ETHNOGRAPHY IN INDUSTRIAL DESIGN

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Professor Ed Dorsa, Chairman

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Professor Eric Pappas                    Professor Bob Schubert

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ABSTRACT

ETHNOGRAPHY IN INDUSTRIAL DESIGN

By Mitra Moshari

Ethnography is among the many tools used in social research. It refers to a set of methods and techniques used primarily by anthropologists in their fieldwork. It is about observing people during specific periods of time or while performing particular actions and writing about what was observed. Because people rarely do exactly as they state, a purpose of conducting an ethnographic study is to uncover meanings about an issue that may not be available through traditional evaluation methods. Field research has the capability of leading researchers and designers to the understanding of people’s needs, wants and expectations; thus, resulting in successful product design. Without conducting field research, the ability of a designer to satisfy consumer’s genuine needs and demands is severely restricted.

Cognitive, physical and cultural differences are factors which distinguish us from one another. Such factors should not be neglected when studying the design process. Could it be possible, for example, that an attribute such as one’s gender can influence and effect decision making or outcome of a project? Although difficult to answer definitively, applying ethnographic research methods can enable us to gain a deeper perspective of the issue.

The present study applied ethnographic research methods in examining differences throughout the design process. A total of eight students (four males and four females) from the Industrial Design department in the college of Architecture and Urban Studies at VA Tech were chosen to participate. In further support of previous gender studies conducted, this research
attempts to show that females do have a tendency to communicate more throughout the design process. In addition, females tend to engage in more of a communal type of design process. Males, on the other hand, were more likely to work independently, with very little or no interaction among each other.
DEDICATION

Thank you to my Mother and Father for their patience and indulgence of my existence.
ACKNOWLEDGEMENTS

Thank you to the three friends who witnessed my pain through this process—you know who you are…especially, Viktor E. Frankl for forcing me through.
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I. INTRODUCTION

Design is a way of thinking and doing. Design involves creative and practical procedures wherein things, or objects, are produced or manipulated to satisfy human needs. Through the design process, ideas are made into actual physical things: observable and useful. In Designing for People, Henry Dreyfuss was among the first to venture a definition of Industrial Design.

“Industrial design is a means of making sure the machine creates attractive commodities that work better. It is coincidental, but equally important, that they sell better (Dreyfuss, 1955)”. Made over forty years ago, this statement still applies to the Industrial Design of the twenty first century. Not only is the function of an object paramount to Industrial Design but so are its aesthetics and ability to compete in a global market.

Dreyfuss emphasized that in order for a design to be considered successful, it is crucial for the designer to have been involved in the design research. Through design research comes the knowledge and understanding of the design process and materials. Through design research comes the understanding of consumer preferences. “I have washed clothes, cooked, driven a tractor, run a diesel locomotive, spread manure, vacuumed rugs, and ridden in an armored tank. I have operated a sewing machine, a telephone switchboard, a corn picker, a lift truck, a turret lathe, and a linotype machine. When designing the rooms in a Statler hotel, I stayed in accommodations of all prices. I wore a hearing aid for a day and almost went deaf. I stood beside a big new gun at Aberdeen Proving Grounds when it was fired, and was catapulted off my feet. Members of our office have spent days and nights in airport control towers and weeks on a destroyer during maneuvers. We ride in submarines and jet planes. All this in the name of research” (Dreyfuss, 1955). This quote illustrates the importance of studying people in the environment where they live.
and work. Dreyfuss further suggested that studying people in environments where they sleep, eat and work in is an integral part of the design process. He found this to be the most effective (if not the only) way to design useful, delightful, and profitable products (Dreyfuss, 1955). Despite Dreyfuss’ initiative and dedication to such field research, it did not become a common part of the design process until more than forty years after the statement was made.

The study of people in their surroundings; where they live and work, is vital to the advancement of industrial design. Through such research, we become better educated in design. In becoming better educated in design, we become more accomplished in designing objects, images and environments that meet the needs of the people and the industry. When applied to the design field, the goal of such research, also referred to as ethnographic research is to improve products and enhance our environments; thus, resulting in useful and profitable products.

**Current Research**

This study explores features of the creative process as observed in a group of third year male and female Industrial Design students at VA Tech. Ethnographic research methods were applied throughout this research.

The creative process is mysterious and many question it having a definable process. Since the end result of a design can be directly communicated, design is usually thought of as the end result; in truth design is a method; and although it does not follow any specific route, it does consist of:

- Defining the problem: identifying and specifying the problem to be solved or the goals to be attained.
Exploring the problem: investigating what is involved and generating ideas and potential solutions.

Planning what to do: making and communicating decisions and anticipating how to implement them.

Producing what has been planned: doing what is required; making what is anticipated.

Evaluating the experience: testing what has been produced and assessing what has been done in order to determine if the problem has been solved or the goals attained; reflecting on what could be done better in order to improve the outcome.

**Creativity**

Creativity is the pathway through which we build castles and cathedrals, and are capable of doing many other things that can stand as our greatest triumphs. We manifest ideas in our minds and through creativity pass them along, and in this process we make of our culture (Benedict, 1934). The creative act is throughout the entire timeline of the process and not just the culmination or final object.

According to Mihaly Csikszentmihalyi, creativity contains three chief ingredients: the process, the person, and the creative system (Csikszentmihalyi, 1990). The creative process can be sparked by a fascination or a question relationship. For example, Madeline L'engle used microbiology as a basis for literature. This interaction of two seemingly unrelated domains (literature and microbiology, for example) is a means in which creativity can manifest itself.

Traditional product centered research fails to provide the necessary detail on how people interact with things that make up their world. That is why studying real people, in the context of their work and life can be a powerful way to imagine innovative products. When applied properly,
ethnography produces the unexpected results that business is increasingly demanding from industrial design.

Why choose ethnography? Because it works: ethnography “…is a relatively low-cost way to identify potentially critical customer needs. It’s an important source of new product ideas, and it has the potential to redirect a company’s technological capabilities toward entirely new businesses” (Leonard and Raport, 1997).

This paper explores the differences in the design process as witnessed in four male and four female industrial design students. The field research conducted involved techniques and procedures for organizing a research study collecting information and analyzing data. As the “ethnographer,” I overtly and covertly participated in peoples daily design lives watching what took place, listening to what was discussed and asking questions. Ethnographic studies in design are similar to anthropological research: both disciplines involve the study of culture, artifacts and human behavior. Therefore, it is of no surprise that industrial design groups such as Fitch, Design Science, E-Lab, IDEO, and others have adopted ethnographic methodologies. Designers involved in ethnography are better able to develop products that people genuinely value, need and want.
II. LITERATURE REVIEW

Art History & Gender

Art history is only one of the many academic disciplines concerned with gender. Gender issues affect the conception, production, and interpretation of an art form. Through its lens, we look at the different manners in which it has informed our ability to study visual imagery. Thus, gender is important in our understanding of the process of looking. Art historians who have shown an interest in "gender issues" have been labeled “feminists.” Usually, this label carries a derogatory connotation. The label feminist is properly a label describing an individual (regardless of sex) who studies women’s social, cultural, and political status within the context of past, present, and future. Throughout this thesis the terms female and male are used when describing characteristics attributed to one’s biology. The words feminine and masculine will be used in referring to cultural aspects. The word sex is usually used to describe the biological state at birth (male or female). Webster’s Encyclopedic Unabridged Dictionary of the English Language defines gender as:

1. Gram. A. (in many languages) a set of classes that together include all nouns, membership in a particular class being shown by the form or choice of words that modify, replace, or otherwise refer to the noun, as in English, the choice of he to replace the man, of she to replace the woman, of it to replace the table, of it to replace the ship,…

In art history, gender is defined as the cultural construction of femininity and masculinity, and not so much the biological sex (male or female) we are born with (Perry, 1999). Unfortunately, feminist theory does not offer an explanation of the differences between males and females; but, most
feminists reject the notion that male and female characteristics are found exclusively in any fixed biological attribute (Perry, 1999). The use of the word “gender” among feminists in the 1970’s was meant to underline the fundamentally social or cultural quality of distinctions based on sex. The word denoted a rejection of the biological determinism underlying the earlier term “sexual difference.” Hurting and Picherin concluded that sex is only a variable when gender is at issue; only when socially constructed categories are evoked having to do with what we expect from men and women (Cassell, 1999).

16th - 17th Century Art & Gender

During the sixteenth and seventeenth centuries, female artists were few and tended to work in a more restricted area of subjects and media than their male counterparts. Most sixteenth and seventeenth century female artists have been written out of art history. If their works were ambitious, it was attributed to their male relations with teachers, fathers, brothers (Perry, 1999). If they seemed to lack skills, women’s works were not seen as belonging to the dominant narrative of stylistic change and artistic progress (King, 1999). Gender issues informed and helped establish the culture of the eighteenth-century art. Women did not only become practitioners of art but also involved in the study of socially constructed categories of femininity and masculinity. In the late nineteenth century, painting was particularly dominated by men. Educational opportunities available to women artists were minimal. Literature on painting techniques from the nineteenth and twentieth centuries claims the process of painting as being gendered. For example, nineteenth century academic drawing was referred to as intellectual and masculine whereas interest in color, surface and texture was seen as feminine (Perry, 1999).
Throughout the history of the social sciences, the issue of gender and sex has been consistently present, rarely with agreement among researchers, psychologists, and biologists. Differences in abilities and especially in intellectual capabilities have been an ongoing debate. This belief, conceived by Ellis in 1894, suggests that males and females vary in both mental and physical characteristics. This belief has obviously had a tremendous array of supporters. Ellis proposed a biological explanation to support his findings; however controversial as Ellis’ methodology was, he found support from psychologists and educators who were staunch believers in the “greater male variability (pg. 39)” hypothesis. It was not until the early 1970’s that literature on gender differences had emerged opposing Ellis. Maccoby and Jacklin (1974) concluded that the sexes throughout the United States had a greater degree of variability in mathematical and spatial abilities (Maccoby & Jacklin, 1974). Maccoby and Jacklin’s results were recently confirmed by Feingold, (1992).

Although controversial, there are several theories claiming to account for sex differences in spatial ability. Biological, environmental and evolutionary explanations have been offered for the female lag in spatial ability. Biological theories of intellectual differences stress brain lateralization (Geschwind & Galaburda, 1987; Levy, 1976), the x-linked genetic theory (Harris, 1978) and pubertal processes (Waber, 1976). Males have been found to perform better than females in the manipulation of two-or-three-dimensional spatial figures. According to the biological genetic theory, a recessive gene for superior spatial ability is only carried on the X chromosome thus, inherited solely by males.
In addition, it is believed that this recessive gene is further activated by the operation of the male hormone, androgen (Whythe, 1986). Not only are the biological arguments presented controversial but also inconclusive, although they are often used to justify the conservative beliefs related to traditional male/female roles.

Psychology & Gender

According to some cognitive-developmental perspectives, gender is a socially constructed concept, which evolves out of the tendency of humans to categorize and to stereotype. In spite of today’s conscious beliefs in gender equality, gender-based schemas unconsciously interpret and guide our perceptions, treatment and inferences of men and women (Geis, 1997). Gender differences in cognitive abilities have been documented. Among the differences: spatial (Voyer, Voyer, & Bryden, 1995) verbal (Hedges & Nowell, 1995) and mathematical variances (Hyde et al., 1990). The apparent pervasiveness of these gender differences has prompted a number of researchers to hypothesize that these are due to sex differences in cerebral organization. Levy (1972) stated that men use the right cerebral hemisphere for non-verbal tasks and the left hemisphere for verbal tasks, whereas women use both hemispheres regardless of the nature of the work. Thus, men’s brains are more lateral than women’s given that their cerebral placement is more asymmetrical. Based on this hypothesis, there is a difference between the processing ability of the two cerebral hemispheres in males, whereas such an effect is not as significant in women. Harris (1978) found convincing support for this prediction in a careful literature review.

It is, thus, likely that sex differences in cerebral organization mediate, at least in part, gender differences in spatial and mathematical skills. If this is the case, however, what would
become of the relation among gender, spatial skills, and mathematical achievement reported by Voyer (1996) when a spatial task is used in the context of a laterality study? It has also been hypothesized that the Environmental theories include the effects of sex-linked experiences and socialization processes (Sherman, 1976; Levy, 1989). Other research results leave no doubt that gender differences in favor of males exist in regards to spatial abilities (Linn & Peterson, 1985; Voyer, Voyer, & Bryden, 1995). In a review of previous studies, Feingold (1992) concluded that males were more variable than females in spatial ability (Nordvik & Amponsah, 1998). Feingold found cognitive gender differences are currently decreasing (Feingold, 1988) whereas Voyer et al. (1995) found evidence for this claim highly questionable. A study conducted about gender differences in spatial abilities (Baenninger, 1997) showed that males fared better in noting directions than females.

**Evolution & Gender**

Evolutionary explanations have also been proposed for the gender differences in spatial and mathematical abilities. Differences reflect a “greater elaboration of the neuro cognitive systems that have evolved for navigating and tracking movement in three-dimensional universe of males than females” (Geary, 1985) as a result of division of labor. Furthermore, according to Geary’s (1985) hypothesis the gender difference in spatial ability may have evolved in the same process that created the gender difference in physical fitness, i.e. the male role, as hunter and fighter required both strong muscles and spatial ability. Geary’s theory raises several important issues. In sports, gender performance differences are fully acknowledged yet performance expectations for men and women in business and education are identical.
Too often, the study of games, especially computer games, has meant looking at boys playing computer games. In fact, the very design of computer games for children has meant designing for boys. A visit to the local video arcade leads us to believe that most children playing these games are boys. Girls are not uninterested in video games and other interactive technologies but are interested in other features of it. It is during kindergarten that video games are viewed as being more appropriate for boys than girls (Wilder, 1985). Females may not be active participants in video games given that most computer games are designed for and by males. Huff, Fleming and Cooper (1992) concluded that computer programs designed for boys focused on time pressure, hand/eye coordination and competition. Computer games and programs for girls, on the other hand, focused on tools for learning via means of conversation. Programs designed and marketed for “children” were very closely related to those claiming to be “designed for boys”. Programs “designed for students” were, in fact, designed with the boys as the targeted audience. Interestingly enough, 80% of the program designers in that particular study were females who expressed concern that educational software was male-biased (Bridgens, 1995).

Evidence shows that gender conditioning begins at a very young age and is further reinforced through the toys purchased and the nature of play (Bradshaw, 1995). Game designers have only recently discovered females as consumers. Empirical and market research shows us that boys and girls enjoy different things, act in different manners, and have different success at various tasks (Cassell, 1999). Unfortunately, most games designed for girls tend to teach domesticity and promote a near obsession with physical appearance. Gender differences in game creation are replicated by gender differences in game consumption (Cassell, 1999). Cooper, Hall
and Huff (1990) found that when students in 6th through 8th grades were given math computer programs with different themes, girls reported stress when working with themes that involved actions such as shooting and propelling objects through outer space. Also troublesome were non-verbal graphic feedback. In contrast, boys reported more stress when using software in which aggression and shooting were replaced by verbal feedback and narration. Stutz (1992) studied children ages 7 through 14 and found that girls and boys play separately. Girls exhibit a physical closeness and intimacy and a universality of their sociability and friendliness. Rarely was there competitiveness or fighting present. In contrast, dominant characteristic of boys play was competition and confrontation usually resulting in a fight.

Females show more of a negative reaction to their first computer experience and are more likely to consider themselves “non-members” of a computer environment. Fleming and Huff further studied this issue and confirmed that women introduced to computers often voluntarily withdraw. In addition to withdrawing they lack enthusiasm necessary to keep them involved. Robinson-Stavely and Cooper (1990) studied gender differences in reaction to the presence of others while working on the computer. Throughout the study, men and women were asked to conduct the same computer task (in private or public). One group was told that the task would be difficult for them. Another group was told that the task would be easy. No gender differences were found when the task was completed alone and no gender differences were found in the public performance. Differences were however found in the public performance condition based on expectation. Those expecting success did better in public whereas those expecting failure performed worse in public (Huff, Fleming, and Cooper, 1992).
Simple research gathering techniques involving focus groups and survey questionnaires have been valuable in the past. Times have changed. Those same methods no longer suffice and need to be combined with other methods. As the saying goes, “actions speak louder than words.” *Ethnography* refers to a set of methods and techniques used primarily by anthropologists in their field work. Ethnography consists of the writing about or descriptions of people. Sometimes the word is used interchangeably with “qualitative methodology” or “naturalistic inquiry” and is among the many tools used in social research (Berg, 1997). Ethnography can be described as an in depth, timely, descriptive study. The purpose in conducting an ethnographic evaluation is to uncover meanings about an issue that may not be available through traditional evaluation methods. For example, ethnography can help answer questions such as *what does that program/product/experience mean for its users/participants? Why?*

Researchers frequently use the term in seemingly different ways. Spradely (1979) for example, explains that “ethnography is the work of describing a culture. The essential core of this activity aims to understand another way of life from the native point of view” (pg. 3). Zigarmi and Zigarmi (1980) refer to ethnographers as one who enters the natural setting in order to conduct *field research*, a concept that itself undergoes some difficulty in understanding (Guy, 1987). Some researchers such as Ellen (1984) describe the ethnographic process as “subjective soaking” which occurs when the researcher “abandons the idea of absolute objectivity or scientific neutrality and attempts to merge him/herself into the culture being studied” (pg. 77). Other researchers such as Ellen and Stoddart (1986) believe that ethnography involves the end result of a field research, most importantly, the final written product. This final product includes the researcher’s (i.e the
ethnographers) written accounts such as notebooks, memos, diaries, interviews... This type of ethnography is best understood as interaction between the observer and those observed.

More recently, however, Lofland (1996) introduced a different kind of ethnography; analytic ethnography:

“*I use the term “analytic ethnography “ to refer to research processes and products in which, to a greater or lesser degree, an investigator (a) attempts to provide generic propositional answers to questions about social life and organization; (b) strives to pursue such an attempt in a spirit of unfettered or naturalistic inquiry; (c) utilizes data based on deep familiarity with a social setting or situation that is gained by personal participation or an approximation of it; (d) develops the generic propositional analysis over the course of doing research; (e) strives to present data and analysis that are true; (f) seeks to provide data and/or analyses that are new; and (g) presents an analysis that is developed in the senses of being conceptually elaborated, descriptively detailed and concept-data interpenetrated“* (Lofland, 1996, pg. 30).

**Application to Industrial Design**

‘Understand your customer. Get inside their heads. Find out what they want.’ This is the current advice for increasing the success of products and services in the new global economy. As competition increases, many design firms are finally beginning to heed this advice. Consequently, ethnography has become a common method used by anthropologists when first beginning to observe people of native lands. Legendary anthropologist Margaret Mead made her reputation studying the indigenous people of Samoa. Claude Levi-Strauss made a pilgrimage into the
Amazon rain forests to research the disappearing native traditions. Given the lack of prehistoric tribes remaining in the wilderness, a modern day anthropologist is left to study another kind of population.

Throughout current marketing and industrial design, new cultures and subcultures emerge regularly. An anthropologist’s site shifts from the Amazon to the supermarket. Because people rarely do as they report, a reliable strategy used in design firms in order to get closer to the consumer is through the use of ethnography in combination with other research methods. Design firms such as The Doblin Group, a consumer research company in Chicago, looks at what people do in their everyday lives; assists in generating information that helps clients chart the future of their businesses. Doblin Group teams apply a variety of disciplines such as the social sciences, strategic planning, and design planning among their plan of action. At the design firm E-Lab, the use of ethnography is crucial prior to delving into a design. E-Lab, (the “e” stands for experience), has been involved in numerous design projects: designing new over-the-counter cold medicines by studying the process of how people get sick; helping create a new station wagon for a major car maker; leading backpack manufacturer JanSport to design a new way of displaying its products in sporting goods stores: in each case the results are initiated by finding meaningful patterns in consumer actions and not by simply asking the consumer what s/he does but also watching what they do.

The term ethnography is relatively controversial among social scientists given its diverse definitions emerging from different schools of thought. Most work claiming to be ethnographic by the traditional, literal sense, simply is not. Using a variety of approaches for even the simplest activities can explain the process of certain actions: how they are connected and how they can be enhanced. Ethnography sheds an innovative light on the human sciences; through it, confirmed evidence of existing behavior patterns are deciphered. A key focus of ethnography is not only to
study the behavior but to learn and understand the symbolism that guides behaviors, beliefs, and, in the case of industrial design, shapes the product.

As the author of this research I will be taking a more pragmatic view of this word. “Ethnography” has come to mean any sort of qualitative field work used to gather requirements for a product. In the following investigation I will use techniques wherein ethnographic definitions are explored through creating an understanding of how they are bent, twisted, and transformed, and thereby fully developed.
III. METHODOLOGY

Design as a human activity has been extensively studied from a variety of perspectives. These include the designers’ cognitive processes, the designers’ perceptions of their roles and activities, the social interactions in design teams and organizations, and cultural influences on the designed product. Another perspective is needed for developing tools, for example, computer tools, to support the design process: how information is created, combined, manipulated, transformed, and communicated to create a plan for a product. Looking at problems from a multidisciplinary perspective is changing the way people work in all disciplines. Understanding market conditions, user behavior, consumer desires, and customer needs is a crucial objective of any design criteria.

The primary objective of this research is to study differences among four male and four females in the design process in industrial design. Students involved in this study were those enrolled in Professor William Green’s third year industrial design studio located in Burchard Hall. Structured and unstructured interviews were conducted prior to conducting the research. Unstructured interviews were broader and seemingly more vague compared to the structured interviews; students were asked to write out their responses so that they would be encouraged to respond openly and freely.

This research is comprised of four phases. Phase I consisted of background design research related to gender. The design question being asked was whether the design process is different for men than it is for women. Phase I involved the identification of the problem or issue: are there differences in design process related to gender among third year industrial design students.
Phase II involved the use of specific investigative methods to gather information relevant to the questions being asked. Methods used included:

1) observing the subjects
2) conducting structured interviews, and 3) conducting unstructured interviews.

Each subject was observed in his/her working design environment (the design studio) for a total of approximately ten hours, spread out in two 4 hour increments and one 2 hour session. Following the observations, questions were asked regarding how male and female designers make decisions related to the design process, such as:

1) how much time they spent researching prior to beginning the actual designing
2) how they interacted with each other

Phase III involves analyzing the data from interviews, and observations. My observations, the interviews, and the questionnaires will enable me to determine the similarities and differences between male and female subjects in each step of the design process. The areas analyzed include the following:

1) what were some differences and similarities in the conception stage?
2) what were some differences and similarities throughout the initial stage and through sketching?
3) what were some differences and similarities in the computer design stage?

Phase IV, the final phase of this thesis, provides final observations and conclusions based on the four stages of analysis of the gathered data. Conclusions based on whether gender is a significant factor in the industrial design process will be drawn and suggestions will be offered as to how gender might affect the design of specific products.
IV. SUMMARY OF RESULTS

A) CHART SUMMARY OF RESULTS

Research Question 1: *Did males and females tend to work collaboratively or alone throughout the design process?*

<table>
<thead>
<tr>
<th>Collaborated</th>
<th>Worked Solo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td>Sometimes</td>
</tr>
</tbody>
</table>

Female #1     X
Female #2     X
Female #3     X
Female #4     X
Male #1       X
Male #2       X
Male #3       X
Male #4       X
Summary of Results

Research Question 2: What are the differences between males and females using the computer as a design tool versus strictly using hand drawings?

<table>
<thead>
<tr>
<th></th>
<th>Computer as Design Tool</th>
<th>Strictly Hand Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Always</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Female #1</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Female #2</td>
<td>X</td>
<td></td>
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<tr>
<td>Female #3</td>
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<td></td>
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<tr>
<td>Female #4</td>
<td>X</td>
<td></td>
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<tr>
<td>Male #1</td>
<td>X</td>
<td></td>
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<td>Male #2</td>
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<td></td>
</tr>
<tr>
<td>Male #3</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Male #4</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
Summary of Results

Research Question 3: *Throughout the entire design process (including conception, design, final presentation) how much time do males versus females spend on the computer and for what purpose?*

<table>
<thead>
<tr>
<th>Female #1</th>
<th>Computer Interaction</th>
<th>Questionnaire</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Did not claim to nor was she observed spending much of her design time on the computer.</td>
<td>Stated that 15% of her time was spent on the computer.</td>
<td>Was observed interacting the most with her peers, especially her female colleagues.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Female #2</th>
<th>Computer Interaction</th>
<th>Questionnaire</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preferred drawing by hand and not so much on the computer.</td>
<td>Stated that 90% of her design time was spent off of the computer.</td>
<td>Seemed very content drawing by hand and not working on the computer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Female #3</th>
<th>Computer Interaction</th>
<th>Questionnaire</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Used the computer primarily for documentation purposes towards the end of a project.</td>
<td>“20% of the time is spent documenting the project which includes some photographing, scanning and layout on the computer.”</td>
<td>Engaged in very little internet surfing but did spend a significant amount of time using design software.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Female #4</th>
<th>Computer Interaction</th>
<th>Questionnaire</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The only female to explicitly state her preference for working on the computer.</td>
<td>“I like to use the computer form start to finish to see what happens.”</td>
<td>Avoided most forms of interaction with her peers.</td>
</tr>
</tbody>
</table>
Summary of Results

**Research Question 3: Throughout the entire design process (including conception, design, final presentation) how much time do males versus females spend on the computer and for what purpose?**

<table>
<thead>
<tr>
<th>Male #1</th>
<th>Computer Interaction</th>
<th>Questionnaire</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Used the internet the most and preferred to sketch more by hand. Used Rhinoceros several times.</td>
<td>“I’d rather work by hand than on the computer but the computer does come in handy.”</td>
<td>Composed many hand drawings without the computer. Spent the least amount of time designing on the computer but did spend time surfing the internet.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Male #2</th>
<th>Advised not jumping into working on the computer.</th>
<th>“You should have your design exactly planned out prior to working on the computer.”</th>
<th>Used the computer the most for tweaking final presentations.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Male #3</th>
<th>Preferred to use both the computer and sketching as the primary design tool.</th>
<th>“I use the use the computer less than 25% of the time.”</th>
<th>Was observed using the computer more than stated; especially for finals and some early sketch work.</th>
</tr>
</thead>
</table>

| Male #4 | Liked to play around on the computer and explore the possibilities. | “Most of the time I do spend on the computer is spent trying to figure out what it is I want to do, how I want to have it done and basically just playing around on the computer.” | Engaged in the most net surfing of all males studied. |
IV. RESULTS & ANALYSES

B) DISCUSSION OF RESULTS & ANALYSES

Questionnaires were handed out prior to the beginning of the study in which subjects were asked to write out the responses as clearly and in as much detail as possible. After the questionnaires (see Appendix A) were completed and turned in, a time was set in which I could meet with the subjects one on one. During the time in which this meeting took place, I watched each subject in his/her work environment. During my observations, I asked the same questions that were also asked in the distributed questionnaires (see Appendix B). Significant research attributes consisted of subjects’ time spent working on the computer (either on a design project or whatever they may have been working on), interactions between subject and classmates, in addition to the common characteristics held by male and female subjects in their design processes.

I met with each subject in the evening after the hour of 5pm. Observations were usually completed by 10 or 11pm. This time frame was chosen because this is the time when most design students prefer to work when not in class or in the studio throughout the week. Each subject was required to spend a total of two sessions being observed; a total of approximately nine hours. The research took place in the design studio located in Burchard Hall, School of Architecture, Virginia Tech, Blacksburg, Virginia.

Given the time constraints and the nature of this research, it would have been nearly impossible to exactly measure subjects’ time between sketching, computer usage, and final presentation preparation. As a result, during the near nine hours I spent with each subject, each was free to work with whichever medium she or he desired.
A coding method was used and will be referred to throughout this research to designate the eight subjects. Female number one will hereon out be noted as FM1 and so on. Male subjects will be noted as M1 and so on. In addition, all quotes are from interviews or questionnaires unless otherwise noted. Research Questions will be coded as “RQ1” and so forth.

**Observations and Subjects’ Responses to Research Question One**

**Research Question One:** *Did males and females tend to work collaboratively or alone throughout the design process?*

Out of the four females studied, FM1 interacted the most with her peers who also happened to be females. In her questionnaires; she stated that she has no problems “going to people and asking them questions and letting them know what I may be researching to see what kinds of insight they may have.” During her interview, she said, “although sometimes the criticism can be difficult, I ask around and am interested in what people have to say about a design or object.”

Female number two generates her ideas by having “someone in mind.” During the time she was observed, she seemed very available for offering advice, especially to her classmate (FM3) who was struggling during a technical drawing. Although FM2 was not observed asking for assistance, she was very willing to offer advice. For example, while FM3 was having difficulty working on a technical drawing, FM2 suggested she draw the object from another angle which may enable a better understanding of the product.

In the questionnaire, FM3 made no mention of interacting with peers or with professors. She was, however, observed showing a need for approval and guidance from her classmates while working on a technical drawing. As previously mentioned, FM3 was not shy asking FM2 for
suggestions; and expressing her concerns and difficulties, especially during her technical drawing project where, after a few attempts, she would show her work for confirmation that she was on the right track. In addition, FM3 showed curiosity towards others’ ongoing projects. In her interview, she said she discussed ideas with classmates and “sometimes I’ll talk to professors about an idea and see if it goes well with him.”

“The source I get the least information from is people who tend to make me feel like I am not doing a good enough job,” replied FM4 in response to questionnaire Question #4 (Where do you get your ideas from?). She had a major problem with criticism and seemed to get defensive almost to the point of tears. For example, when asked how she goes about making design-related decisions, she said: “there have been times that I have left crits really upset. I don’t really know but I don’t think what I do is wrong and it makes me upset when I get questioned by professors so much.” When asked if she tends to avoid interaction due to her fear of criticism she replied, “possibly, at times.”

Unlike most students’ studied, Male Number One stated that he generated ideas from sources such as “lectures and travels.” He neither mentioned nor was observed discussing designs or ideas with his peers or professors; he seemed mostly independent in his design process and interacted with his colleagues mostly for entertainment purposes. For example, after having worked for an hour, he was quick to get up from his seat and go chatting to his friends about non-design related issues.

Male Number Two developed his ideas from “other people’s ideas…” and was observed answering questions when someone asked him. He was very focused and did not appear to have any difficulties making design decisions. He neither asked nor volunteered assistance to others. He was not observed struggling with any design decision. No mention of using people or
professors as a source was made. The internet however, he mentioned as a primary source of inspiration.

Signs of interactive work mentioned by Male Number Three were with two other male classmates in spending days discussing “wacky ideas,” followed by “where can we go from here.” Interestingly enough, M3 found that when he and his fellow male classmates were working on the same projects they would “all end up designing different yet inherently similar objects or screens.” Male Number Three continued; “it’s funny how we think alike. A few times we’ve had very similar designs for this one project.” He was not observed discussing projects and seemed to work solo; when at his desk, he wore earphones.

Out of the four males observed, Male Number Four was the most independent. Although he was the most physically active designer (given the fact that he actually stood dancing while designing on paper), he was also the most anti-social in that he failed to make eye contact with any of his peers including the researcher observing his working methods. Rarely did he look up from his work. In addition, he made no mention of interacting with people, but, he did stress television as source of inspiration.

**Analysis of Research Question One**

Males and females differ in many ways including in their behavior. The present analysis extends research concerning this area of gender. In this case, adding to the research on ethnography and gender. Although limited to eight subjects, this study has managed to reveal in a short period that there is a difference in the manner in which male and female design students go about designing. Not only is there a difference in their actions as adult design students, but it is
very likely that they shared common traits as children which in all probability resulted in their current behaviors and beliefs (May, 1997; Feingold, 1994; Feingold, 1993). Social factors, for example, are commonly shared and capable of influencing us, particularly as children (May, 1997; Feingold, 1993).

Gender differences evolve from childhood (Cassell, 1999). Initially, boys tend to play cops and robbers, cowboys and Indians and G.I. Joe followed by participating in sports (usually team sports) where competition is not only encouraged but also rewarded (Cassell, 1999; Sadker and Sadker, 1994). The objective of such games may include reaching a goal, which further includes winning (Haim, 1998). Boys learn to move on after losing and how to respect hierarchy: a coach or team captain. Girls, however, are conditioned to play more collaboratively. Research exhibits that girls instinctively dislike conflict. Thus, they minimize power differences (Heim, 1998). If there is a dispute, for example, girls will negotiate until the issue is resolved. Negotiation includes communication. This one on one dialogue is a very effective way to engage in results, skills and work methods. Immediate feedback enhances a situation (in this case, the learning environment of a design studio) and has the potential to recharge creativity which is fundamental in Industrial Design.

Behaviors such as various learning styles, play, attitudes and thought processes naturally affect our everyday lives for these cognitive differences carry themselves into the workplace (Swanson, 1996). So, it is of little surprise that these differences would effect male dominated fields such as industrial design and engineering to mention some. The study of gender differences within the work environment is not a current research topic. It is an area that has been continuously researched with results similar to those of this study: females work more collaboratively than males (Haim, 1998). For this reason, it was no revelation that the females throughout this research worked interactively ; even though the projects were not group projects. Female subjects talked
more about their projects, critiqued each other more, and asked for assistance when needed. With
the exception of FM4 who avoided most interaction with her colleagues, the other three females
discussed sketches, overall design processes, and final decisions.

Interestingly enough, none of the males were observed interacting nor discussing projects
in any depth, as did the female students. Whether this is a matter of design confidence, security,
or previous experience is a different topic altogether and could be captured in future research. For
every example, M1’s top three methods for getting ideas constituted of books, brainstorming, and
discussions. Although “discussion” can be a method of interacting, he did not specify whether this
included discussing with peers or discussing design projects in a group. Throughout observations
though, he was observed interacting with his peers regarding non-design related issues only.

Observations and Subjects’ Responses To Research Question Two

Research Question Two: What are the differences between males and females using the
computer as a design tool versus strictly using hand drawings?

Female Number One preferred not to solely design on the computer because, “I enjoy
doing my own sketches and work by hand.” Like many other students, she used the computer
very little for designing, and when she did use the computer, it was for final presentation revisions:
“I did several different finalizations of this one on Computer Aided Design (CAD) to see the options
available to me.”

Female Number Two was currently “learning more off the computer than on the computer.
I really enjoy designing on the computer “especially if it involves any sort of graphic design projects
(using Photoshop, etc.).” She did stress, however, that she would rather use her more “creative
skills than the computer.” Female Number Two’s estimated time on the computer versus hand
drawings was 90% off the computer and 10% on the computer.” In accordance to her responses, she was observed engaging in very little computer design: “I prefer working with my hands, even though I am learning Vellum and other software.”

Similar to the other students observed, Female Number Three stated:

designing on the computer is a final step for me. I come up with ideas through models and a few sketches and then I use the computer as an aid in presenting my work. For me, design is a hands on process; you must be able to hold your design in your hand to know if it will work, and then I use the computer to show the things that may be possible for me to show on a model.”

Surprisingly, she did prefer to design on the computer, however, given her response to the question: Do you prefer designing on the computer why or why not? She stated, “I prefer designing on the computer rather than sketching. It feels more exact and mathematical.”

Regardless of the mathematical precision that computers may offer, from the observations, FM3 still chose to do many more sketches than working on the computer, stating, and contradicting her earlier statement: “I don’t really like drawing on the computer but do it if I have to.”

Female Number Four preferred working on the computer because she felt she had more control over the designs. Very few hand drawings or sketches were done by FM4. She was aware of this and rationalized it by saying, “because I’m so into graphics, I use Illustrator and Photoshop most of the time.” In agreement with her response, she did do her entire project on the aforementioned computer programs.

Male Number One stated that he spent “a lot less time designing on a computer than anywhere else.” He composed many hand sketches, especially profile views of objects because they were “easier to draw.” His preference for hand drawings, including sketching and rendering
sans a computer, still made him appreciate the computer at times: “I’d rather work by hand than on the computer, but the computer does come in handy for final presentations.”

Male Number Two stated, “I usually use the computer once I have decided on a certain design and I want to create a prototype of it and see how the product might actually look in reality.” Male Number Two used the computer a great deal for final designs, presentations, and some early sketch work. He advised not jumping into working on a computer because “you should have your design exactly planned out prior to working on the computer.”

Male Number Three preferred to use both the computer and sketching as a primary design tool: “I prefer to use both…in this order: sketching, computer model, physical model…” Although he used hand drawings more than the computer for design work, he still used the computer to “figure out how it works.” He concluded; “its good to use all building methods to get a good understanding of how the object works.”

“Since you can never do enough sketches, I am constantly doing sketches of my product. Sometimes even after I have built it.” Male Number Four managed to distribute his time equally between using the computer and designing by hand: “I spend about 50% of my time designing on the computer and about 50% designing off the computer at my desk.”

**Analysis of Research Question Two**

Research Question Two: **What are the differences between males and females using the computer as a design tool versus strictly using hand drawings?**

With the exception of Female Number Four, who avoided most forms of interaction altogether, the three females made a point of discussing what they were working on and problems
they faced. In FM4’s case, one could argue that her choice in design methods (mainly the use of the computer as a primary design method) was in favor of the social restrictions it provided. Female Number Four was able to work solo, with little to no interaction; thus, preventing her from receiving much criticism.

Using the computer as a primary instrument requires little to no interaction from one’s environment. While working on a workstation, it is easy to ignore one’s surroundings and interact solely with the non-human device facing you. Therefore, given FM4’s near fear of confrontation and criticism, interacting with a non-human device would seem to be the preferred design method. Most of the males studied, however, tended to work not only less interactively but also more on the computers than they responded on the questionnaires. For example, M3 stated using the computer as a design tool less than 25% of the time when in fact he was observed using it more than what he stated, and for other purposes than solely design (i.e. internet surfing).

In general, as evident in this case, the male design students used the computer more often than the females. This trend may be attributed to the association carried with computers in that they have been associated with machines and math; both of which are thought of as belonging to the male domain (Benokratis and Feagin, 1995, Stutz, 1992; Underwood, 1990). As children grow, they are often unconsciously encouraged to adopt sex-stereotyped roles (Cassell, 1999). Boys are encouraged to play with action toys and learn about mathematical concepts (Cassell, 1999) while girls are encouraged to express themselves verbally (Cassell, 1999; Stutz, 1992). Boys, for example, have been found to create three-dimensional objects in their heads. Girls, on the other hand, try to create a process they can not see by using words rather than mental pictures, using the skill they have developed (Hensel, 1989).
Observations and Subjects’ Responses To Research Question Three

Research Question Three: Throughout the entire design process (including conception, design, final presentation) how much time do males versus females spend on the computer and for what purpose?

On her questionnaire, Female Number One stated that approximately 15% of her design time was spent designing on the computer. From my observations, she did engage in very little net surfing and the little time spent on the computer was in fact spent documenting her work and putting the finishing touches prior to discussing the project with her professor.

Female Number Two stated that 90% of her time was spent off the computer and 10% on the computer. In accordance with her response to the questionnaire, she did in fact use the computer 10% of the time, with very little inter net surfing and even less time spent designing on the computer. This computer usage of 10% consisted mainly of finalizing her designs. Like the other females, FM2 seemed very content drawing by hand and did not prefer to draw on the computer. This observation may, however, be attributed to the fact that these were merely preliminary drawings and designs, and not final works.

The only female to state that some of her ideas were generated “on line” was Female Number Three. Not only was she observed surfing the internet the least, but she was also observed designing on the computer (using Photoshop, Pagemaker and other design soft ware).

Female Number Four was the only female to explicitly state her preference for working on the computer: “I like to start the building process on the computer from the start to see what happens.” As she stated, she did, in fact, use mostly Photoshop and Illustrator as design tools. From my observations, FM4 used the computer most the time (sixty percent or more).
Of all males studied, Male One was observed spending the least time designing on the computer. Male One noticeably surfed the internet less than the other students but did, however, use the design program Rhinoceros approximately 20% of the total observed time. Male Two stated the internet as a “great resource, and the web can give some good information and ideas.” Unlike M2, Male Three claimed to act one way and was observed acting another. “I spend much more time off of the computer. Probably seventy-five percent.” Having said this, his actions proved otherwise for he was noticed using the internet extensively and designing on Rhinoceros approximately thirty percent of the time observed.

Male Four engaged in the most internet surfing of the males and appeared to enjoy the capabilities of the computer a great deal. His words matched his actions wherein he recalled spending thirty to forty percent of his time on the computer (either on the internet or designing): “Most of the time that I do spend on the computer, however, is spent trying to figure out what it is that I want to do, how I want to have it done, and basically just playing around on the computer.”

**Analysis of Research Question Three**

Research Question Three: *Throughout the entire design process (including conception, design, final presentation) how much time do males versus females spend on the computer and for what purpose?*

The results of recent research have repeatedly indicated that males demonstrate more favorable attitudes towards computers (Dambrot, Watkin-Malek, Silling, Marshall, and Graver, 1985; Ogletree and Williams, 1993). From elementary school through college, enrollment patterns show fewer females participating in computer-related courses (Borasi, 1991). In high schools,
males outnumber females two to one in computer classes. At the university level, only 26.5% of master’s degrees and 8.4% of doctorates in computer services were earned by women (Swanson, 1996). Finally, in the work force, only 27 percent of all computer programmers and analysts were women (Borsani, 1991). In unison with previous studies, there was unquestionably at least twice as much computer use among the males than among the females. Once again, with the exception of Female Number Four, who spent the majority of her time on the computer and the remainder involved in researching (in books, and magazines), males used computers twice as much as females.
V. CONCLUSION

The primary objective of this research was to study various design characteristics among four male and four female industrial design students. The first focus of the study was in observing communication and interaction among male and female industrial design students.

1) Research Question One

Research question one asked if males and females had a tendency to work collaboratively or alone throughout the design process. Throughout this study, interviews were conducted which offered insight into the interaction and design process of male and female design students. Interviews were conducted which also offered insight into the interaction and design process. There were both surprises and anticipated, yet still useful, commentary further supported by previous studies. Three out of four females observed did work collaboratively. When interviewing the fourth and final female, however, I noticed her voice changing as her peers walked past her, and she became noticeably shy when her peers were near. Her change in speech pattern led me to believe that she was going out of her way to keep her work from her classmates. After spending some time with her, it did come out that she was indeed inhibited and did not wish to interact with them. Once again, female number four was the exception in her avoidance in interacting with her peers for the other females in the study, interacted with each other frequently. As illustrated in the Results section, there was a strong distinction between the two. With the exception of the aforementioned female design student, every other female designer interacted with her peers and professors. Four out of the four males observed had a strong preference to work solo. Not only
did they communicate with each other as little as possible, but also interacted minimally with their professors. These results are of little surprise, however, given the literature on gender communication and work. Obviously, men and women work differently. This fact is evident from childhood play through the adult years. Women most often work at a steady pace (Haim, 1998), and build small breaks into the day. Men are more likely to work non-stop, at a frantic pace, with very few or no breaks (Kramarar and Teichler, 1990). Women workers tend to see themselves at the “center” of things (Kramarar and Teichler, 1990). Men view themselves at the “top” (Haim, 1998). As further supported in the present study, and in accordance to Haim’s findings, women are more comfortable sharing information while men tend to collect and often hoard information. In addition, women place a high priority in relationships in the workplace with their subordinates, peers, and bosses. As a result, females have been much more likely to make themselves available to peers and subordinates versus male workers (Haim, 1998). This availability was especially true among the three females who discussed nearly each design decision prior to constructing. Studies have also suggested men are more likely to position themselves favorably with their bosses (including female supervisors) in meetings while women generally see meetings as a place to “talk out problems” and find collaborative solutions (Haim, 1998; Hensel, 1989). There is great diversity in communication styles and practices within each group as well. Past research has shown that in mixed groups, and in many informal conversations, men have been found spending more time talking than women (Vanfossen, 1994). Interestingly enough, just the opposite was found to be true throughout the present study.
2) **Research Question Two**

The differences between males and females observed during computer usage was also a primary topic of interest. The second research question asked what differences exist among males and females in computer usage throughout the design process. Once again, a great discrepancy in the use of computers was revealed throughout the design process. Not only did males rarely collaborate with one another, they usually collaborated with computers more often than collaborated with their peers. The males also engaged in more internet surfing than the female designers. Where males rarely collaborated with each other, females almost always collaborated with one another. With the exception of female number four, three out of four females *sometimes* used the computer as a design tool whereas four out of four males engaged in computer use more than just *sometimes*. Yet again, given previous research studies concerning communication styles and practices, this is to be expected. Unlike the present study, one study found that at mixed gender groups, and in many informal conversations, men spent more time talking than the women (Vanfossen, 1996). In addition, men initiated more interaction than women. Another study found females were more often interrupted than males by males. Furthermore, women had their comments ignored by males, resulting in women having less confidence (Vanfossen and Fitzpatrick, 1996); which may give reason as to why in the present study women collaborated with other women but made very little attempt at collaborating with other males. The present study also showed a difference in communication abilities between males and females but was not as thoroughly conducted as the above mentioned studies. Obviously, time was a crucial factor; however, the present study did find males not discussing their design decisions and ideas nearly as much as the females. It seemed as if the females needed more reassurance from not only each other, but also from their professors. The males, on the other hand, appeared confident and did
not lag in their decision-making. Dialogue was rarely initiated among the males but almost always initiated among the females (with the exception of one female). This does not necessarily support the commonly held assumption that men and women stem from different psychological and social worlds, but definitely invites further investigation.

3) Research Question Three

Research question number three stated; throughout the entire design process (including conception and final presentation) how much time do males versus females spend on the computer and for what purpose? As evident in the Results section of this research, the males used and interacted with the computer much more than the female student designers. Research in support of males using the computer more often than females exists and is still increasing. In fact, this is a trait beginning at a very young age (Hall and Cooper, 1991; Huff and Fleming, 1992; Williams, 1990) and is further encouraged by higher educational systems. There is no doubt that the use of computers and technology has furthered our capabilities in design; however, throughout the conception phase of the design process, the use of paper-pencil sketchings may offer a more intimate and creative option. Rushing into using computers at the initial design phase may build a boundary between the designer and the medium. Most of the females observed (three out of four) preferred to use the computer towards the finalization phase of their design work. Instead of using the computer from the initial design stage, some male and female students observed preferred using paper and pencil or at times a combination of paper-pencil and computer. Although one male and one female actually did engage in using the computer at the initial design phase, more males were prone to using computers throughout the overall design process. Perhaps the males in this study tended to use the computer more throughout the overall design process as a result of
their early introduction to computers in games and outside encouragement given that most games and programs are designed with boys’ stereotypical preferences and aptitudes in mind. It may be constructive for educators to be aware of this disparity; professors leading design studios may suggest that their students limit their use of computers during the conception stage. Regardless of the students’ preference or capability, limiting the use of the computer at first may lead to more creative, and humanistic designs and possibilities.

**Implications to Education and Design Studio**

Having an equal number of males and females in a design studio or in the workplace will result in a more expanded design process with greater possibilities given that each individual brings various characteristics to the process. Also, an equal distribution of males and females in a design studio may give an enhanced perspective while encouraging interaction and teamwork. As a result, more possibilities are offered in appealing to market and consumer use.

Many females in industrial design are involved in graphic design and not as many are involved in research. Conducting design research will be one of the most important contributions designers can make to the design world. By creating, recording, and distributing new knowledge, the designs will be further developed while contributing to the design field. The design process involves creativity. The creative process is not stagnant but consists of problem solving methods using routes never before traveled; something teachers should encourage. University faculty have a difficult challenge ahead of them as they not only encourage these various paths but also manage interdisciplinary design projects in ways that enable their students, other faculty, and clients to get the most out of the interdisciplinary experience. The best wood shops and state-of-
the-art computer programs alone do not create great research or great products. The mix must include resources, a breadth of experience, and a depth of expertise. Once all that is harnessed, great design can result. Universities can create programs that follow industry wherein projects can be designed as such. It seems important to reinforce the notion of both teaching by doing and collaborative discussion; students and faculty can both learn from those in industry. Learning between students and faculty should be even more reciprocal. Real world input from professionals offers collaborative learning opportunities for both students and professionals. Working together can provide opportunities for faculty, students, and working professionals to work on industry research projects, thereby keeping knowledge and skills current.

**Implications for Research**

One of the primary interests of conducting research is to raise questions and stimulate discussion on the importance of innovations through design. It is in this realm of research that the present study falls. The overall intention of this exploratory study was twofold: to enhance the scope of understanding about ethnography and its relevance to industrial design; and on a more pragmatic level, to provide assistance to the on going effort in developing additional tools to those educators interested in using ethnography as a research tool. It is hoped that the ideas presented in this study will encourage further study.

Max Weber argued for *Verstehen* as a concept, defining it as the role that social science should play in enabling the comprehension of the interactions among people. Included in this understanding are the attitudes and values people display (Weber, 1949). Although originally intended for social scientists, this philosophy should be equally applied to the research conducted
Research, in particular ethnographic research, alters the way we view the world: it changes our behaviors, expectations, perceptions, attitudes, and our understanding of the construction of reality. One of the primary objectives of ethnography is to understand the relationships among activities, objects, environments, and people with the intention of describing those relationships in a way that makes the behavior comprehensible to others. When performed in this manner, ethnographic research can alter the way designers perform and think about products, and the values associated with those products. Instead of making assumptions about what people do, think, and feel, ethnography enables determinations to be made regarding what is actually taking place and why things are actually happening. Ethnography can lead to an understanding of how people experience everything from donuts to televisions and convenience stores. This understanding is then turned into new products and ideas or services.

By applying ethnographic research methods, designers are forced to rethink behavior; the result is a new manner of thinking about how they do things and view the world. For example, anthropologist and author Nancy Sullivan spent time in Papua New Guinea questioning people about canoe paddles, cowrie shell necklaces and cooking pots. In the United States, she uses the same ethnographic methods to learn how people use products and advertisements as a way of defining themselves. Whether it is an outrigger canoe or a Sport Utility Vehicle, things are “empty vessels” until people invest them with meaning and attach a definition to them. “Americans are richly symbolic in their materialism,” says advertising executive Tom Maschio, “they use products as a way to construct their lives.” Whether working with the system of symbols in America or in another culture, it is important to be versed in an understanding of how people create meaning from the things around them.
The Importance of EBD Process to Various Disciplines

Experienced Based Design (EBD) is a process that employs a deep understanding of people’s everyday products, as well as the service use and experience, and applies it to inform and shape business objectives and goals. The objective is to make successful design more frequent and predictable by understanding everyday use and experience. Connecting this knowledge, for example, to the business goals that companies have in making products and offering services is an important objective. The value of this information for corporations and schools is that it improves the quality of design while also providing a deeper connection to customers. An experience-based design process for industrial design will yield the best results, for it makes sure to fulfill those needs and desires. Through the use of EBD, designers can create products that anticipate and address the full range of ways in which people encounter, use and experience artifacts. In the business world, EBD has the ability to reflect a corporation’s strength and talents. If conditions leading to success are not articulated and discussed, there can be no dialogue, no discourse, and no sharing of information within the design field, or among the other related fields and disciplines. Finally, various disciplines can gain a great deal from developing new criteria to measure success (not just consumer success). For example, are the results reproducible, documentable and communicable to other teams members?

Primary among the areas requiring enhanced and more fully developed dialogue is the issue of gender stereotyping. Many people will deny that gender stereotyping in the workplace exist, let alone confront such a sensitive topic. This fact seems especially true in a male-dominated field such as industrial design. While the number of women represented in the design and art fields has increased, there still remains a vast gender inequity. Women make up only 11.5% of the
Industrial Designers Society of America’s membership (Davis, 1999). In education, a mere 25% of enrolled students in industrial design programs and 20% of students in engineering are female (Davis, 1999).

**Implications for the Workplace**

The cognitive differences between males and females do not necessarily have to be problematic. Because different people bring various skills and experiences to a given situation, very positive results and benefits to both parties can be attained from having, for example, an equal number of males and females working together on a project versus individuals working alone. Design is a form of problem solving that should not be independent. In addition, the type of product being designed should not determine the gender composition on that design team. Clearly, women should not be the sole creators of products such as toys and blenders. Most importantly, because males and females bring diverse skills, talents, and management types to design, it is crucial to encompass a balance and knowledge to a design setting. For example, women have stronger communication skills while men are apparently more aggressive leaders (Heim, 1995). Thus, the design team would benefit from having, for example, one party identifying specific core design problems or dealing with indecisive or difficult clients. Most importantly, however, it should be emphasized that both males and females need to be involved in this process of learning to communicate (or learn from whatever she or he is lacking) with other designers and be coached in improving his or her abilities. Perhaps due to a lack of interaction, the designers throughout this research failed to address design issues that could have enhanced their work. Although the author only comments on eight individuals studied through this research, the results of the study, supported by several previous research reports, still support that females tend to work
more collaboratively and appear to prefer a communal-type of design process. When conducted more in depth and within a longer time frame, this research may indicate that due to earlier exposure to computers, which may often result in preferences to use the computer, males may have a greater advantage in the design process since using the computer has become more intuitive for them.

**Ethnographic Research and Education**

Although ethnographic research uses careful analyses and interpretation of data observed in the field, it is less about the applying of rigorous research methods than about enlightened interpretation. Research in industrial design should involve using readily accessible methods such as looking, questioning, taking notes, videography and photography, to gain a deep understanding of people and their lives. More and more design groups are adopting ethnographic research as an essential part of their design methodology. Although it is still not universally practiced, ethnography has clearly emerged as one of the most significant and transformative developments shaping industrial design today. Ethnography can assist in the design of a successful product. A product or service is a *success* when it meets or exceeds a company’s business objective and goals (Peters, 2000). A product is deemed a success not only when it is a hit with consumers but when it is well crafted and becomes essential, in some cases, central to our lives. Ethnography’s importance lies in its allocations to resources, working with others and the use of information and technology. Design research can help define customer and user needs: global market research is especially needed to inform designers of global needs. Research can insure that the product is focused on customer needs, can uncover latent or hidden needs and meanings as well as more
obvious, explicit needs. As companies become more human centered in response to market needs, the challenge will be in making computers that know you and can learn about your needs and understand verbal and nonverbal language (Negroponte, 1995).

One drawback of the present research was time; although the author studied only eight students, the results coincide well with the previously mentioned studies. Current design studios encourage contact with the faculty as well as fellow students. Contact means that students are not only encouraged but required to interact on projects and arising project issues. Traditional skills-based studio experience incorporates little time for interdisciplinary studies and more varied student exposure. Unfortunately, technology is often thought of as the solution instead of being a part of the solution. Many existing programs fail to include in their curriculum collaboration and team dynamics, cultural differences and business strategies; all of which are important in the marketing and the process of industrial design. Academic institutions think differently from corporations and are organized differently. Therefore, these differences should be embraced in academia. Thus, a faculty member’s responsibility in preparing students for the workplace begins from the time students step into their world. A studio-based education (which most designers have) is vastly different from a traditional program of study such as Chemistry, for example. Since there are numerous possible answers in a design curriculum, an education with interdisciplinary studies would benefit a designer’s education.

**Future Possibilities**

Advances in technology and design are occurring at a rapid pace. Establishing a network of resources between academicians and professionals will offer design students up-to-date
information regarding their work and ideas. Teaching does not end in the studio or in lecture, but continues in every contact students have with a diverse faculty. Educational models should be based on more of a human-centered approach; for example, learning how different genders work in the design environment and distinguishing their strengths and weaknesses can help improve a product. Many educational institutions congratulate students and faculty for knowing one correct answer instead of encouraging creative problem solving and various ways of approaching an issue. Instead of emphasizing individual work, institutions could structure more teamwork and human-centered design projects. Faculty could hold intensive workshops for students (and also for each other) in whatever their specialty or particular interest may be. Doing so not only hones their skills while exposing them to new knowledge, but also allows the sharing of new information.

“*The world and the world of business are changing. Individualism is out, teamwork is in. Specialization is out; now-style generalism is in. Rigid organizational lines are out, fluid collaboration is in. Power is out, empowerment is in. Hierarchical organizations are out, replaced by network organizations, adaptive organizations, informal organizations and horizontal organizations. Right smack in the middle of all this sit cross-functional teams composed of experts ready to move quickly and flexibility to adapt to changing business needs.*”

Glenn Parker, *Cross Functional Teams.*
APPENDIX A: Questionnaire

Please respond the following questions as thoroughly as you can on the given disk.

1. Do you think a person’s sex helps determine processes used in design? How so?
2. Approximately how much time do you spend designing on the computer vs. designing off the computer? (includes sketching, models….)
3. Do you prefer designing on the computer? Why or why not?
4. Where do you generate your ideas from (ex: magazines, books, television, people….)?
5. Do you think men or women have a higher tendency of being more creative?
6. Do you visualize a plan prior to starting the actual design?
7. How far along the process are prior to actually beginning to build?
8. Please give an example of a project that you have completed from start to finish.
9. Estimate a percentage of time spent on pre-design involvement.
APPENDIX B: Subjects Responses to Questionnaires

Female #1

1. Do you think a person’s sex helps determine processes used in design? How so?
I think that a person’s sex may or may not determine the processes in which he or she uses when
designing. If one looks at children, as an example, he or she usually finds that boys have one way
of doing things while girls have another. Boys tend to be very abrupt and rough while girls tend to
be more moderate and delicate. However, there are ALWAYS exceptions to this statement. This
is why I would say that a person’s sex may or may not determine the way he or she designs. If one
prefers to generalize, he or she may say that males would be more inclined to complete a design
and run for the shop to get their hands dirty. One may also say that females would be more
inclined to take their time on designs and be more hesitant to get in the shop. In some ways this
may be true, but there are plenty of males who would be like the generalized female and vice
versa. There is not an “archetypal” male designer or a “archetypal” female designer, unless one
can prove what that would entail.

2. Approximately how much time do you spend designing on the computer vs. designing off the
computer? (includes sketching, models....)
I most definitely design more off the computer than on the computer. I really enjoy taking the time
to design, then taking the next step to eventually see my design become a reality. I am currently
learning a computer modeling program, but I would never try to solely design on the computer. I
hence could never see what sort of hands-on effort went into the design. If one wanted an
estimate on this, I’d say 90% off the computer and 10% on the computer.
3. Do you prefer designing on the computer? Why or why not? I do enjoy design in on the computer, especially if it involves any sort of graphic design projects (using Photoshop, etc.). However, like I stated in the previous question, I like using more creative skills in my designs.

4. Where do you get your ideas from? Where do you generate your ideas from? (magazines, books, television, people…) I get my ideas usually from some sort of inspiration, whether it is concrete inspiration or mental inspiration. I often will generate my ideas from my inner thinking, but having someone or some thing in mind. In this I mean… I don’t see something on television and say… “hey, I’ll take that idea or notion and completely use it in my design” but rather, I’d be more inclined to read about a need for something or know about a need for someone and generate a new design with that in mind.

5. I don’t think that either men or women have a tendency to be more creative. If I were to answer this question before I got to college, I would say that women were slightly more creative because of all the female talent I saw in a some of my art classes. However, after being in college for almost three years, I have seen so much talent amongst both men and women, that I couldn’t say which sex is more creative.

6. Do you visualize a design plan prior to starting the actual designing?

I would say that I usually start out with a design plan, but end up changing that plan as the project progresses. If I stick to a design plan throughout the project, this would probably mean that I am experiencing an extreme amount of success…every test has gone how I thought it would and I have made little or no mistakes. However, if you were to ask any design student, this rarely happens. Instead, I normally have a route in mind but I don’t make new turns until I am ready to. How far along the design process are you prior to actually building? I am usually not too far along the design process when I begin to make models. Three-dimensional models almost always help
me to see the problems I may encounter better than any two-dimensional drawing ever could. I also like to have many iterations on each project so that in the end I have a final design that I am extremely satisfied with. Model making definitely helps me to accomplish such.

7-8. Please give an example of a project (from start to finish) that you have completed in the past as a studio project. My light fixture project: Created a program for the project........what sort of fixture do I want to make? I decided that a sconce for hallway or mood lighting would be a good area to start with. Conceptualize my ideas in simple sketches of what the sconce would look like and what sort of light it would produce. Make simple models (still conceptual) to continue to visualize the way my light would work. Start to understand electricity and how to get a light fixture to work. (e.g. playing with wires, electricuting myself a few times). Get some input from a lighting designer and my fellow classmates and teacher. Use some of their advice. Begin to finalize my work. Make final decisions about function and aesthetic. Run for the shop.........I love the shop. Start machining all the parts for the light fixture (e.g. fasteners, body, etc.) Have a final project that is aesthetically leasing, satisfies my program, and most of all, FUNCTIONS!!

9. Estimate a percentage of time spent on pre-design involvement (i.e. Brainstorming, sketching, visualizing, discussing, researching, etc.) The percentage of time I use on pre-design involvement is probably 50-60% of the time. This percentage would probably be much higher if it didn’t take so long to actually create a finished-looking design satisfies my initial ideas for the project.

**Female #2**

1. Do you think a person’s sex helps determine processes used in design? How so?

No I feel it is more how the person was raised and their personality characteristics that effect their design processes. Some may say a girl is more scared by the shop then a male. I know for a fact
that is not true. From what I witnessed in my lab the females work as much or if not more in the shop creating models. The only difference I see in my lab is the time spent on creating the idea. But that is more of a personal characteristic not a gender characteristic.

Approximately how much time do you spend designing on the computer vs. designing on the Designing on the computer is a final step for me. I come up with my ideas through models and a few sketches and then I use the computer as an aid in presenting my work. For me design is a hands on process you must be able to hold your design in your hand to know if it will work and then I use the computer to show the things that may be impossible for me to show on a model.

2. Do you prefer designing on the computer why or why not?

I prefer designing on the computer rather then sketching. It feels more exact and mathematical. But as I stated before there is nothing that can compare to a model.

3. Where do you get your ideas from? Where do you generate your ideas from?

For me a lot of my ideas come from researching the subject in books or online. I look for ways to make the product better either in the way it looks or how it works.

4. Do you think men or women have a tendency to be more creative? Why?

Being a woman I would like to say we are more creative but I know that is not the truth. I believe creativity comes from your parents. But I also believe creativity can be practiced. Therefore I do not believe that one gender overall is more creative then the other.

5. Do you visualize a design plan prior to starting the actual design?

Yes, I feel a design plan is a necessity if there is any kind of deadline. I personally write down my plan on a sheet of paper and live by that sheet of paper until the project is done. I will not move on to the next step in my plan unless the previous is done otherwise you might be skipping something in your overall design.

6. How far along the design process are you prior to actually beginning to build?
As I have stated the model is the most important part of the process I usually start building after a few preliminary sketches have been completed I do this because paper doesn’t give you a complete idea of how your design works visually or physically.

7. Please give an example of a project that you have completed from start to finish?

The best I can do is write the design plan for my lamp

1. research lamps
2. create a basic idea (tough lamp for bedside)
3. research touch lamps
4. order materials based on research (Aluminum)
5. preliminary sketches
6. final sketches showing measurements in different views
7. shop- creating lamp on lathe and milling machine
8. renderings of lamp
9. computer renderings in vellum as final step

9. Estimate a percentage of time spent on pre-design involvement.

Pre-work usually takes up about 40% of my overall time. But my situation is a little different than other people. My “Pre-work” is throughout most of the process. I come up with an original idea then quickly make a model I then go back to more pre-work and fix the glitches. This is a cycle that continues until I feel I have come up with the best solution.

**Female #3**

1. I disagree that a person’s sex can determine processes used in design. Process in design, I believe, is something that is not gender related because it is a orderly way of doing something that
is one’s own personal style and understanding of how something should go about, in order to find an answer or to lead to an understanding.

2. From introduction to documenting a project I spend about 10% researching, 30% sketching and brainstorming, and 40% model making, finalizing and making more sketches. The other 20% is documenting the project, which includes photographing, scanning, and layout on the computer. Designing on the computer usually for me is done only for documentation, which is done at the end of a project. I seldom use a computer before documentation but recently I have been learning Vellum 3D solids so I plan to use this for projects in the future to go along with my sketches and first conceptual ideas.

3. I prefer not designing on the computer because I enjoy doing my own sketches and work by hand. Every individual has their own style of drawing and expressing themselves so I think it is important to see this in one’s work. Having access to the shop allows me more to see how things work and how processes are done. I like using the shop and drawing by hand opposed to designing on the computer. I just began working on my portfolio this semester and so far I enjoy the graphic design, it is time consuming, but I do think it is an important part of the process of design because of the fact that it is documenting everything about my project. Designing on the computer is something I will always be adjusting to but I believe it is a challenge at the same time.

4. I generate my ideas from magazines, books, television, people, past experiences, and just by observations. I like going to people and asking them questions and letting them know what I may be researching to see what kind of insight they may have. I also research the library to see what kind of books may direct me into helpful areas.

5. Generally just interacting in everyday society and observing the kinds of things that go on and what people are interested in product wise helps generate ideas. Teachers are resourceful when class goes on so they help guide me to the next step in my projects. Looking at magazines on
racks and just flipping through them and looking at pictures is something I think is exciting because it throws out possible conceptual ideas.

6. I think men and women for the most part, aren’t more creative than the other" but instead have slightly different interests in creativeness. For an example a male might have more interests in certain projects likes cars but at the same time this is not always true. I think there are certain projects that women might be more interested in that men would not even want to take part in but I don’t think one can generalize and say that one is more creative than the other.

7. For most of my projects so far, I have visualized a plan prior to the actual design. I think it is very important to make a plan because it helps organize the stages throughout the project, from beginning to end. Some projects from the beginning have a group of parameters like size, form, and materials, which help, guide a way towards the actual designing. During the design process I begin to build the actual design after going through a couple of conceptual ideas and possible conceptual models.

8. This is about middle way through for some projects and some even sooner because it is good to understand what materials, forms, and ways the actual building processes are available at the time and how they actually work.

Fastener Project from start to finish-Given this project in my second year lab, I first decided to redesign the key chain as a fastening mechanism. I chose this project because the rings that are used for everyday keys are just too difficult to interchange. This was one of my pet peeves. So I sat down and started sketching ideas and observing fastening mechanisms and other key chains that people were using and some that were out on the market (in stores). Then I decided that a spring-loaded mechanism would work for making a design that would be less difficult to manage when taking off or putting on keys. Next I created a design where a ring was still involved but the fastening mechanism was an easy pinch and twist to relieve the key from the ring. I did many
versions and drawings by hand, but I found that since it was such a small object to draw I was able to precisely draw it better in CAD on the computer. So I also did many versions of this on the computer as well. During this time also I was able to research materials that I may be able to use. This included taking three different materials and machining them to see how exactly they would machine and interact with one another. So eventually when I found the design I was satisfied with, I was able to draw final renderings of my design by hand and on the computer. When I finalized my work I then photographed the project and scanned in the images and then made a layout and documentation of my fastener project.

9. I like to make sure I spend enough time on pre-design just because it is important to brainstorm, sketch, visualize, discuss, research, etc. I think that about 40% of the time I am pre-designing but at the same time I am also doing these kinds of things throughout the project up to the final design. I find that it takes longer to get to the final design than I would have thought so that is why I think the percentage of pre-design is so high.

**Female #4**

1. I do believe that a person’s sex helps determine processes used in design. I think that males tend to enjoy working with machines and large tools in a shop atmosphere much more than females do.

2. I think that females like to do much more work in an atmosphere that they are not constantly worried that they may chop off a finger or something. I also think that males tend to like projects which are different than females, and each take different routes when doing the same projects. For instance, a car project is much more interesting for males who tend to worship cars and have for a
longer period of time. However, I think the brainstorm process at the beginning of a project is the same for both sexes.

3. Both tend to start research in the same way by learning as much about previous designs as possible. Since I am especially interested in graphics, I tend to do most of my work on the computer, with little done sketching and modeling. I really don’t like to model at all. So that will receive the smallest amount of time. I do prefer designing on the computer because I feel like I can change things easier, as well as put out much more work than if I was not working on the computer. I get my ideas from everything that I come into contact with. However, I mainly get inspiration from printed media including books, CD covers, magazines, mail, brochures, etc. The source that I least get inspiration from is people who tend to make me feel like I am not doing a good enough job. I think that creativity depends on the person and their own mind. I don’t think that creativity depends on a sex because I know plenty of un-creative males and females. For me, it depends because I work in many different media such as computer graphics, collaging, painting, sewing, cartooning, etc.

4. The different things require different design processes. With collaging, I can sit down and have absolutely no plan at all and something will come to me. The same goes for computer graphics and cartooning. However, with sewing and painting, I tend to have a plan in my head as to what I am going to have to do and when. In those instances, I tend to like the ones that give me more freedom more than the one’s that don’t. I like to start the building process (on computer) from the start and see what happens.

This is a funny question (asking to give an example of a project that I have completed from start to finish) because I tend to never finish anything, because I start and lose interest so quickly. However, the stuff that I do with graphics come to the most closure. With those, I have always gathered information about the project and looked at past designs. Then, I get images that I think
will do the trick, and then I head to the computer, where successful designs have taken as little as 15 minutes and as long as days. I usually spend about 50% of the time on pre-design.

**Male #1**

1 & 2. Proportionately, I spend much more time off of the computer. Probably 75%.

3. For physical objects (i.e. 3D modeling and what not) I must prefer manual sketching and ideation over computer brainstorming. I usually prefer to use Both in this situation, however, in this order: Sketching, Computer Model, Physical (ren, urethane) Model. Having the ideas out first, then the specific image of what it will look like, then the physical “hold it in your hand” model.

4. Hooo boy! Where do I get my ideas from? A lot of different sources of inspiration: related applications or forms in nature (i.e. make this car look like a bug”), stylistic influences from earlier times in history (i.e. The Golden Age, pre-WWII, Ancient Japan, whatever), especially if these older styles can be updated to fit modern technology without losing their original flavor. Movies or TV shows (esp. cartoons) tend to give me lots of ideas, as do graphic novels and comic books. A lot of the time I try and pull ideas from psychology/sociology/ancient mythology -- as in, observed patterns of. This question has a conditional answer…For physical objects (i.e. 3D behavior relating to design since way back when. Stuff like "use of color and texture" or even just form or pattern studies (like a *good* persian rug).

5. See Answer #1. Again, it CAN relate to how he or she is brought up, and often under different applications) males and females are encouraged to be more creative in their traditionally obligatory fields (i.e. guys : cars, women : fashion, yada yada ya). Stereotypically, guys and girls have about an equal amount of mental baggage which *prevents* creativity: such as "she can't take criticism"
or "he can't communicate" or whatever. In other words, no. Although there's more historically
creative work by males, how long have women had anything resembling social equality?

6. Uh, sort of. Sometimes I get a flash of inspiration and I already know what I want to do upon
first reading a program. Other times I have to poke around a lot until something clicks (if that's the
case, I do a lot more sketching and small-model work than in the former).

7. As in #6, it depends. If I really have no idea what I want to do for a given project, sometimes I
start building out of clay or paper or something (study models) almost immediately. Other times, if I
have a solid conception of my final plan, I'll get almost everything else out of the way first (although
SOMETIMES, especially with the computer, I'll still generate a model on to get a good feel for its
appearance). Wishy washy answer, I know.

8. Recent project (with Jerry E. and K.A. Joseph) - Automotive Display Project

Day 1 - Research and Ideation - where can we go with this project, etc. How "out there" can we
make it? No realism yet, just wacky ideas. Went to the Shelor dealership to see an existing
projected Display on the new 2000 Vette. Day 2 - More Research, More Ideation - we're a little
more informed now as to the nature of what we're dealing with, so we can focus more clearly on
our objectives. Again, more random ideas, roughly sketched out on paper (we had about thirty
pages up on the wall). Day 3 - Ideation, Focus - We cut out a lot of "too wacky" ideas, started
developing specific designs (one or two each). Solid renderings (about a half hour each), as well
as a short idea/design presentation to a couple of project managers. Day 4 - More renderings, etc
(Interiors, Steering Wheel, Dashboard), as well as initial Ideation into the actual projected Display -
Started doing a little bit of computer work now - 3D modeling of the Car Interior, as well as 2D
layouts of the screen. Day 5 - Day 7 (weekend) - Solid designs complete for the wheels/interior.
Design process focused on projected image. Initial computer models completed, layout
established. Day 8 - Day 9 - Started producing pages to explain the process by which this whole contraption works. Multiple visual images, multiple explanations, general template format.

Day 10 - Panic Day: Finished all pages (total of 62 color plates between the three of us): Title, Intro, Doc. Statement etc. Interior Concepts Estimated Image Views Sample Menu Navigation Sample Item Use, etc. Applications, future use, etc. Printed out the whole thing ($$$), shipped to Detroit. All done.

9. In the project above, almost fifty percent of the time was "pre-design" merely because we were given wide latitude with the project at hand. Given a more specific program, the "pre-design" time is cut down to around 20 - 25%. Group projects tend to have much more "pre-design" time so that the members can focus more clearly, even if working on separate designs. Often we would find that we were all designing different yet inherently similar objects or screens.

Male #2

1. I believe that the way someone grows according to influences (such as parents, teachers, authority figures, etc.) has the most to do with the determination of processes used in design. Sex, in this case, has a lot to do with the with way the influences handle a relationship with an individual. Obviously, boys are treated differently than girls and vice-versa. Therefore, someone of a specific gender will tend to reach for existing or learned methods (according to sex) in order to design by appropriation. So, yes, I think that sex affects the design process. How so? To be specific, sex affects the way we write (letter-size and form) the media we use, the routes we will take to gather materials, and the way we present out work and ourselves. As well, our influences and mentors, many, not all) seem to treat genders differently through expectation, conversation, evaluation, and just about anything else ending in -ation or -ism.
2. I spend a lot less time designing on a computer than I do at my desk or anywhere else. I estimate (excluding page layouts) that I spend more time designing by hand (at my desk or elsewhere) by a factor of five (5:1).

3. I always prefer a physical model or a well hand-drawn image to a computer-generated model or image. My level of sensitivity and enthusiasm is much higher in this case. I use computers only to achieve nice rendering capabilities, exact dimensions, and better precision (basically, to cut corners). It is a shame that many people, these days, seem to prefer computer jockeys and stylists to good designers.

4. I generate ideas from books, brainstorming, discussions, lectures, magazines, brochures and pamphlets collected on travel, and the internet (on occasion) in this order. Depending on the context, a person of one gender can be more creative. Also, gender-specific factors can be more creative. This also depends mostly on the individual.

5. I cannot answer why without making false stereotypes. I tend to gather information first and then form a program unless I have a given program to follow. I tend not to have what some call a “big idea” prior to designing. On occasion, the rubber will meet the road faster. This is when the program has to do with something that really interests me.

6. In the design process, I begin to build once I have coherent drawings, a functioning concept, decided on materials, drawn plans according to materials, and gathered materials.

7. New Clorox label-the assignment was a group research project in which we all were asked to create our own label designs. We split up the research into groups of 4-5 persons. The groups were asked to analyze consumer navigation (the way someone reads the label according to direction of eye movement), color, photographs of the label and the location of Clorox bottles, content, and font. The assignment was intended to last for two weeks. My efforts mostly dealt with the photography, presenting images to stir the others’ imaginations, and designing my own label.
began by going to grocery stores with my group members and photographing Clorox bottles and the surrounding items. We then photographed images of Clorox bottles in other places they belongs and in places they if not belong. The photographs were meant to illustrate the most appropriate and the most inappropriate locations and uses. We, then, placed the images onto a computer in which all other Clorox designers had access. On my own, I began to lay out pages with the images on them and played with other complimentary or contrasting icons having to do with household cleaner. I also rendered a bottle in Rhinoceros 3D on order to be able to may my label designs on the bottle to see hoe the label design(s) worked. Upon meeting at a specified time with the rest of the designers, I was able to draw from their ideas and learn from presenting my own. Then, I began to design my first label prior to our first critique by the way of scans, font downloading, image collection (Clorox collectors bottles on the Clorox web site), and Adobe Photoshop 5.0. I had to compromise with time and did not finish the first attempt as I would have preferred. Though, I had finished just enough to receive a good criticism at the next designated meeting. Next, I returned to my computer in which I used the criticism to guide my design decisions. Finally, we met one last time to present our most recent (final) designs. Upon presenting my most recent label, which was pasted to a bottle, and receiving input, I felt my label was near success! Some of the designers, then, placed out bottles on display. I do not know why they chose to hang the bottles in the path of student and faculty traffic. So, I apologize for the inconvenience. I’m sure they meant well.

8 and 9. I assume that all of my so-called pre-design involvement is design. However, I estimate that the percentage of time spent working, researching, etc before coming to a precise design conclusion is somewhere in the range of 70% to 80%. The other 20% presentation, and making adjustments.
Male #3

1. The process of design involves ideation and conceptualization as well as model and prototype development. I believe that a person’s sex does not affect the ideation and concept development phase of design. A person’s sex might play some role in the method used to develop a model or prototype.

2. For example: using shop tools to machine parts etc. might be more male dominated though I believe that it really depends on each individual person.

3. This depends on the amount of time I have to finish a project. It also depends on what I want to accomplish by the end of a project. If the project requires a finished looking prototype in a short amount of time then I would spend a majority of the time creating the prototype on the computer.

4. In most cases I spend about 75% of the time ideating, conceptualizing and making mock-ups outside of the computer environment. The rest of the time is spent on the computer if the final product requires it.

5. I do not design on a computer. I must have some idea about what I want to do and only if the product requires that I use the computer do I use it. I usually use the computer once I have decided on a certain design and I want to create a prototype of it and see how the product might actually look in reality.

6. I develop my ideas after researching some books, existing products, other people’s ideas, etc. The Internet is a great resource. Though new ideas usually come down to what I think works.

Male #4

1. Personally, no, I don’t believe that your worth as a designer comes from what sex you are—neither male nor female. A good designer comes from within. A good designer comes from your
ability to reason logically and meet people’s needs by that which you design. Both males and females might meet this criteria. I do not give more weight or validity to a design based on the sex of the designer.

2. I spend about half of my time on the computer and half of my time designing off of the computer: at my desk either sketching, rendering or making models. Most of that time that I do spend on the computer, however, is spent trying to figure out what it is exactly that I want to do, how I want to have it done and basically just playing around on the computer or until I get it right.

3. I prefer designing on both the computer and in other ways. Working on the computer allows me to be more exact in my measurements and is more likely accepted. I'm not really sure if I think that males or females are more creative. Personally, though, I believe that it is one’s experiences that make you a good designer. The most valuable skills to have as a designer (and this can be proven, just call up any design firm and ask!) is that you have strong communication skills and that you can draw, sketch, render on command (i.e. when asked) and work on the computer (CADD).

4. We are taught not to have a design before we start working on a given project. We are encouraged to do more research on the project and learn as we research.

5. But usually, yes, I guess I do try to have some sense in my head as to what the product should work like, look like, be like…but that idea is never carved in stone nor is it ever finalized; it is important to constantly be ready for change and never be stuck on a design.

After I have done enough research on the project and have decided what materials will work best is when I start actually beginning to build. Also, after I have an exact idea as to how the product will function. Since you can never do enough sketches, I am constantly doing sketches of my product. Sometimes even after I have started to build it.

6. An example of a current project would be: The Lamp Project. The assignment was to build a lamp. So, I chose to do a desk lamp out of recycled materials.
7. I spend a few days researching available recyclable materials and looking at lamps in general going lighting stores, looking at lighting and architectural magazines. Second, I spent a few days sketching what I thought would consist of a good light and what are some factors that equal good lighting?

8. Thirdly, I spent even MORE days drawing lighting. Fourth, I decided on a design and went straight to the yellow foam as my material and began making models. AND THAT’S ALL FOLKS!

9. So my percentages could be broken down to the following: time spent brainstorming: 10% (although I also brainstorm while I draw). Time spent on Pre-design and researching materials: 30%. Time spent on sketching: 40%. Time spent on the final design and prototype/model: 20%.
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VITA

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