worlds of industrially designed products and marketable fashion apparel.

Theory of Direct Perception- theory that all the cues needed for perception to take place are present in a given environment and not necessarily from predisposition or exposure.

Theory of Drive- theory explicates the aspects of motivation that cause people to behave the way they do. Studied by Sigmund Freud, drives serve to satisfy biological needs.

Top-Down Processing- theory the processing information is guided by information stored already in the mind from previous experience, teachings, associations, and ideals, not from the immediate environment.

Total Quality Education Curriculum- based on management concepts, curriculum advocates a means-end orientation and emphasizes using technology to achieve quality (1985- present).

Wearables- intelligent fashion technologies that are equipped with micro technologies allowing them to be worn on the human form to facilitate daily functions.