

A GUIDE FOR THE STANDARD STRUCTURE OF THE FIRST YEAR OF
INDUSTRIAL DESIGN EDUCATION

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Corin Meagan Ludwig, daughter of Dan and Heidi Ludwig, was born September 25, 1981 in Honolulu, Hawaii. She spent her elementary and high school education throughout seven different states and Canada. She graduated from high school in 1999 and entered the Virginia Polytechnic Institute and State University in the fall of the same year. She completed three years in the Interior Design program at Virginia Tech and then decided her passions lay with industrial design. She then transferred to Auburn University and entered the post-baccalaureate program in the Industrial Design department the summer of 2002 and received a Bachelor of Science in Environmental Design, Suma Cum Laude, in December 2003. She was accepted to the graduate program in the spring of 2004 and entered the Masters of Industrial Design program at Auburn University in January of that year. During her graduate schooling, she served as president of the Auburn Student Chapter of the Industrial Designer's Society of America, was initiated into the Auburn University Alpha Theta Chapter of Tau Sigma Delta Honor Society for Architecture and the Allied Arts, and also worked as a Graduate Teaching Assistant for two semesters.

THESIS ABSTRACT

A GUIDE FOR THE STANDARD STRUCTURE FOR THE FIRST YEAR OF INDUSTRIAL DESIGN EDUCATION

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The creation of a guide for the production of a standard structure for the foundations year of industrial design education is the essential purpose of this thesis. This teacher's guide will offer a resource for instructors to reference when creating a foundations year studio curriculum. It provides a means for guided discovery for the development of a departmental structure. This study will discuss the psychology of adult learning as it pertains to introducing design students to abstract concepts. The definitions of the elements and principles of design will be described and their inherent psychological references will be outlined. This study will also explore relationships among the fundamental principles of design as well as proposing a chronological order for presenting the foundations elements and principles in the first year of design. This

thesis will involve the design and fabrication of a device an instructor can interact with to aid in the creation of a curriculum. This transportation device will include the following preparatory resources; core concept teaching points, interactive note taking devices project idea sources, visual descriptions of the principles and elements, student evaluation materials, self-reflection sections and a guide for documenting an instructor's work as well as that of the students. These combined resources make up the teacher's guide, which serves to organize and record the process and materials necessary for the creation of a curriculum. The purpose of this guide would be to not only provide a standard basis for design foundations studios, but also to encourage the professor to add ideas, create and try new projects, and record what works and what does not, thus creating a solid curriculum.

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Style manual or journal used:

APA Standard Guide, Fifth Edition

Computer software used:

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1. INTRODUCTION TO PROBLEM

1.1 Problem Statement

The first year, or foundations year, of design education is essential for the creation of a design language that will be used throughout the remainder of students' creative careers. However, there exist many instances in which these beginning fundamentals are ambiguously communicated. The importance of recognizing and defining the basic foundations principles is well known, but a vastly encompassing task. A teacher's guide is one option to facilitate a standard source of course material and concepts all foundations year studios should include. Receiving the teacher's guide or kit would especially benefit foundations year teachers by providing a standardized structure, recommended by the department, in which to follow while creating their own curriculum. It would also provide them with background materials to keep improving and building upon the existing course plan.

1.2 Need For Study

Without a solid knowledge of how to apply the principles and elements of design a student is unprepared to make well measured decisions needed to create exceptional products. Unfortunately, a standard structure for professors to follow while creating a curriculum does not yet exist.

Research was done on these shortcomings of industrial design departments through several areas. I first examined my own experience with both theoretical and systematic approaches to the fundamental classes. I then held discussions with faculty in the design profession, which directed my research. Then I moved to analyze my experience as a Graduate Teaching Assistant in the foundations year level and also made exchanges with the design community in on-line discussion boards. The result was a realization that high-level design could not be reached if the fundamentals are not adeptly understood and in turn applied by the students.

A survey of design literature reveals numerous essays and articles outlining the problems associated with design education, but I found none that offered any solution. Philip Roberts, a design educator who contributed to the book of essays called, *Issues in Design Education, Art and Design Education Series*, comments on the question of what is being done to find a standard structure for design education. Roberts says, "...there is a considerable struggle going on to restructure part of the practice in the secondary curriculum, an attempt to formulate a coherent model of curriculum; and until a sufficiently coherent new paradigm of practice emerges, the urgency surrounding this question must continue" (Thistlewood 1990). Roberts' observations illustrate the need for an answer of how to create a standard design curriculum with which to consistently instruct students. Focusing on the foundations year will provide students with a solid understanding of the principles and elements of design that will prove essential for all subsequent years of design work.

1.3 Literature Review

This literature review is an introduction to some of the issues that motivated me to explore concerns surrounding industrial design education. Although, my experience has been limited to schools in the United States, the literature I have referenced in these beginning stages of my thesis have led me to believe the non-existence of a standard structure might be a global problem. The following quote by Michael Yeoman, British author of *The Future of Design in Further and*

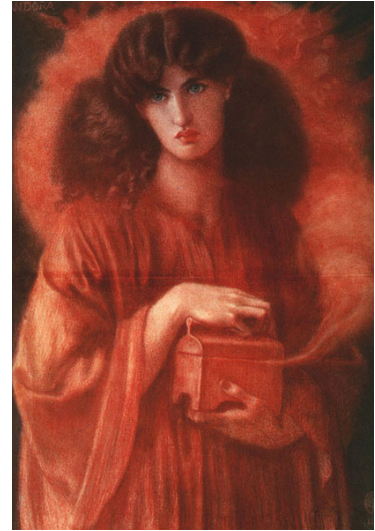


Fig. 1 - Pandora, Dante Gabriel Rossetti 1869

Higher Education, shows how the subject of industrial design education offers both a dilemma and an opportunity. Yeoman states, “Depending on one’s point of view, design education can be Pandora’s box or a cornucopia” (Thistlewood 1990). The lack of a resource outlining what skills and concepts industrial design students need to learn is a widespread problem in need of attention. This in mind, the lack of solutions for this problem is to be expected. It is a complex and dynamic quandary and those on the front lines rarely have the luxury of trying to examine the problem in a large context. While this subject is too broad to undertake for a masters’ thesis, taking the first steps to offer a possible solution could be the beginning of a dialogue to collect a wealth of potential avenues of exploration. Through this literature review I begin to uncover the combination of different attributes associated with a design fundamentals curriculum. This information will aid in the creation of a guide for use by foundations year design professors in the successful instruction of the elements and principles of design.

Transition Into Studio Experience

In an article written by Joe Wilson, a professor at the National College of Art and Design in Dublin, the notion of a Metaphorical Geiger Counter or a gage with which to observe the world, is discussed, “This Metaphorical Geiger Counter is a subtle blend of formal skills and inventive acrobatics which respond to the proactive procedure of looking and noticing” (Wilson 2000). Wilson’s ‘gage’ describes how successful design students stand apart from the rest in their ability to actively observe the world around them. This distinction, he claims, comes by learning how to make intrinsic connections with their surroundings, “demonstrating that she or he *looks* with intelligence and curiosity, and *notices* in a mode of personal exploration and discovery which is directed towards what’s ‘out there’”(Wilson 2000). The challenge is found in the process of how students are taught these skills.

If we can break down this skill into words, why can we not find a way to teach it effectively? Making students into excellent designers is not a cookie-cutter process; exceptional students have a drive and passion for design, but they do not get there on their own. However, instructors could address the skill of ‘noticing’ while teaching the fundamentals. With my design school experience I have observed two types of schools; a technical process-oriented school, and a blue-sky theoretical school. Both have inherent qualities of making successful designers. However, these two institutions could benefit from each other’s strengths.

Wilson claims, “learning to notice is not something which comes naturally and nor does keeping track of this noticing” (Wilson 2000). Taking some thoughts from more theoretical schools would aid in helping students to push outside of their walls of

reason and skepticism. Wilson goes on to say, “a lot of effort and imagination is used by the inventive, sensitive, curious student/teacher/master in avoiding the trammeling effect of learning arbitrary skills, techniques and procedures for the simple reason that these skills are not impartial and *do* influence the ways in which we go about our daily visual organizing” (Wilson 2000). Wilson’s comments reflect a need for both an organizational structure to learning as well as the freedom of conceptual exploration.

With these ideas in mind I plan to address not only the primary information about skills the instructor needs to teach in class, but also the big-picture concepts all design students should be exposed to such as; the studio environment, the art of critique, ideas for developing process, and how to find inspiration. These are issues instructors should be aware of in order to help the students begin to see with ‘a design eye’.

Adult Learning Styles

To understand how to best present fundamental concepts to students we must delve into the psychological aspects of design. Teaching higher education brings us



Fig. 2 - Image showing left & right brain activities

beyond the developmental levels of younger students and must address the techniques required for adult learning. Rudolf Arnheim’s book, *Art and Visual Perception, A Psychology of the Creative Eye*, illustrates the principles of sensory perception in art. Arnheim states, “The relevance of these views to the theory and

practice of the arts is evident. No longer can we consider what the artist does to be a self-contained activity, mysteriously inspired from above, unrelated and unrelatable to other human activities. Instead, we recognize the exalted kind of seeing that leads to the creation of great art as an outgrowth of the humbler and more common activity of the eyes in everyday life” (Arnheim 1974). Professors can certainly use these observations as a cornerstone for their lectures and projects to ensure an effective approach when introducing the fundamentals.

Rudolf Arnheim dissected how the brain understands and relates to the principles and elements of balance, shape, form, growth, space, light, color, movement, dynamics, and expression. (Arnheim 1974) Virtually all university-aged students already possess an understanding of prior experiences with all of these terms, so lecturing on the text-book definition of each does not aid in the establishment of creative vision. Showing students how both physical and psychological forces play on the compositions can put the elements and principles into the context of how the potential viewer will subconsciously understand the information presented. Arnheim offers, “if we make the reasonable assumption that every aspect of a visual experience has its physiological counterpart in the nervous system, we can anticipate, in a general way, the nature of these brain processes”(Arnheim 1974). He goes on to describe the essential use of this information by stating, “Whether or not we choose to call these perceptual forces ‘illusions’ matters little so long as we acknowledge them as genuine components of everything seen...What [the artist] creates with physical materials are experiences” (Arnheim 1974). If we approach design learning from this perspective, we can express the importance of understanding of how viewers perceive visual information. This knowledge can aid in

the successful manipulation and control of the elements and principles - - the very purpose of the foundations year studio.

Creating Successful Projects

Much of design education literature is based not on higher education, but the introduction of design in the elementary years. Some of this information can be transposed to post secondary education from resources such as Richard Kimbell's *Design Education, the Foundation Years*. In his book Kimbell offers criteria for judging the value of a project. Kimbell's states, "Two distinct sorts of criteria are involved, the first concerning the material content of lessons and the second concerning the teaching method adopted" (Kimbell 1982). It is most important to develop solid projects for the students to learn how to use the principles and elements to make decisions. An important aspect of creating a curriculum is the ability to define how to know if a project is successful and, on the contrary, why a particular project was ineffective. Kimbell points out,

"Just because a project goes well it does not follow that it is a good project. The reverse may be true (a project that is badly received and has poor results is probably a bad one) but to be sure that it is a good project it must display further qualities...being concerned with the introduction of skills, concepts and procedures that the children will be expected to employ in their more advanced design work later on" (Kimbell 1982).

Herein lies the difficulty of creating a curriculum. How are new professors to know, unless through positive experiences of trial and error or a structure handed down from

colleagues, what makes a project beneficial to the students' development? Unfortunately, each class of students only has one or two semesters to master the fundamentals of design. A system could exist to guide the professor in the most



Fig. 3 - Young woman or Old woman? Can you see both?

successful methods of teaching fundamentals without having to struggle to develop a new curriculum or pedagogy from their own school experiences of long ago. Academic freedom is of the utmost importance and instructors should be free to manipulate the class content as he or she deems necessary, but the essentials of the principles and elements should not change. There is no one structured system for professors to gather all of the necessary information to construct a foundations year design studio that is assured to address all of the foundation concepts needed to build a good knowledge base. The premise of this thesis is an exploration into developing this structured system. It will hold the means for helping new instructors with where to look for answers to the questions they will inevitably have about developing foundations year projects.

A solution to the previously stated problems in design education could be a teacher's guide. This guide could help to define and arrange the principles and elements of design. It would facilitate the grouping of them for better understanding by the students and easier project creation for the instructor. The purpose of this guide would be not only to give a standard basis, but also encourage the professor to add ideas, create and try new projects, and record what works and what does not for the betterment of the class.

There is an existing absence of information on this matter. This is the main reason that leads me to believe a need exists for a foundations year level standard or guide to assist in the creation of a solid foundations studio. This thesis could be a benchmark for the design education community to study and build upon.

1.4 Definition of Terms

Common terms needing clarification used in design education are as follows:

Methodology – a set of procedures developed to lead one through the process of designing.

Design Fundamentals/Foundations – a language used to communicate design ideas through vocabulary consisting of the elements and principles.

Elements – building blocks for a composition; line, shape, direction, size, texture, color, value...etc.

Principles – concepts using the elements of design in a composition; balance, rhythm, emphasis, figure/ground relationships, harmony, dominance, unity, hierarchy...etc.

Gestalt – a theory used in design that states; a unified physical, psychological or symbolic configuration having properties that cannot be derived from its parts, but from the whole. The gestalt theory can be used by applying; closure, continuance, similarity, proximity, and/or alignment.

Accepted Ambiguity – the ability to let go of preconceived archetypes about everyday observations to see the world anew through the design fundamentals. Developing

comfort with the unknown in order to develop innovative approaches for transferring abstract thought to form.

Generators – a method using a point of inspiration (ex. idea, object, emotion, etc.) as a guiding tool for making decisions in a design.

Archetype – the original pattern or model of which all things of the same type are representations or copies.

Studio – educational environment in design departments. A classroom where students (about 10-20) have dedicated space to work on projects.

Pedagogy – the theories and teaching methods one has developed as their design philosophy.

Academic Freedom – the right of a professor to teach whatever they feel is necessary in meeting the goals of the class requirements.

Process Pages – a tool in which to record ideas, sketches, and thoughts about a project on a continuous sheet or roll of paper. The purpose of which is to aid in arriving at a solution to a design problem while documenting all steps made in the design process.

Diagramming – similar to sketching, but used as a tool for translating information from abstract ideas onto paper in order to communicate visually. The breakdown of an object into its essential lines or forms in order to show it symbolically.

Semantics – the language of signs used both literally and non-literally to communicate information.

1.5 Assumptions

While developing my thesis on design education I will make several assumptions without providing proof due to the general acceptance of each belief. First, I will design for a general age group of university students without major disabilities to accommodate for. I will assume many curriculums need help to provide a structure for their fundamentals courses. Finally, it is commonly believed, in schools I have been exposed to, a design language should be learned through the application of the principles and elements during the first year of design education.

1.6 Scope and Limits

The scope of this thesis is limited to the foundations year of design. I will cover the principles and elements of design as they relate to the foundations year of design education. The supplementary skills needed at the foundations year level for example, model building, computer skills, history, etc. are outside the scope of his investigation and will only be touched on in connection to a principle or element. This thesis only addresses the foundations issues in curriculums of public universities.

1.7 Anticipated Outcome

This thesis will culminate in the creation of a standard guide for instructors to use while teaching. It will include teaching points, an image database, an interactive 'sketchbook' for the development of new projects, evaluation tools, and documentation templates. Through my research I will be able to establish the need to develop a reusable curriculum proven to be successful in communicating the principles and elements to

foundations year design students. The long-range effects would be the assurance of a consistent level of education offered to students even through faculty transition periods, which would better prepare students to enter into higher levels of studios, then eventually into the 'real world' of the design field.

2. WHAT IS INDUSTRIAL DESIGN EDUCATION?

For the purpose of this thesis the following definitions will provide an understanding of the particular skills required to make a well-rounded industrial designer. First, the many definitions of industrial design range from that of Bruce Hannah, author of *Becoming an Industrial Designer*, who describes this profession as, “designing for the theater of life...filled with acts, actors, and actions that drive designers to create better and more interesting products” (Hannah 2004) to industrial design as described by Robert Gillam Scott in *Design Fundamentals* as, “a basic human act. Whenever we do something for a definite reason, we are designing” (Scott 1). In *Becoming an Industrial Designer* Bruce Hannah interviewed many prominent designers and recorded their personal definitions of product design.

Hannah’s own definition states, “Product design is really about making stuff – that is, transforming information about a problem, relayed by the consumer, the manufacturer, the engineer, the salesman, the marketer, and the client, into a solution that satisfies everyone” (Hannah 2004). Designers are a hybrid of artist, researcher, marketer, engineer, and salesperson. Designers use skills from each of these trades to discover the best solution to problems found in an endless list of consumer product areas. Not only are industrial designers diverse in their skill sets, they can design products for many industries; transportation, medical, consumer, furniture, electronic, footwear, toys, soft-goods, exhibit, packaging, and so on. Any product can be designed or redesigned with

the help of an industrial designer's education. The wide range of skills and specialties associated with industrial design illustrates why it is difficult to decide on only one definition. Hannah also points out how people who pursue the field of industrial design often share certain qualities,

“Almost all (designers) are people watchers at heart; they derive endless joy from watching what people do and figuring out why. Whether they design simple kitchen utensils or complicated medical devices, designers will tell you that watching people perform the tasks of daily life is what leads them to design discoveries that, once made, are incredibly obvious”
(Hannah 2004).

This observation by Bruce Hannah suggests that perhaps an industrial designer does not have one specific talent, but is a person with specific traits. Just as there are many areas of design, the following is a discussion about the different skills that are developed in industrial design education.

2.1 Industrial Design Education

Most design schools are four-year curriculums with design studios being the primary class structure; many are four or more hours in length and meet three or more times per week. Supplementary classes are often required to hone skills used in studios such as rendering, methodology problem-solving techniques, model making, and computer aided design courses. The foundations year studio is an introduction to the design process and an exploration in the design language. This studio is often during the first year of study, but in some curriculums students take university core for the first year

of school and enter the foundations level studios their second year after completing a summer technical drawing course. The purpose of this summer course is to build basic skills and to accept only a certain number of students who pass the strict grading standards in order to keep the upper levels of design studios from growing too large for the small professor to student ratios needed for design studio education. The foundations year of design education is the focus of this thesis as it is the most essential for building a strong foundation for upper-level design courses to build upon. Many of the fundamental concepts are abstract and therefore, the projects during the foundations year are exercises in applying the specific principles and elements and not the re-design of specific products. Product design requires a complete understanding of these basic concepts before entire products can be designed well.

During the foundations year of design, students will learn how to communicate visually, which is a language unto itself. The following chapters will discuss how the principles and elements of design are part of the vocabulary associated with this new language and subsequently how best to help the students become fluent in it. Other skills the students may learn during the foundations year of design education are; problem solving methods, sketching, model making, computers, materials and processes, social responsibility, design history, and a range of supplementary classes, such as photography, depending on the curriculum. Many of these skills need to be consciously worked into the foundations year studio curriculum to ensure an understanding and ability to properly apply the fundamentals to more advanced design problems encountered in the future.

2.2 Where To Start?

In order to communicate to the students how to apply the principles and elements of design, you may first step back and try to give the students more than just the language of design; they should understand the life of a designer. As an instructor you may first ask what you believe the students need to have been exposed to, absorbed, and able to apply by the end of your year with them. The foundations year of design must provide the students with the building blocks of the very basic skills and fundamental language that designers use to communicate and create good design as well as the ability to encompass the role of an industrial designer. The following are ten aspects of being a designer for instructors to reference and instill into the students throughout the year.

1. To understand and learn to speak the language of design. *Principles and Elements.*
2. To become objective, not defensive, of their work and the work of others. *Critique.*
3. To define and discuss what is good design and what is bad design in the world around them. *Design Eye.*
4. To understand the identity and responsibility associated with their profession. *Pride in Industrial Design.*
5. To develop the desire and drive to always produce good design. *Passion.*
6. The ability to make personal guidelines during the process of creating. *Design Guidelines.*
7. To learn to observe the users, to define the real problem in a product and produce a unique solution. *Parameters.*

8. To push the boundaries of these parameters, their creativity, and the project limits.

Innovation.

9. To use their design language, sketching, computer skills, and process to produce well thought-out 2D compositions and 3D forms. *Skills Application.*

10. The ability to refine and develop a process for successfully making design decisions. *Foundation.*

There exists no fool-proof plan for conveying these traits to the students, but reading them often can help to remind an instructor of what the larger context of a design fundamentals class is and what ideas to keep presenting to the students. Instructors should also be conscious of the unique experience of learning in a studio environment.

2.3 Transition Into Studio Experience

Bruce Hannah describes the transition students must make with regards to how they must recognize the person a product should be designed for. “Design schools teach students how to observe, research, and understand the problems people have either using or manipulating a product. This at first seems like it must be easy – but it isn’t. Students can stubbornly resist believing that other people actually exist in the world, let alone that they actually have real problems” (Hannah 2004). Hannah’s quote touches on the differences between industrial design schools and traditional areas of study. Students entering a design curriculum will most likely not have had any experience beyond the occasional art class. This is not a problem, but an opportunity to help the students understand how to see the world with a ‘design eye’. One of the first skills to be developed in studio is the ability to actively see how design affects the world and how

people interact with design. Chapter five provides some examples of exercises to stimulate the students to start throwing out their pre-conceived notions of the world and really start ‘seeing’. The students will undergo a transition into the studio environment, which can be facilitated by the instructor.

At first, many students could be intimidated by the open and ambiguous projects, the informal setting (design professors are often on a first name basis with the students), and especially the uniquely challenging design projects. Until now many of the students have only been exposed to high school and traditional college lecture based courses. The studio environment is interactive; you only get out of it what you put in. An instructor can help this transition in several ways; understanding the students’ individual learning styles and backgrounds, and providing opportunities to let the students influence their physical environment are only a few of examples.

Take into consideration, how a wide variety of personality and learning types will challenge an instructor to present the design concepts in ways all students can absorb and understand them. In *Designer’s Notebook*, a guide to industrial design written in the 1970’s by Bill Bockus, the example of two different types of students was given to illustrate the occurrence of how some students are technical learners and some are conceptual learners.

“It is often noticeable that a certain type of student, A, will do very well with a-type problems. He draws well, specs well, and completes renderings with professional ability. Yet this same student may find that later in the course he has difficulty in coming up with original concepts. He dallies, he procrastinates, he asks instructors for concepts instead of

technical advice and just cannot create an original idea. Another student, B, less rigidly trained in drawing techniques, may do rather poorly on the a-type problems. However, later he may discover he has original ideas or creative modifications, regarding the b-type assignments, coming out of his ears” (Bockus 1977).

This example illustrates the strengths and weaknesses students have with the unique hybrid of technical and creative skills needed in industrial design. It may be beneficial to explain this behavior to the students so, they will be able to recognize the skills in which they excel naturally and which ones they will have to work hard to develop. Adult learners are usually rational people and if students understand the context of the issues being discussed and how all of the teachings relate to ‘the bigger idea’ of product design. Students will then be able to apply the concepts more quickly than if every project was approached as a lecture and regurgitate exercise. Whether it is through a sketchbook, a process page, diagramming exercises, brainstorming sessions, or inspiration cards, (all of the previous techniques will be discussed in the body of this work) the students will be able to find out which process helps them individually to develop better solutions. It is vital the professors recognize different learning styles expressed in the students and to help the students understand what type of ‘learner’ they are themselves and if they have the capacity to thrive in a design environment.

Not only are grades a ranking tool to reward hard work and excellent solutions they are a means to show students if they are also a good match for the industrial design field. It is essential both to the students and their peers that those who would be better suited for another major/field of study should be helped to make this realization. If poor

students are allowed to proceed into upper levels his/her presence can often marginalize the efforts of others, bringing down the collective efforts of the studio. The success of a studio depends on both the morale of the entire class and also the physical environment.

The second aspect associated with transition into the studio environment is the actual studio space. Bill Hill, a professional designer, was quoted in the book *VizAbility*, an interactive guide for learning to communicate visually, with regards to his workspace, “the environment to me is probably the single most important element in creating visual work. It’s the place where thinking occurs. And the control of that environment... is to me the most important aspect of being creative and taking advantage of my creativity” (Hooper Woosley et al 2004). Designers thrive when being stimulated visually, but unfortunately many institutions are a sea of taupe walls and florescent lights. Design students should have control over their space, even if the university’s facilities division will not allow permanent alterations to the building. Denny Boyle, an engineer and product designer for the design power house IDEO is quoted in *VizAbility* as saying, “I’ve found that surrounding myself with as much material as I can, whether it’s related or not, it all tends to be related somehow, indirectly. I can make some lateral connection between things that aren’t normally associated, to make them try and express my idea” (Hooper Woosley et al 2004). Boyle’s approach to his environment is helpful for the students. The instructor can encourage the students to design lighting alternatives or provide a space for students to bring in ‘inspiring’ products or images. The students will start to manipulate the space to be a more creative environment if they are introduced to the idea. Several other aspects of the unique design education experience are explored later in chapter five such as grading and critiquing.

If students have an understanding of what design school is like they will be more prepared to absorb the design fundamentals. To clearly present the concepts of the principles and elements we must be able to reference the specific traits each possess and understand how students will interpret them. The following chapters offer instructors preparatory resources to utilize in creating a successful foundations year curriculum.

The intent of this thesis is not to outline the actual lectures or hand instructors a book full of project outlines. Rather, the professor must do so on their own so as to incorporate his or her design philosophy in order to passionately communicate ideas and inspire students. I will, however, provide both a structure to serve as the backbone for a standard curriculum and a system in which an instructor can create projects that cover all of the concepts students must understand and apply.

3. UNDERSTANDING: THE PSYCHOLOGY OF LEARNING THE FUNDAMENTALS

The last chapter showed us how the industrial design field is unique and why we need a unique approach to educating design students. Now instructors must learn how best to approach students with this new information. First, the recognition and understanding of how university-aged or adult students learn should be researched. And second, instructors must have a firm grasp on the principles and elements before they can try to communicate them clearly to the students. Professors know how to design successfully and apply the concepts themselves but can they explain this developed instinct to someone else? Especially someone in a partially informal setting who is supposed to challenge the answers they are given. The question of “what makes your opinion and answer the right one.” “How do you know?” Etc. have been and will be posed in class. The answer is found in our understanding of the psychology of learning.

As the purpose of this thesis is to prepare an instructor to successfully communicate the principles and elements to the foundations year of industrial design studios I will provide an insight into a number of concepts gleaned from reputable sources. My intent is not to prove or disprove the information regarding visual perception found in these sources, but to provide the most important teaching points in order to help the professor gain a full understanding of the concepts and also to format them in such a way that this text can be a useful reference for lecture or critique in class.

3.1 Adult Learning Styles

There is much research and information available pertaining to developmental psychology and early education. Children cannot generally communicate to the teacher why they were having a hard time understanding a certain subject or concept. In contrast, adults and young adults are thought to be able to actively seek the best way to learn, however this demographic of university-aged students also has special needs and requirements for learning. Malcom Knowles is one of the pioneers of the study of adult learning and his approaches were outlined in an online teaching resource, *Principles of Adult Learning*, written by Stephen Lieb, a senior technical writer and planner from the Arizona Department of Health Services. Knowles' begins by identifying the unique characteristics many adult learners share.

- Adults are *autonomous* and *self-directed*. They will learn best if the instructors are facilitators, actively involving students in the process of learning instead of simply feeding them facts about the principles and elements or other concepts you might be covering. Students will grasp the material better if they discover their own connections and also see how the concepts relate to the big picture of their goal of becoming a designer
- The students will come into this curriculum with their own unique *life experiences* and *perceptions* or *knowledge* about the principles and elements of design. They have seen the world one way for eighteen plus years so, instructors must not approach the students as if you are teaching them new words. For the most part students will have a basic understanding of what balance is, etc. It is the professors' job to explain

how these design concepts can be connected to the students' past experiences and also how they can control them to make new observations and eventually purposeful design decisions about how a viewer will perceive a composition.

- Adult students are *goal/relevancy-oriented*. They are in college for the ultimate goal of graduating and becoming a professional. Students can become frustrated if a clear reason for an abstract project is not apparent. Many of the foundations year level projects can be extremely abstract. To alleviate such concerns an instructor may show or explain how the project will relate to skills professional designers use while creating products.
- Adult learners are *practical*. Unlike those of us whose passion is education, students are rarely interested in knowledge for its own sake. Instructors should reinforce the idea that a complete understanding of this visual language is key to the rest of their career in design.
- All learners need to be shown *respect*. In this unique major where personal work is subjected to criticism from both instructor and peers. If one shows students respect by giving honest and clear reasons based on the knowledge you have of the fundamentals and also be open to criticism yourself, the students, in turn, will show respect to you and their peers as well. (Lieb 1991)

Malcom Knowles makes a valid point regarding the different learning styles of students, "Learning results from stimulation of the senses. Some people may use one sense more than others to learn or recall information. Instructors should present materials

that stimulate as many senses as possible in order to increase their chances of teaching success” (Lieb 1991). The ‘senses’ do not necessarily mean smell, touch, taste, sight, and sound, but can relate to individuals intuitive learning senses. Students can be audio or visual learners. They can be kinesthetic or multi-sensory learners. As illustrated in the previous chapter, students can be technical learners or conceptual learners. Some students learn best from writing their entire process down while some prefer to dive right into a model once a concept direction is established. The most effective approach is to recognize how students learn and to teach them how they may develop the most efficient way of solving problems individually.

Knowles offers four critical elements of learning that provide a student with the opportunity to fully grasp the information presented, *motivation*, *reinforcement*, *retention*, and *transference*. The first, *motivation*, is important to address because, as Knowles points out, if a student feels intimidated, offended, or does not see the relevance of the information, the instructors’ efforts will be in vain. An instructor should establish rapport with the students, which is not difficult in the informal atmosphere of a studio. Additionally, a level of tension should match the level of importance of the subject matter. It has been found that people learn best under low to moderate stress. Similarly, a level of difficulty should also be challenging enough to motivate the students, but not too high that they cannot reach an end reward of a successful project. And finally, the students need to receive specific feedback with regard to their work. (Lieb 1991)

The second element for adult learning Malcom Knowles addresses is *reinforcement*. Instructors must encourage correct modes of behavior and reward only exceptional work to show the student and their peers what makes a solution successful

and worthy of being awarded the elusive 'A' in studio. Critique is the means by which a visual work is judged and how students learn from the mistakes and accomplishments made both on their own projects and those of their classmates. Tips for successful critiquing are included in the guide section of chapter five. (Lieb 1991)

Third, *retention* is the measure of how well students received and processed the concepts communicated to them in class. A principle or element is only learned when the student is able to understand, interpret, and, most importantly, apply the information through their design decisions. A section on how an instructor can measure students' retention is offered in chapter five's section on evaluation. (Lieb 1991)

Finally, *transference* occurs when students are able to use the information presented to them in a new setting. Transference can be noted when the students associate the information with something they already know, when they find it similar to something they have learned previously, or when they have learned a critical skill that is extremely beneficial to the 'real world' of product design. The understanding of the principles and elements will be seen through the students' application of them in the class projects. (Lieb 1991)

In summary, Knowles' tips provide a basis for working with university-aged students and to help point an instructor's teaching style in a direction that will be most successful in communicating the foundations subjects to design students. An instructor must also be prepared to teach the foundations material itself. The following chapter offers an insight into how an understanding of psychology can aid in the explanation of the principles and elements of design.

3.2 Psychology of the Design Fundamentals

Donis A. Dondis' thesis, called the *Primer of Visual Literacy*, addresses both the psychological and subconscious aspects of how students learn the fundamentals of design. Dondis introduces the idea of the visual language by saying, "but the use of the word "literacy" in conjunction with the word "visual" does have enormous significance. Sight is natural; making and understanding visual messages is natural to a point, but effectiveness on either level can only be achieved through study" (Dondis 1973). Instructors know what concepts to teach, but an understanding how the students already perceive these principles and elements is the key to being able to present them in a way students will be able to relate to.

I have designed a book to assist the instructor in introducing the principles and elements of design to foundations year industrial design students through visual examples and brief definitions. One page is devoted to a principle or element for each letter of the alphabet. The book will be included in the teacher's guide at the culmination of this thesis project. The book can also be printed out page by page to be posted in the foundations year studio for the students' reference and inspiration. The majority of the images I collected were from the Red Dot Design Awards website, red-dot.org, art.com and most of the quotes were found at thinkexist.com. I also resourced a book by Tim McCreight entitled, *Design Language*, for the elements and principles representing each letter of the alphabet.

The following material includes the corresponding lecture notes for each of the pages in *the ABCs: Principles and Elements of Design* and the various complimentary concepts associated with each of the fundamentals. This visual aid will help explain what

the students should be gleaning from the first year with specific attention to industrial design. The pages of the books are scaled down to fit as visual reference in this thesis (Fig. 4). Please, reference the actual ABC's book for actual size relationships.

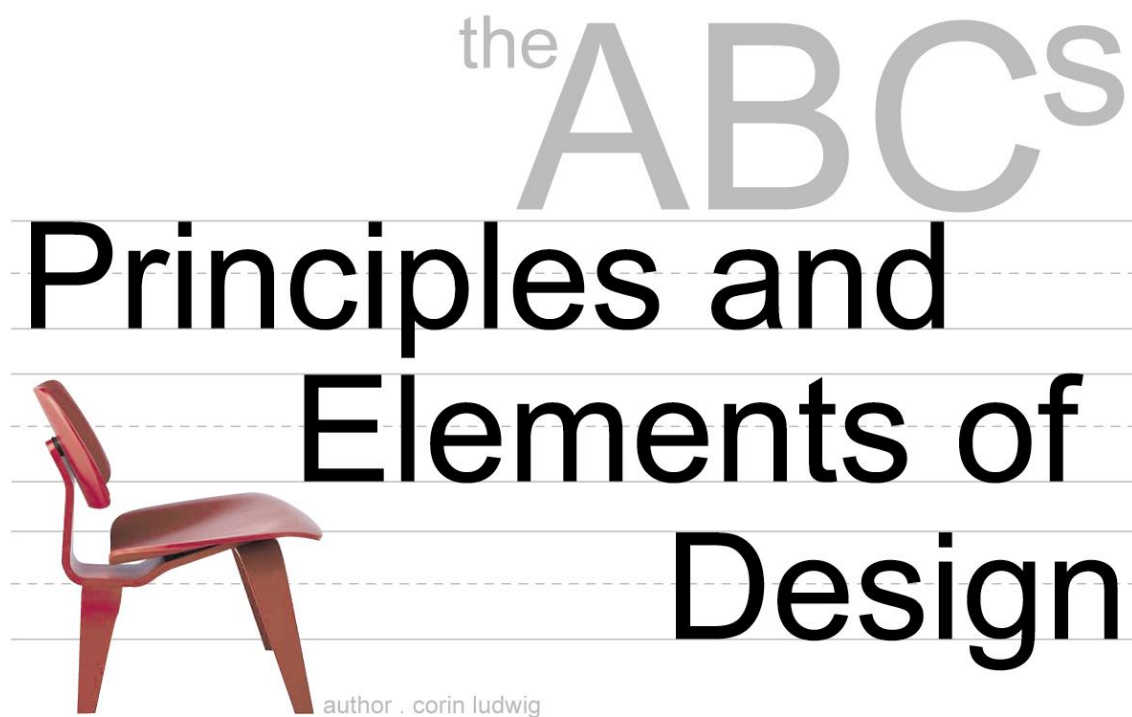


Fig. 4 – Title page for the ABCs, Principles and Elements of Design book. A visual aid.

3.2.1 A is for Abstract

Ab·stract

(ab-'strakt) 1: expressing a quality apart from an object.
2: having only intrinsic form with little or no pictorial representation.

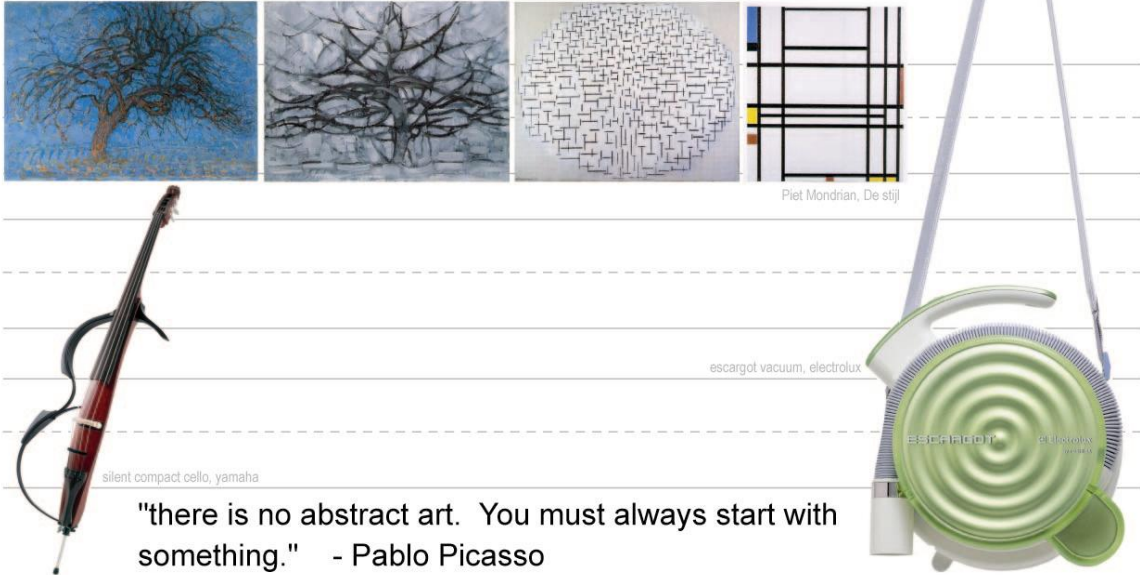


Fig. 5 – A is for Abstract

Abstraction is a principle relied upon by designers to interact with first inspiration ideas or generators. To abstract is to break the image down to only those properties intrinsic in the object, emotion, idea, etc. so as not to represent this form literally. Piet Mondrian, a painter of the De Stijl period, illustrates the abstraction of a tree from a pictorial representation, to a less realistic tree only using vertical and horizontal lines and finally his renowned style of perpendicular lines and only primary colors of blue, red, and yellow. Mondrian captured the most 'tree-like' aspects, in his mind, of vertical and horizontal lines directed by the guiding principles of the behavior of branches (Fig. 5).

The product examples of the cello and vacuum illustrate this breaking-down or abstracting principle by constructing only the outer-edge of the cello and the middle

string section. Ask yourself; if the cello were electric why would it need the entire form and parts of the antecedent acoustic cello? The Escargot vacuum offers an example of how an object, in this case a snail, can be used as a generator for the form and function of a seemingly unrelated object. The form speaks to a snail's spiral shell, the placement of the feet and hose were decided by looking at how an abstracted snail's body is constructed and the location of the handle could be associated with a snail's antennae.

Donis A Dondis illustrates in *Primer of Visual Literacy* how the mind understands abstraction,

“We express and receive visual messages on three levels:

representationally – what we see and recognize from environment and experience; *abstractly* – the kinesthetic quality of a visual event reduced to the basic elemental visual components, emphasizing the more direct, emotional, even primitive message-making means; *symbolically* – the vast world of coded symbol systems which man has created arbitrarily, and to which he has attached meaning. All three levels of information retrieval are interconnected and overlapping, but can be sufficiently distinguished from each other so that they can be analyzed both as to their value as potential tactics for message-making and their quality in the process of seeing” (Dondis 1973).

Dondis' definition explains how an instructor can start to introduce the students to a new way of seeing the world; recognizing the representational observations they have always seen and then identifying ways in which the students can look again, abstract the most

essential parts to make a new whole, the essence of which is the underlying theme of the original object.

3.2.2 B is for Balance

Bal·ance

(BAL encz) 1: stability produced by even distribution of weight on each side of the vertical axis b : equipoise between contrasting, opposing, or interacting elements 2 a : an aesthetically pleasing integration of elements b : the juxtaposition in writing of syntactically parallel constructions containing similar or contrasting ideas

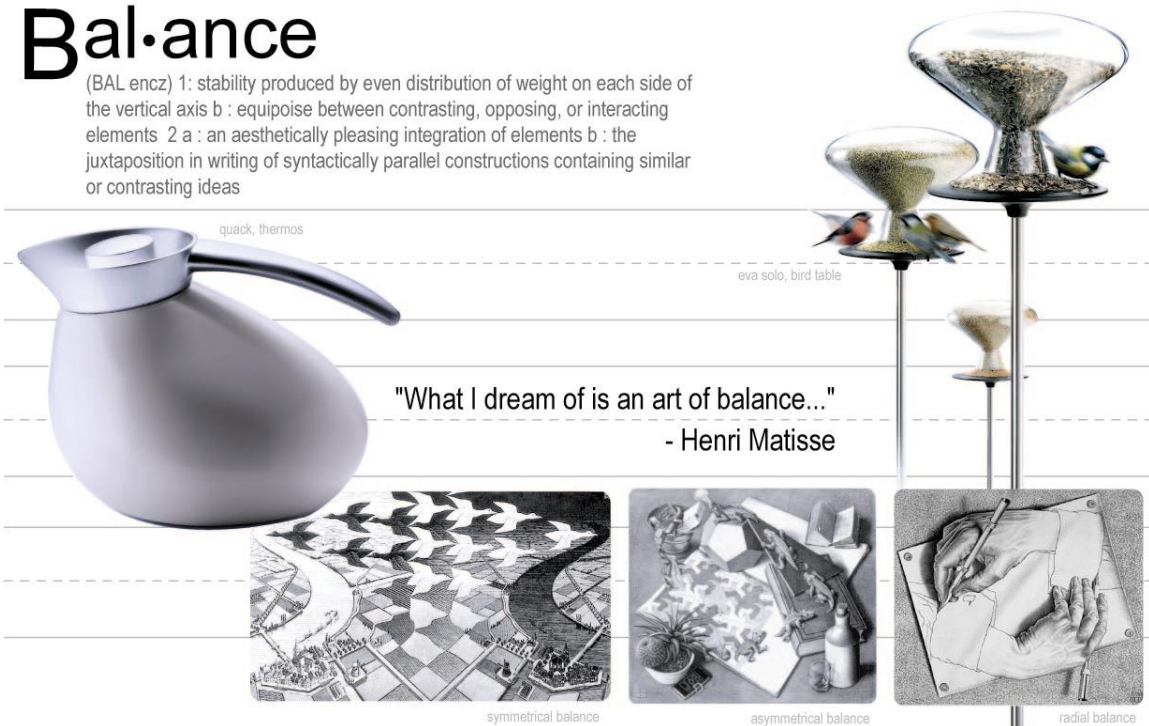


Fig. 6 – B is for Balance

Balance is a principle we as socialized humans understand through our subconscious (Arnheim 1974). This reference to Rudolf Arnheim, *Art and Visual Perception, A Psychology of the Creative Eye*, refers to his general theme of applying the psychology of how we perceive the world psychologically to the realm of fine arts. We feel agitated or uneasy when we are placed in an out-of-balance situation for example, if a sign is tilted, we tilt our heads to right the words or pictures in our minds. As designers it is essential we know how to create balance to ease the psyche of the unknowing consumer. If a composition or form is unbalanced viewers do not want to look at it very

long, which is detrimental to selling a product. As Donis A. Dondis states in her book, *A Primer in Visual Literacy*, “the most important psychological as well as physical influence on human perception is man’s need for balance, to have his two feet planted firmly on the ground and to know if he is to remain upright in any circumstance...equilibrium is man’s firmest and strongest visual reference” (Dondis 1973). A design student must learn how to make balance in a composition by exploring the different influences of symmetry.

There are four main types of balance; symmetrical, asymmetrical, occult, and radial. The distinction is based on how the composition behaves with relationship to an axis. As Dondis explains occult balance by stating, “this visual axis is also called the *felt axis* which better expresses the unseen but dominating presence of the axis in the act of seeing. It is an unconscious constant” (Dondis 1973). Robert Scott, professor of design at Yale University, includes the distinctions of occult balance in his book, *Design Fundamentals*. Scott states, “Occult balance means control of opposing attractions through a felt equality between the parts of the field” (Scott 1951). Scott illustrates how a composition can be balanced by opposing elements without actual axis or centers of focus (Scott 1951). The MC Escher illustrations shown are excellent examples of two-dimensional balance (Fig. 6). They demonstrate central axis symmetry, asymmetry, and radial symmetry from left to right. Dondis describes how symmetry can play on the viewers’ emotions, “axial balance designs are not only easy to understand, they are easy to do, employing the least complicated formulation of counterpoise... The classic Greek temple is a tour de force in symmetry and, as would be expected, a most serene visual

form” (Dondis 1973). The description of the Greek temple as being serene plays off of the idea of how people can predict and understand a composition they feel at ease with it.

The Eva Solo bird-tables show a symmetrically radial balance while the Quack thermos is an occult balance. The Quack is still balanced, but not equally around an axis. (Fig. 6) The following quote by Dondis can explain why the Quack thermos is interesting visually without being agitating, “It could be argued that it is compositionally more dynamic to arrive at a balance of the elements in a visual work through the technique of asymmetry. It is not as easy” (Dondis 1973). The control of asymmetry is a challenge to the students and should be enforced in order to discourage always taking the safe or easily controlled option.

3.2.3 C is for Composition

Com·po·si·tion

(kom po ZISH shun) 1: arrangement into specific proportion or relation and especially into artistic form 2: a putting together of parts or elements to form a whole: a combining.

- symmetry tends to promote stability

- diagonals are more active than horizontals

- proximity creates tension

"The arrangements we make are either pleasing or not pleasing. An explanation is not necessary." - Kenneth Bates

- sameness is frequently boring

- regularity creates rhythm

- contrast exaggerates an effect

- placement in corners creates awkward tension

- equal amounts of figure and ground confuse the eye

DC07 All Floors, dyson vacuum

Ansel Adams photography

Fig. 7 – C is for Composition

The two product examples, Dyson vacuum and Swiss Card, combined elements to form a whole to illustrate the essence of a composition, good, bad, or ugly (Fig. 7). Learning how to arrange a 2-D composition is the first step to organizing thoughts into a clear manner in order to communicate both verbally and visually. The points listed on this *ABCs* page should be considered throughout the process of designing a composition; symmetry tends to promote stability, diagonals are more active than horizontals, proximity creates tension, sameness is frequently boring, regularity creates rhythm, contrast exaggerates an effect, placement in corners creates awkward tension, and equal amounts of figure and ground confuse the eye. All of these tips are helpful when critiquing a composition, a skill essential for the students' understanding of what makes a good or a bad composition. Dondis reinforces this fact by stating, "The process of composition is the most crucial step in visual problem solving. The results of the compositional decisions set the purpose and meaning of the visual statement and carry strong implications for what the viewer receives. It is at this vital stage in the creative process that the visual communicator has the strongest control of the work and the greatest opportunity to express the total mode the work is intended to convey" (Dondis 1973). Learning to control what a viewer sees is the ultimate goal when teaching composition.

The photography by Ansel Adams is an example of how compositions are formed by looking through a lens and finding how to capture the best layout of existing elements. Much of what the students will do involves deciding what information is most important on a presentation board, a graphic label, or in the form of a product. After the hierarchy has been determined the student must decide how to show this importance visually

through; size, scale, proportion, placement, font, color, texture, and so on. A good composition will guide the viewer in the path the designer designates and also be an aesthetically pleasing visual work.

Grasping the ideals for a good composition is a way to begin the transition to ‘design thinking’ for the students. Learning to develop an order or system with which to judge a composition, as being ‘good’ or ‘bad’ is important for the students to receive in the foundation year. Several of the other elements and principles can be discussed as well, most notably Hierarchy, Integrity, Visual Balance, and Organization. First, students will have to understand the elements of Line/Curve, Shape, Scale, Quality, and Text. Dondis states, “The visual elements are the basic substance of what we see, and they are few in number; the dot, line, shape, direction, tone, color, texture, dimension, scale, movement... The structure of the visual work is the force that determines which visual elements are present and with what emphasis” (Dondis 1973). Composition seems as if it is one of the most complex concepts to master. However, students will quickly be able to apply the fundamentals to a composition once they can gain control of a few of the basic elements.

C is also for Concept

Giving the students the tools to start making their own ‘rules’ to follow in each of their projects will give them a strong foundation for making good choices in their designs. Concepts help students control the direction and purpose of their designs by providing a starting point; an idea, an emotion, a form generator, a problem statement, etc. all act as points of inspiration. The students should first learn how to ask themselves

questions about what their design needs to do or be in order to find the best possible solution. As Bill Bockus points out in his book, *Designer's Notebook*, "concept is the designer's analysis of those factors which must be satisfied to achieve a solution. It is his visualization of the finished product" (Bockus 1977). Bockus' definition begins to describe to the students the art of creative problem solving in design. Introducing the need for students to make well-considered decisions is essential to understand the design process and, in turn, produce the best possible solution.

Another helpful consideration Bockus lists in his book about an introduction to industrial design learning is to show students how to ask themselves questions about the problem in order to formulate a concept or direction to explore;

1. Will the product relate to the user and his surroundings? Or does the product only call for attention with little regard for appeal? Does it make the person using it feel as if he belongs in the same environment as the object? Or is it so different, so way out, so tradition-less that it alienates or repulses?
 2. Does it function emotionally and visually for the user, as well as physically? Or is it designed for other designers to "Oh" and "Ah" over?
 3. Is it your intention to design a product that will last? A lifetime? Or will it be trivial junk to be cast aside in a matter of weeks – another spoiler of earth's raw materials?
 4. Will it enhance the environment? Or is it another "well-designed" billboard?
- (Bockus 1977).

This set of questions is relevant for the students to understand what solutions are based on a strong concept and produce an innovative answer and what solutions are simply

putting a new face on a product or hiding poor design with flashy forms and unnecessary additions.

Bockus offers a final point of advice to students stating, “the moral or warning to you, the neophyte designer, is that concepts should be looked at very critically.

Designers are human, and ordinarily they hate to be told, “It won’t work.” What you should do is to inquire. “OK, It won’t work or sell... Why? Then get all the criticism you can from qualified sources and sift the destructive as well as the constructive criticism” (Bockus 1977). Forming a strong concept is just as important as understanding when to let a stagnated one go to explore new directions in search of designing a new solution for an existing problem.

3.2.4 D is for Dynamic

Dy·nam·ic

(dy NAM ik) 1: Pertaining to energy, force or motion related to force 2: Characterized by continuous change 3: Energizing, vigorous, forceful 4: Variation of intensity, as in a musical sound - A composition that implies movement, that is, a dynamic composition, is more likely to grab our attention than a static one.

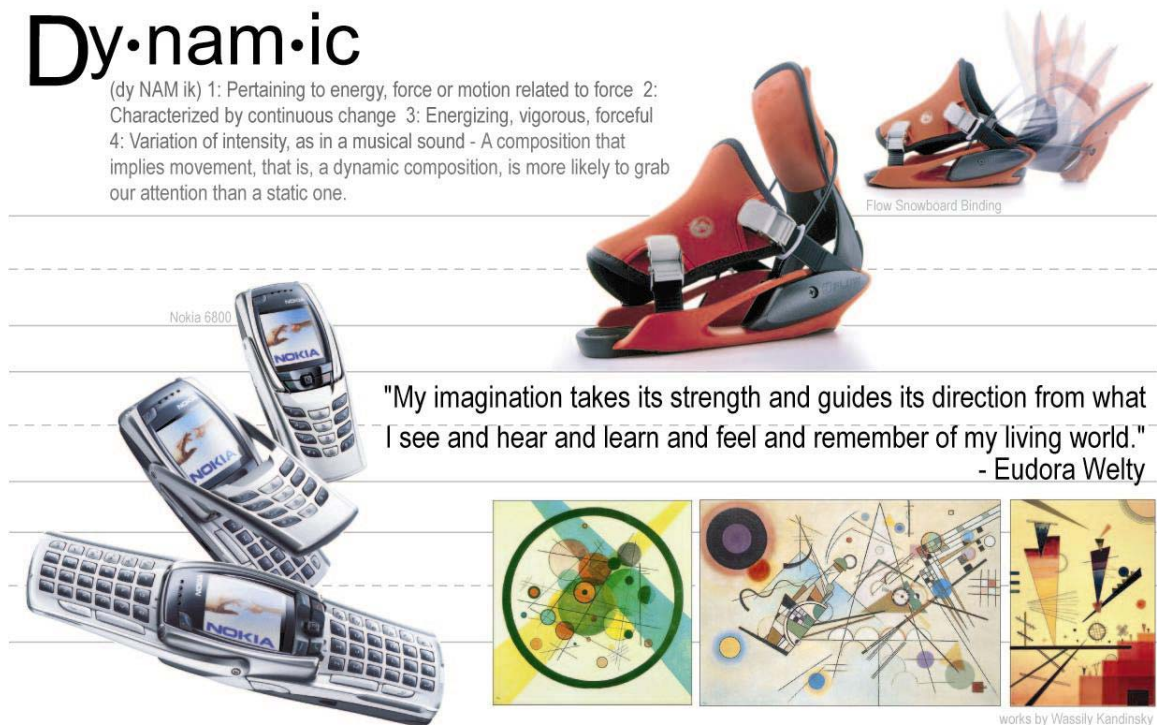


Fig. 8 – D is for Dynamic

Showing motion in a stationary product is a great challenge. The students should be able to describe why the Kandinsky paintings (Fig. 8) are dynamic; diagonal lines, chaotic placement, sharp edges, motion lines, etc. These 2-D notions will help students to eventually understand how forms can be manipulated to add interest.

The examples shown above are products that should look fast or dynamic due to their uses. (Fig. 8) The Nokia 6800 mobile phone is associated with high-speed technology and its form reflects these criteria through lines, materials, and the flip-function. Along the same lines, the Flow snowboard binding also matches its form to the extreme-sports genre it was designed for by the designers' choice of color, form, materials, and mechanical function.

A designer must interpret the marketing 'buzz words' used to describe the target users or desired branding for a potential product. The designer then will translate these words or ideas into forms that will best describe to the user what this product is, how it works, and appeal to their aesthetic tastes.

3.2.5 E is for Emphasis

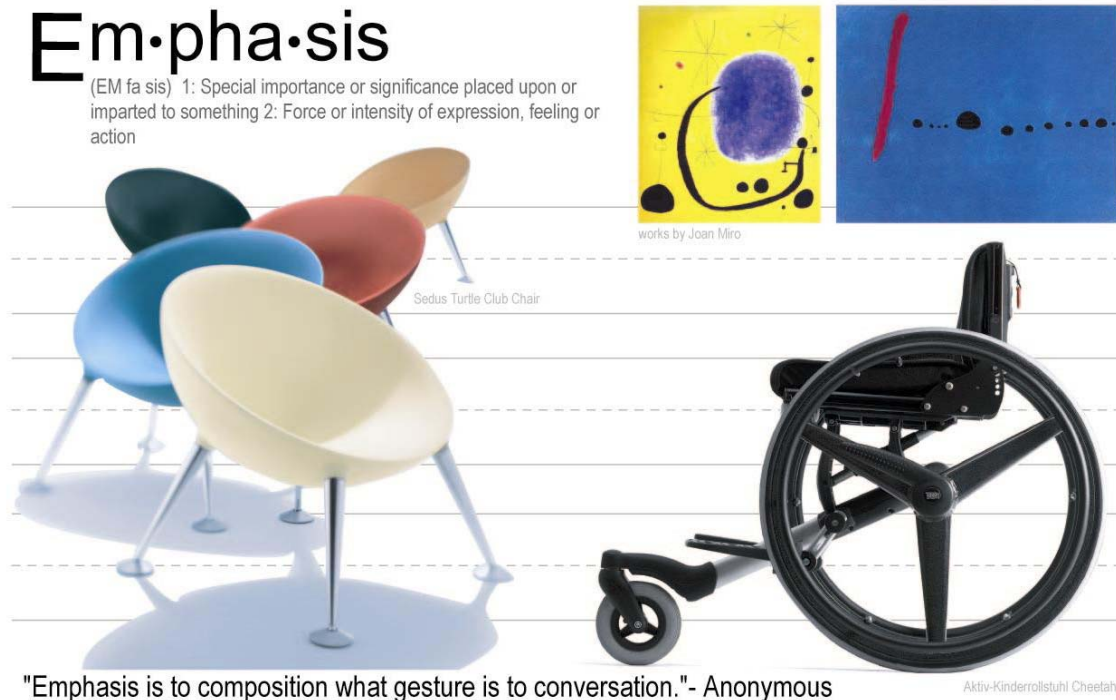


Fig. 9 – E is for Emphasis

Emphasis can be shown through many design decisions, for example; color differences, scale, positioning, and shape relationships, like those found in the Turtle chair (Fig. 9). Understanding emphasis will help students to control their compositions. This principle also lends itself to a discussion of hierarchy (see 3.2.8 H is for Hierarchy) to develop a sense of highlighting what is important on a product or in a composition. Emphasis on certain parts of a product may be important for explaining the operation functions to a user without words. Perhaps the designer designates all of the parts the user should touch with a certain color or shape, emphasizing the specific purpose.

Emphasis in a 2D composition is also an important skill. Miro's paintings illustrate how the emphasis of a certain color, shape, size relationship can lead your eye around in the way the artist wanted you to. (Fig. 9) This control and guidance is what

designers strive for, because we cannot always stand next to our projects to explain or defend our decisions, our products must speak for themselves.

3.2.6 F is for Figure/Ground

Fig·ure /ground

(FIG yer / ground) 1: refers to the relationship between what stands forward and what recedes in a composition. On this page, the letters are figure and the white of the paper is ground. The degree of tension or harmony between figure and ground contributes significantly to the effect of a work.

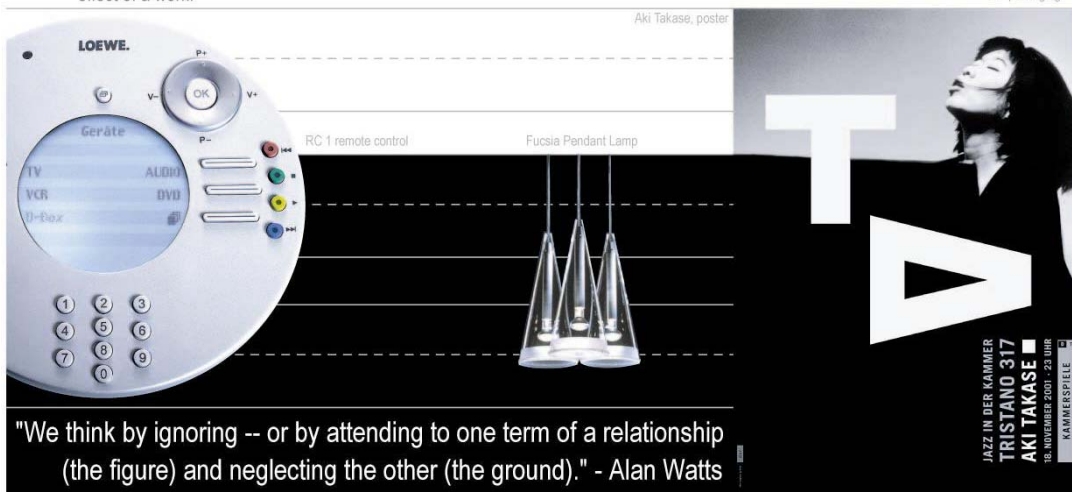


Fig. 10 – F is for Figure/Ground

The relationship between figure and ground is one the students might not have considered before. It is a tool that can create tension or harmony between the figures, in this case the black words, to the ground, the white paper. Understanding how to bring forward or set back the elements of a composition will begin to show the student how very small changes affect their works dramatically thus, illustrating the importance of control over their design decisions. The poster and the perfume packaging are engaging because of the tension created by the figure and ground reversal. The remote control is also another way to begin a dialogue about how to show why it is so important to

understand all principles and elements relating to a product, composition, etc. in order to design well. The buttons are figures on a ground, but also are ground to the numbers and symbols printed on them. (Fig. 10)

When discussing figure/ground relationships in three-dimensions, introduce the concept of negative and positive space, both literal and implied. Dondis states, “the significance of positive and negative in this context means merely that there are separate yet unified elements in all visual events...positive and negative are in no way meant to describe darkness or lightness in mirror image as they do in the description of film and prints in photography...What dominates the eye in visual experience would be considered the positive elements while those more passively displayed would be considered the negative” (Dondis 1973). This observation by Dondis touches upon the importance of understanding the principles and elements in reference to products and the unique aspects of industrial design, in addition to viewing them as art or photography students do. Relating the concept of negative and positive space to how the object interacts with its environment will help the students design in a larger context and not only what they see on their desk.

3.2.7 G is for Gestalt

Ge·stalt

(ge STALT) 1: a unified physical, psychological or symbolic configuration having properties that cannot be derived from its parts. 2: Our need for wholeness is so great we assemble elements into as large a unit as possible. 3: A knowledge of gestalt allows a designer to leave forms unconnected, knowing that a viewer will add the missing ingredients to create a unified whole.

"The objective of studying gestalt is to put the designer in control of what the viewers see when they look at a composition."

- James T Shaw



work above by Georges Meurant
below by Ellsworth Kelly



Closure - the mind supplies missing pieces in a composition

Continuance - once your eyes are guided in a direction you will continue to look in that direction

Similarity - refers to what items look like and how that effects grouping

Proximity - refers to where items are located and how that effects grouping

Alignment - placing items so that they line up in groups and organizes information to create order



Crosslight

Fig. 11– G is for Gestalt

One of the vital theories to grasp as a designer is the Gestalt theory. In *A Primer for Visual Literacy*, Dondis addresses the Gestalt theory by stating,

“much of what we know about the interaction and effect of human perception on visual meaning is drawn from the research and experimentation in Gestalt thinking ... Its theoretical base is the belief that an approach to understanding and analyzing all systems requires recognizing that the system as a whole, is made up of interacting parts, which can be isolated and viewed as completely independent and then reassembled into the whole. No one unit of the system can be changed without modifying the whole” (Dondis 1973)

An entire composition can be seen as successful if it considers the Gestalt principles. Closure, Continuation, Similarity, Proximity, and Alignment are all rules to be followed when creating compositions. These five ideas stem from how our brains make sense of what we see. The Closure theory supports what the students learned from abstraction, we can leave out the redundant information, and our minds will connect the missing pieces if guided in the right direction by Continuation. Our eyes will follow the direction they are pointed in until something else comes into view, which is why understanding Continuation can help students to intentionally guide a viewers' eye. Similarity refers to how our minds automatically group items that share common traits. Proximity speaks of why locations of items affect how we compare and make relationships among the elements in a design. Dondis describes these points by stating, "in a visual language, opposites repel, but similars attract. So the eye fills in the missing connections and automatically relates the like units more strongly" (Dondis 1973). Finally, Alignment can help students begin to organize information according to what order they would like to create in a composition.

The examples in the *ABCs* book illustrate how learning about industrial design products as well as art or other disciplines could expand the students' knowledge base and understanding (Fig. 11). The Meurant painting on top will illustrate how our minds will group the rectangles together then create groups out of those groups and then break them apart and make new groups and finally combine all of the groups to see the whole painting. The bottom work by Elsworth Kelly serves to open the students' eyes to the concept of Closure. Their minds will lead them to believe there are vertical lines in this painting when Kelly painted none. The Crosslights, by the Amsterdam based firm mno

design, exhibit how Similarity, Proximity, and Alignment may be utilized to create a whole out of parts. Which speaks to the perceptions Rudolf Arnheim deals with in regards to mans' desire to make wholes out of units. As quoted by Dondis, Arnheim states,

“The power of attraction in visual relationships represents another Gestalt principle with great compositional value, the law of grouping...Man, through his perceptions, has a need to make wholes of units, in this case, to connect the dots by responding to their attraction. This is the visual phenomenon that inspired ancient man to see the interlacing points of light of the stars as representational forms” (Dondis ref. Arnhiem 1973).

Arnhiems' description of how humans inherently try to form connections is an excellent point for the discussion of 'over-design' in a studio. Many students feel they have to keep 'over-designing' by adding extra parts or unnecessary decoration to their designs in order to communicate their concept or meaning. Showing examples of how objects are descriptive with only a few elements, such as the Crosslight example, can be effective in demonstrating how subtlety can still prove interesting in products.

3.2.8 H is for Hierarchy

Hi·e·rar·chy

(hi e RAR ke) 1: a body of elements arranged according to rank, authority or capacity. 2: a body of entities arranged in a graded series. 3: the presentation of certain elements as more important than others, by conveying a clear sense of hierarchy an artist provides stability, sequence, and movement within a design.



Buena Vista moviebeam receiver

- shape
- position
- value
- form
- contrast
- size



typic by Lisa Kowalski

"Always design a thing by considering it in its next larger context - a chair in a room, a room in a house, a house in an environment, an environment in a city plan."

- Eliel Saarinen

- color
- texture
- emphasis



Fig. 12 – H is for Hierarchy

The quote by Eliel Saarinen, a prominent architect, which was used for the Hierarchy page in the *ABCs* book, is appropriate when suggesting to always design in context (Fig. 12). “Always design a thing by considering it in its next larger context – a chair in a room, a room in a house, a house in an environment, an environment in a city plan” (thinkexist.com). The ability to identify what information, relationships, elements, etc. are the most important and giving them some kind of emphasis or authority will help to develop a strong decision making process for the students.

Knowledge of the hierarchy principle can help students to communicate through their design, to the user; what part should be held, where the power switch is located, how the latch works, where the top connects to the bottom, how the accessories attach,

where to place your feet, where the product belongs in context to its environment, and other considerations.

The Buena Vista projector, as seen on the Hierarchy page of the *ABCs* book (Fig. 12) uses a similar square button set to explain how the ambiguously shaped product is operated by remote. The paintings represent the various elements and principles that can order a composition, shape, position, value, form, contrast, size, color, texture, and emphasis. Any of these devices can serve to designate parts of a composition as being more important than others.

3.2.9 I is for Integrity



Fig. 13 – I is for Integrity

Demonstrating personal integrity in ones own presentation and insisting upon it in students' projects will prepare students for the time when the will need to stand up for

themselves when asked to compromise on a project with their name on it. This is where 'Pride in their Profession' can come in play. Students should have drive enough to produce work that adheres to their social, environmental, and moral integrity.

The integrity of the sketch examples in the *ABCs* book and the materials used to build the Manet Ambient hardware speak well to the need for students to develop good craft and sketching skills (Fig. 13). Choosing materials that explain the design concept in a student project is often hard because of limited resources. It is important for an instructor to explain how materials that lack integrity, such as arts and crafts supplies, will lessen the integrity of the project presented, no matter how solid the concept.

The Hob swivel chair also has integrity within its concept. The idea of line and flow were carried out through the entire piece of furniture, an example of how integrity exists in all portions of a product. Although, this chair does not have any embellishments, the use of ornament can have integrity if it follows a concept and adds to the products' integrated beauty instead of acting as a superficial skin.

3.2.10 Juxtaposition

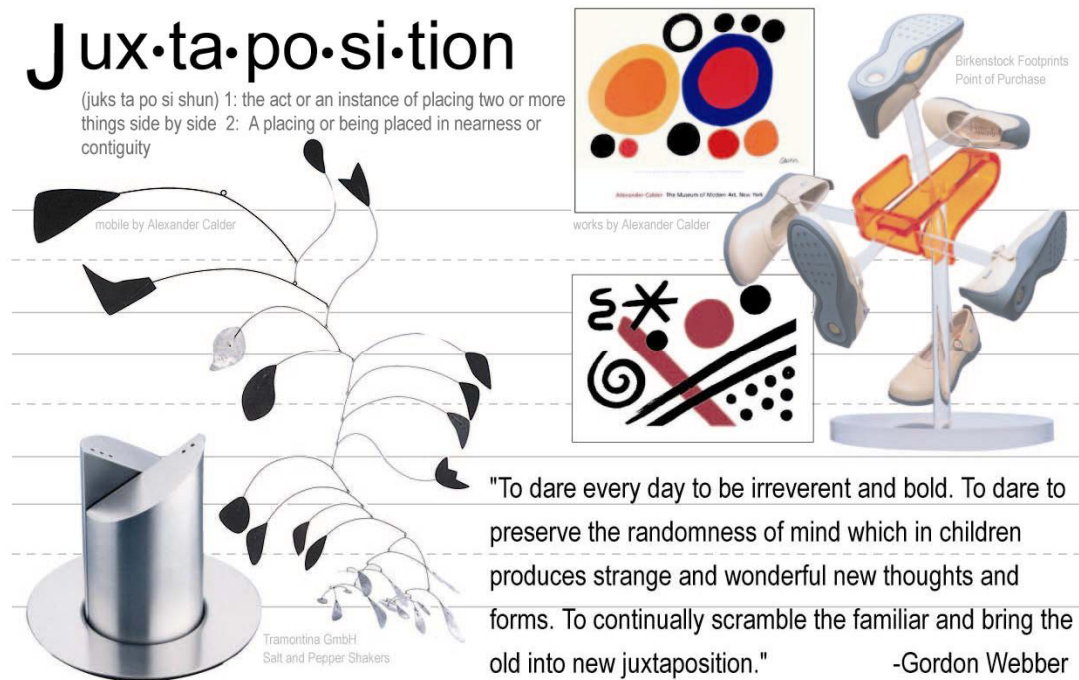


Fig. 14 – J is for Juxtaposition

Placing objects next to one another can create interest especially if those elements (ie. form, color, texture...) are not usually associated with one another. As seen in Alexander Calder's work, compositions can be created by the decisions made when combining objects. The Birkenstock Footprints point of purchase display is an example of how position and grouping can formulate a dynamic product. (Fig. 14)

Encouraging students to push the parameters and make connections on their own will create a strong basis for the rest of their design education. Juxtaposition is a good concept to show students how exploring beyond the project requirements is much more rewarding, even if it does not succeed, than if they were to only do what was asked in the project outline. Putting ideas or objects together to see what happens is a small step out of the box the students have been living in for the first eighteen years of their lives.

3.2.11 K is for Kinetic

Kin·e·tic

(ki ne tik) 1: of or relating to the motion of material bodies and the forces and energy associated there within 2: supplying motive force

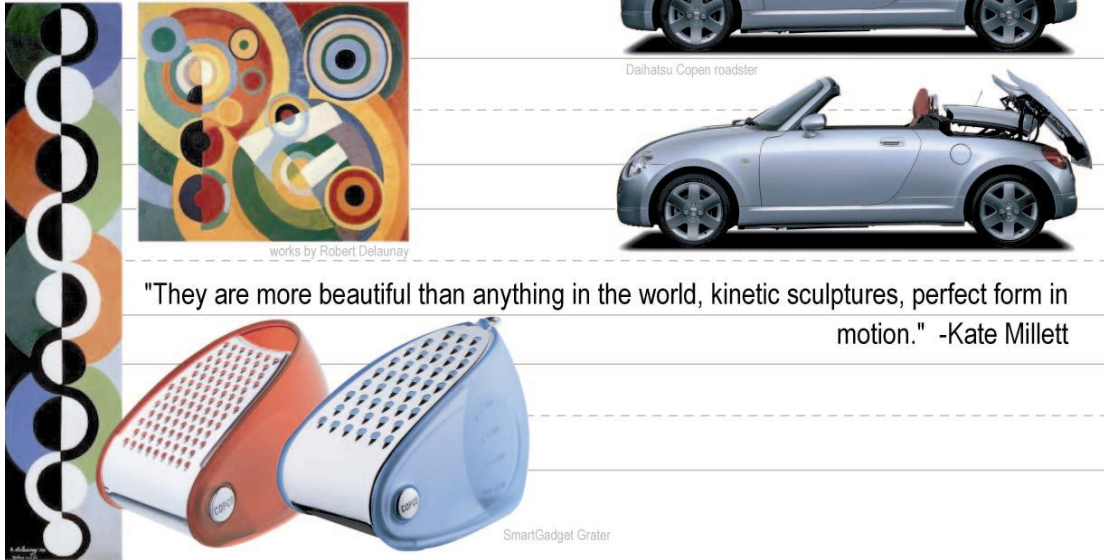


Fig. 15 – K is for Kinetic

Kinetics, much like the dynamic and juxtaposition principles, deals with motion or movement associated with compositions and conceptual projects. The challenge of making something look fast or energetic when all students can see is a blob of clay or several pieces of foam core may be frustrating unless they are able to grasp what properties, elements, principles, etc. need to be considered or manipulated to produce a kinetic object.

In addition to forms communicating motion, color theory can be easily applied to this principle in an effort to show students how putting certain colors next to each other will change the effects of the composition. As seen in Delaunay's work, the use of color and shape can make a painting jump off of the canvas and vibrate visually. The SmartGadge graters and the Daihatsu roadster are examples of a product designed to look

as if they were meant to move or be used in motion and also shows how static forms relate to mechanical parts. (Fig. 15) These products give yet another reference to the industrial designers' role as form interpreter.

3.2.12 L is for Line

Line

(line) 1: The focus of a point having one degree of freedom 2: A thin continuous mark, as that made by a pen, pencil or brush applied to a surface 3: long, short, thin, thick, solid, broken, straight, curved, vertical horizontal, uniform, irregular...

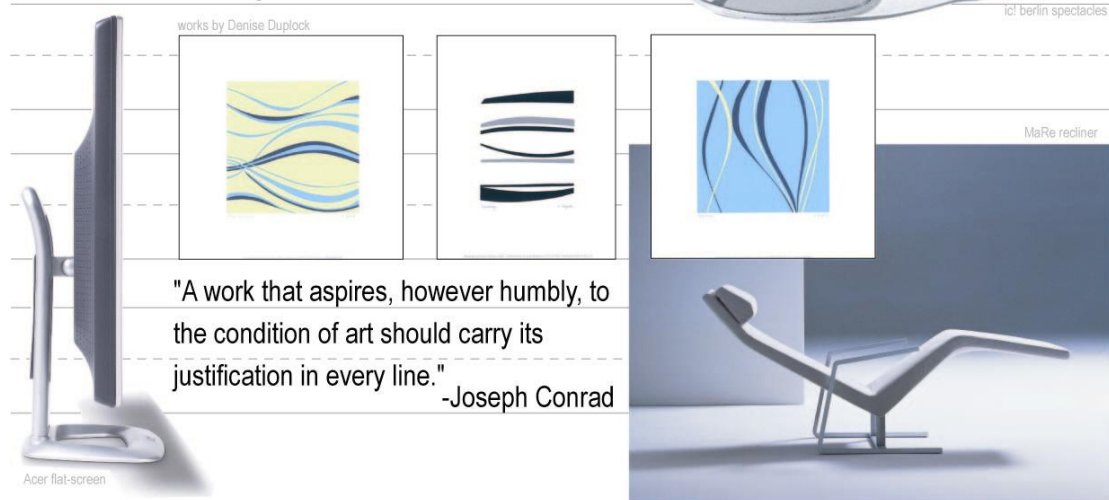
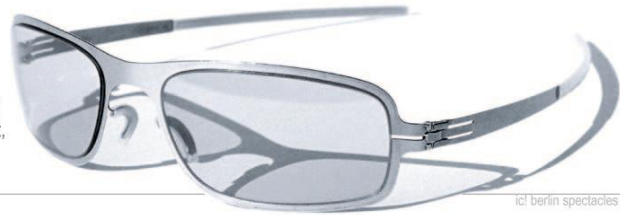


Fig. 16 – L is for Line

Typically one of the first elements taught to students and used everyday is 'Line'. Lines can be emotional and descriptive in a composition or product. Learning how to describe what the lines and curves are doing to make the product interesting can allow the students' to better articulate their ideas and participate more in critiques.

Mastering the control of a line is a significant point for foundations courses to address. One approach is explaining the emotional connotations denoted by horizontal (calming), vertical (strong, masculine), diagonal (activity), curves (feminine, organic),

etc. As Donis A. Dondis explains, “line describes shape...Each of the basic shapes has its own unique character and characteristics and to each is attached a great deal of meaning, some through association, some through arbitrary attached meaning, and some through our own psychological and physiological perceptions” (Dondis 1973). This understanding will help students begin to recognize lines in everyday things such as their spectacles, chaise lounges, computer screens, etc. and open their eyes to a new way of seeing the world (Fig. 16).

Along with line comes the other basic elements such as; point, curve, and shape. These elements can be used as pre-visualization tools, helping students to record sketches and diagrams to try to explain what they are seeing in their minds’ eye (Dondis 1973).

3.2.13 M is for Module

Mod·ule

(MOD jool) 1: part of a construction used as a standard to which the rest is proportioned 2: a self-contained unit that performs a specific task 3: a completed unit that allows for creativity



Fig. 17 – M is for Module

One method for constructing a project is the idea of a module. One self-contained and easily controlled unit can make amazing things when multiplied and combined. The ‘easily controlled’ part is what makes modules a great tool to use with foundations year students. Teaching them to control decisions, materials, etc. is what makes a good project, teaching them to make creative solutions with limitations is an excellent challenge.

The modular furniture by Polstermobel Lobby is an example of the fantastic versatility and user excitement over controlling their spaces and products. Dilbert’s Ultimate cubicle also gives a tongue-in-cheek approach to how designers can influence the everyday lives of people by designing innovative solutions that can be mass-produced. (Fig. 17)

3.2.14 N is for Non-literal

Non·lit·er·al

(NON lit er al) 1: when utilizing literal objects for inspiration or generation take only the abstract references to help form design guidelines for concept 2: follow more abstract thought not tied to actual objects, ideas, emotions, spaces, etc.



Fig. 18 – N is for Non-literal

Probably the most intimidating concept for many students, because much of what they know is literal and representative. Asking students to design a tree that does not look like a tree can be a challenge. Once students grasp the concept and can abstract inspirations, they will be prepared to start thinking about advanced projects without the risk of reverting back to the easy and obvious solutions. Presenting this very conceptual idea in several ways and, through projects is important. What brings about the “AH-HA!” moment in some students will not for others, so this variety will offer greater opportunity for success.

The examples show how a backpack can have all of the distinctive properties of a turtle without a green shell and four feet. Students can see how the notion of finding inspiration from the literal world to create something new can lead to breakthrough designs (Fig. 18). Having the students see abstraction as one of the most important aspects of a literal idea, emotion, object, etc. and then using those elements as a concept or guideline for a design will be a significant step toward mature design thinking.

3.2.15 O is for Ornament

Or·na·men·tal

(or na MEN ti) 1: something that serves to decorate, embellish or adorn 2: added to enhance a good design rather than excuse a poor design 3: a useful accessory

"True ornament is not a matter of prettifying externals. It is organic with the structure it adorns, whether a person, a building, or a park."
-Frank Lloyd Wright

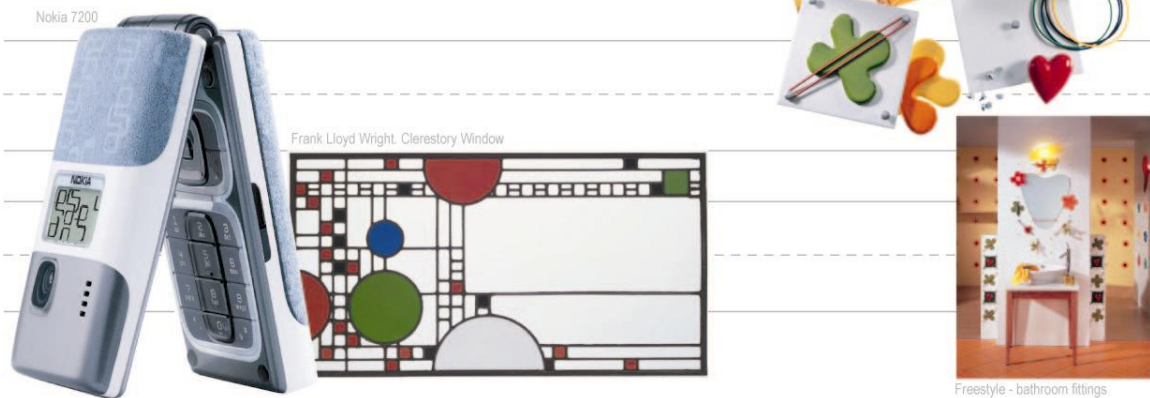


Fig. 19 – O is for Ornament

Something that many students use to cover-up bad design decisions can be presented in a different light. Frank Lloyd Wright explains this concept perfectly, “True ornament is not a matter of prettifying externals. It is organic with the structure it adorns, whether a person, a building, or a park” (thinkexist.com). (Fig. 19) Ornament can be an amazing attribute to a project if used within the confines of the guiding concept. If a part on a product does not serve any purpose other than being there it may better be defined as frivolous decoration than ornament.

The examples in the *ABCs* book for ornament are very broad (Fig. 19). The cellular phone has a textured design element on the front and back serving as a gripping surface. The same color effect is also carried through the screen showing that it is honored as a design element and, in its own right, incorporated into the product rather

than applied as an after-thought. Frank Lloyd Wright, himself, took to ornamenting his spaces with stained glass, but because his designs spoke to the style of his architecture and continued the concept from the house to the windows he was successful. The bath tile accessories are, again, not a vital part of a bathroom, but due to the thought in design and control of materials in the space they serve as interesting elements with purpose.

3.2.16 P is for Parameters

Pa·ram·e·ters

(pa RAM e trs) 1: fixed limits or boundaries 2: characteristic element 3: the outside dimensions, boundaries, particularly in reference to a task or brief 4: restrictions, challenges of a project, all of which will impact design decisions



Fig. 20 – P is for Parameters

From a student's first project in design school until their retirement, designers will be expected to define and deal with parameters in projects. During the foundation year, students need to challenge themselves when meeting project requirements in new and innovative ways. Many students may feel that by simply meeting the requirements the instructor has outlined for the project, a sufficient solution will be produced. It is most

important students have the chance to explore the boundaries of the theoretical projects in the foundations year. An instructor should experiment with ways in which they present projects to the class giving them direction while allowing enough freedom for the students to develop their own design guidelines. In concept it is better to go ten steps beyond an idea and come back five than it is to only go three steps in total. Blue-sky, or limitless concepts are also beneficial to include in a curriculum. These blue-sky projects are effective in giving students the freedom to pursue notions that may seem at first impossible, but may eventually become an innovative idea. Allowing students to create their own set of parameters can be a beneficial aid in developing their own 'design guidelines' to follow through the design process.

The experience of stepping as far as possible outside of the box will benefit students where advance studios may offer much tighter restraints. The students will be able use the requirements of a product as inspiration instead of a hindrance to their ideas. The examples of how Andy Warhol pushed the archetypal element of a soup can to make it art and how a life vest can be fashionable are helpful for the students to see how simple products can have innovative solutions. These solutions might not have been seen without finding a new way of looking at an existing product. (Fig. 20)

3.2.17 Q is for Quality

Qual·it·y

(KWAL it e) 1: peculiar and essential character 2: superiority in kind
3: the attribute of an elementary sensation that makes it fundamentally
unlike any other sensation



Fig. 21– Q is for Quality

Quality goes hand in hand with integrity. The quality of the materials used, the craft in manufacturing, the ideas generated, and the levels of development are all reflections of a product's integrity. The quality of work shows the integrity the student has for him/herself and the field of design. Demanding high quality projects is the only way to prepare a student for the job hunt and the 'real world'. Students should know what level of work is expected of them and feel that only their utmost effort will justify their grade. Quality of each project will improve when the students receive constructive criticism through the class critique time.

The painting of Pygmalion by Gerome for the 'Quality' page was chosen to illustrate how producing the best quality products may become highly desired and have a life of their own. The products show how high design is not only found in glamorous,

one-of-a-kind pieces, but also in everyday products from skis, to containers, to cocktail shakers. (Fig. 21) The quality of a product is a judgment of the choices made reflecting a combination of material choice, integrity in the technical workings, and well-developed design decisions relating to the fundamentals.

3.2.18 R is for Rhythm

Rhy·thm

(Rhythm) 1: any kind of movement characterized by the regular recurrence of strong and weak elements 2: the effect of recurring or repetitious lines, colors, forms, etc.



Henri Matisse



"Beauty of style and harmony and grace and good rhythm depend on simplicity." -Plato

Fig. 22 – R is for Rhythm

Understanding how elements occur in a regular, progressive, alternating, or syncopated rhythm is a principle often noted in good design. The works by Matisse show how a composition can be associated with the rhythm of dance even if the objects in the paintings are not always people (Fig. 22). The power to control how the elements work in a composition is the goal all students should strive for and will be apparent in work that is successful. Examples of the Zanzi stools and the CombiNation utensils illustrate

how rhythm impacts the composition of the *ABCs* book page itself (Fig. 22). Rhythms do not always have to be a regular occurrence of two or three elements; compositions can form harmonies of progression and syncopated notes like those of musical compositions.

3.2.19 S is for Synesthesia

Syn·es·the·sia

(sin es THEE zha) 1: a phenomenon in which one type of stimulation evokes the sensation of another, ex. hearing a sound resulting in the visualization of a color 2: a crossover between sensual perception 3: using terms from one domain (touch) to describe another (sight); "cool colors" or "soft shapes"



Georgia O'Keeffe



Fig. 23 – S is for Synesthesia

Synesthesia is a term concerning the phenomenon of sensual perception crossover, where we associate sensations with others or with outside stimuli (McCreight 1996). The terms of warm and cool colors are excellent examples. There is no physical sense of hot or cold in the color itself, but we perceive blues and greens to be cool and reds and oranges to be warm by seeing them. These associations can be predicted and used to trigger synesthetic responses.

The Synesthesia page illustrates how two seemingly different objects, a baby carriage and a sugar/cream dispenser can carry the same visual feel by considering the shapes, materials, colors, textures, etc (Fig. 23). Aesthetics play a big part in how we perceive the world. Georgia O'Keefe's paintings illustrate how shapes and colors can be perceived with feelings. The forms used are curvilinear and feminine which we associate with the texture of softness. Helping students understand how to make educated choices with the knowledge of synesthesia can define what combinations of form, color, texture, etc. are appropriate. Additionally, students should have the ability to identify when an element does not conform to the overall dynamic of the composition. This skill may help students to form a more articulate vocabulary for describing objects as they relate to emotional perceptions and the way looking at these compositions impact our minds and bodies.

3.2.20 T is for Texture

Tex·ture

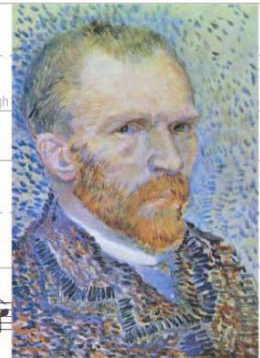
(TEKST shur) 1: a grainy, fibrous, woven, or dimensional quality as opposed to a uniformly flat, smooth aspect; surface interest 2: the representation of the structure of a surface as distinct from color or form 3: the visual or tactile surface characteristics and appearance of something



"The pattern, a web at once sensuous and logical, an elegant and pregnant texture: that is style, that is the foundation of the art of literature."

-Robert Louis Stevenson

Vincent van Gogh



Literal Texture - actual surface of a material object.

Implied Texture - remembered texture of an object

Conceptual Texture - complex pattern; literature



Fig. 24 – T is for Texture

Textures can be very appealing if designers understand how literal, implied, and conceptual textures can influence a consumers' perception of a product. Designers have the ability to create objects people want to interact with.

The literal, or tactile, textures can offer a physical connection to the user as well as provide gripping surfaces or signify areas of interaction. The Mini Go Bag is linked to the actual Mini Cooper it was designed as an accessory for by using the same fabric textures and visual lines associated with the automobile's style.

Implied, or visual, textures can use the sense-memory recognition of a texture or pattern to associate the same feelings or emotions tying the real texture to one that does not actually exist on a product. The brush-strokes seen in Van Gogh's *self portrait* create an implied texture of the real painting even though it is reproduced on the page.

Finally, conceptual textures can be developed through the complex knowledge of how the mind perceives and combines information. The images in the fabric examples at the top of the *ABCs* book page for texture create a visual texture, layered with many colors and shapes but the fabric itself is two-dimensional. Visually layered elements on a page convey a single conceptual texture like that of how musical notes form a textured melody. (Fig. 24)

3.2.21 U is for Unity

U·ni·ty

(Yoo ni te) 1: the state of being one 2: the ability of a composition to coordinate its various parts into a stable whole 3: the effect of the whole exerting a greater force than the simple collection of the parts



Porsche 911 GT3



ipod

"Together let us desire, conceive, and create the new structure of the future, which will embrace architecture and sculpture and painting in one unity..."
-Walter Gropius



Bauhaus posters

Fig. 25– U is for Unity

Unity is: the state of being one. Unity is: the effect of the whole exerting a greater force than the simple collection of the parts. (McCreight 1996) These two definitions are reminiscent of the Gestalt theory. When talking about unity the Bauhaus school comes to

mind. The spirit of one group of designers and the idea of learning the fundamentals in a unified whole seems very desirable, no matter what underlying politics may have existed. Supplemental references to design history, such as the Bauhaus, will help to provide students with a deeper understanding of their profession.

Strong products like the Porsche and the ipod are unified expressions of carefully considered design decisions (Fig. 25). Similar shapes, forms, and styles, if well designed, may become a recognized style easily recognized without a label applied to the product. Unity always plays a part in the strongest designs and should be well communicated to the students.

3.2.22 V is for Volume

Vol·ume

(VOL yoom) 1: the size or extent of a three-dimensional object or region of space 2: broadly, the capacity of such a region or of a specified container 3: measure of the interior space

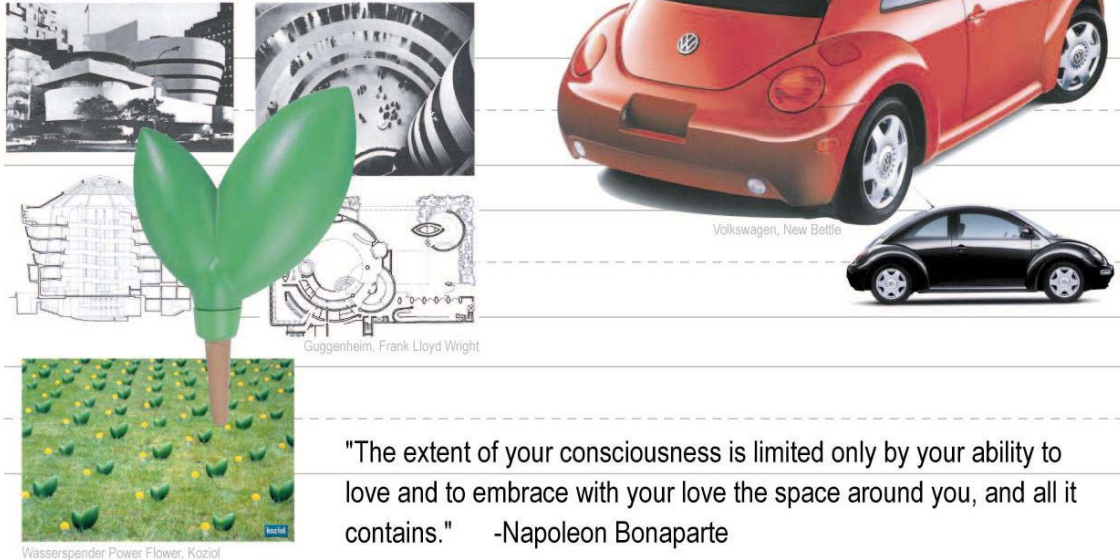


Fig. 26 – V is for Volume

Volume and transition of form go hand in hand. Beautiful forms and spaces are created with a good understanding of space, three-dimensionality, and how forms should transition from one to another. The examples illustrated in the *ABCs* book are helpful to show students how one shape meets another physically and the way that very subtle transitions can be quite complex. The way the two bulbous leaf forms of the Koziol water dispenser meet and transition into a cylinder is quite beautiful, as is the uniquely curvy exterior of the New Beetle by Volkswagen (Fig. 26).

Not only is it important to be able to manipulate volume but also understand how our products exist in the space around them. It is easy to become overly focused on the items one is designing. Students should be encouraged to take a step back and let the environment surrounding the product add more insight into the creation of a viewing

experience. The space created inside an object is just as important as the outside as seen in Frank Lloyd Wright's Guggenheim museum. (Fig. 26)

3.2.23 W is for Weight

Weight

(wayt) 1: a measure of the heaviness or mass of an object 2: the gravitational force exerted by the earth or another celestial body on an object 3: influence, importance, and authority



Mark Rothko

Nr. 44 Kompass/Wetterstation



"A common mistake that people make when trying to design something completely foolproof is to underestimate the ingenuity of complete fools."

- Douglas Adams



Tandemwalze DV 40/DV 70/DV 90



Fig. 27 – W is for Weight

Visual weight is often perceived by students without the ability to verbalize it. As Dondis explains, “Weight, which means in this context ability to attract the eye, of course, has enormous significance here in terms of compositional balance” (Dondis 1973). By giving a name to this phenomena and showing students what happens when weight is not distributed correctly in a composition will help them begin to understand why some solutions are more effective than others.

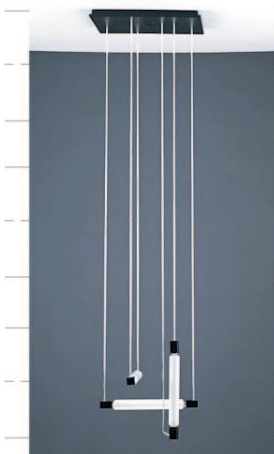
The compass device, Nr.44 Weather Station, at the top of the *ABCs* page is designed to look substantial and sturdy even though it is a small hand-held device. When

in comparison, the Hammtronic DV/90 steamroller, understood to be thousands of pounds, looks quite light visually thanks to the uplifting, orange color on the bottom portion of the machine. Mark Rothko's style of color-field paintings also demonstrates the manipulation of visual weight through the use of large sections of intense color. (Fig. 27)

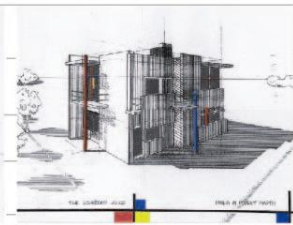
3.2.24 X,Y, &Z are for Planes

X·Y&Z planes

(playn) 1: any flat or level surface 2: an imaginary surface that unifies or at least describes a series of points which can interact in one, two, or three dimensions 3: to be three-dimensional, a form must interact with the x, y, and z planes



hanging lamp, Gerrit Rietveld



Red, Blue chair and Schroder House, designed by Gerrit Rietveld

"Design in art, is a recognition of the relation between various things, various elements in the creative flux. You can't invent a design. You recognize it, in the fourth dimension. That is, with your blood and your bones, as well as with your eyes." - D.H. Lawrence

Fig. 28 – and XY&Z planes

It is imperative that students understand what makes an object or space three-dimensional. Not only does it have form, but also should occupy and interact with all three planes in order for it to truly be 3-D. The Schroder House by Gerrit Rietveld is an all-encompassing tribute to the X,Y,&Z planes. The house consists of intersecting planes

and lines. The light fixture embodies the three-axis structure and the furniture also is designed for this specific space. It is inspiring for students to see actual work that is completely based around one concept. So often designers will have to compromise or be allowed to stray from a concept, but the Schroder House follows the concept in every detail. (Fig. 28)

Summary

This chapter serves as an overview of principles and elements required for all designers. The previous definitions and examples of the principles and elements provide a reference point with which an instructor can to develop their own teaching points associated with each fundamental concept. Many of the existing texts pertaining to the principles and elements of design are focused on fine arts applications and are treated as dry definitions. Information here is presented with reference to how students will best receive the elements and principles in the context of industrial design. If instructors can make connections amongst the principles and elements, like the example of unity and the gestalt theory, perhaps the students will have a more holistic understanding of the fundamentals and how they relate.

The next chapter will present a resource for arranging these concepts into Core Concept groups to better establish a chronological order with which to create a curriculum.

4. APPLICATION: TEACHING THE DESIGN LANGUAGE

The order in which the concepts are taught is difficult to determine. In order to begin communications with the visual language students must work with all of the vocabulary at once. To consider each on day one is too overwhelming a task for an instructor to undertake and too much information for the students to absorb. Therefore the order in which the principles and elements are taught must be decided. The chronological order of the fundamentals may fluctuate year-to-year depending on what concepts appear in scheduled projects. The *design.edu* map (Fig. 30) has been developed to divide the lengthy list of terms into a set of Core Concepts with supporting principles and elements. This map will show overlapping Core Concept elements reinforcing each other as the semester goes on.

4.1 Chronological Order for Presenting Fundamentals

The most difficult part of any project is getting started. Building a foundations year design curriculum can be especially intimidating. In the visual language there is a vernacular that must be quickly learned in order to describe what one sees. This allows students to talk about each of the concepts with more substance than the inevitable, “I like it...I think it’s interesting... I think it’s ugly” student response. Teaching the students to speak this new language is just like teaching any other foreign tongue; one must begin with the vocabulary, the elements and principles. Which concept should you

start with? It would seem the best approach would be to introduce students to all of the principles and elements first, but several problems arise. First, there are too many concepts to cover thoroughly in one sitting. Secondly, the principles and elements overlap, intertwine, and tend to describe each other. There is no way to make a numbered list that shows what is the most important concept to learn first, second, third, and so on for every circumstance. And finally, these fundamental ideas cannot be taken out of context or studied in a vacuum. To list a definition for each of these elements and principles would only help the students recognize what they are. The primary goal of this thesis is to help students understand what the fundamental concepts do and how to manipulate them in combination. In order to manage the endless vocabulary list of terms the principles and elements can be consolidated into eleven Core Concepts.

The Core Concepts

From an initial list of forty-four principles and forty-eight elements gleaned from a number of sources eleven Core Concepts were identified. To help organize the initial list a physical mind-map was created. Each word was pinned onto a wall and string was used to connect ideas (Fig 29). Terms that shared common attributes in the design language were grouped and in turn created larger groups with general themes. Through this process Core Concepts were established and placed in a chronological order that could be managed and presented.

The term ‘chronological order’ is used loosely to describe how the principles and elements play off of each other through the process of learning. There exists no singular

order in which the principles and elements should always be presented. These concepts are intertwined and only through the class projects can they be fully understood.

As the project possibilities are endless, the concepts can be successfully communicated in many ways. This in mind an interactive diagram was created to help the instructor build a custom map of the concepts they want to address and in what order. The *design.edu* map is only a tool to visually grasp how the fundamentals can be grouped and serves as a reminder of exactly what essentials the students need to learn in the foundations year.

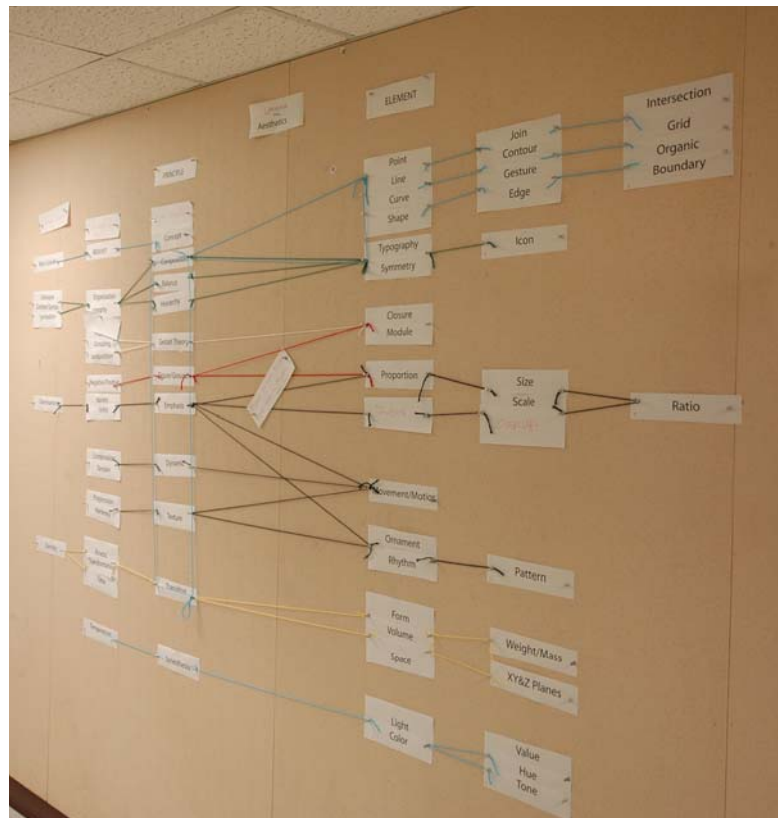


Fig. 29 – Process of grouping Core Concepts in mind map

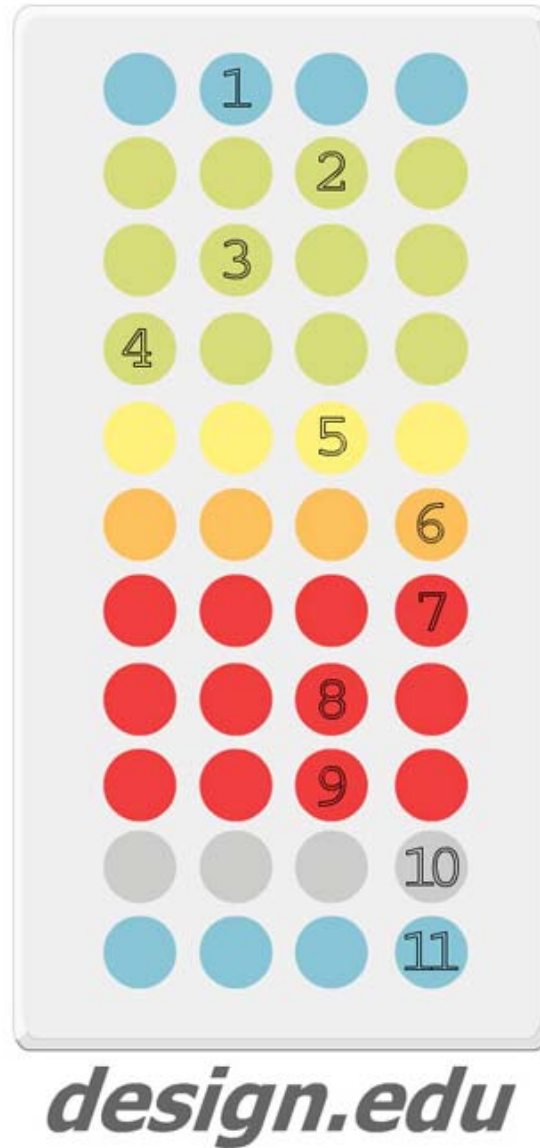


Fig. 30 – design.edu interactive map

The *design.edu* map shown above consists of eleven rows of differently colored dots to represent each of the Core Concepts. (Fig. 30) The numbers only serve to show the order of these concepts, but the dots are interspersed and can be clicked in any sequence to create an order of the instructors' choosing. The Core Concepts and their

supplementary principles and elements appear by clicking on the numbered circles. The colors signify groups in which concepts are particularly intertwined and could be presented together. The top and bottom, blue concepts, can be introduced in tandem with any of the other nine concept groups. This means both the ‘concept’ and the ‘synesthesia’ bubbles are applicable in every other concept group and act as supplements to learning the other nine concepts. The Core Concept appears in the large bubble attached to the numbered dot clicked upon. To the left of the Core Concept are the secondary and tertiary principles that describe or lend to the explanation of the Core Concept itself. To the right of the Core Concept are the elements that do the same. All of the bubbles are arranged to be visible when all of the numbered buttons are depressed to show the horizontal connections made in each of the Core Concepts as well as the vertical order in which they can be presented (Fig. 42).

The Core Concepts explored in depth for my teaching experience were ‘Concept’ and ‘Composition’ and therefore include the teaching points found to be useful while actually presenting to a class.

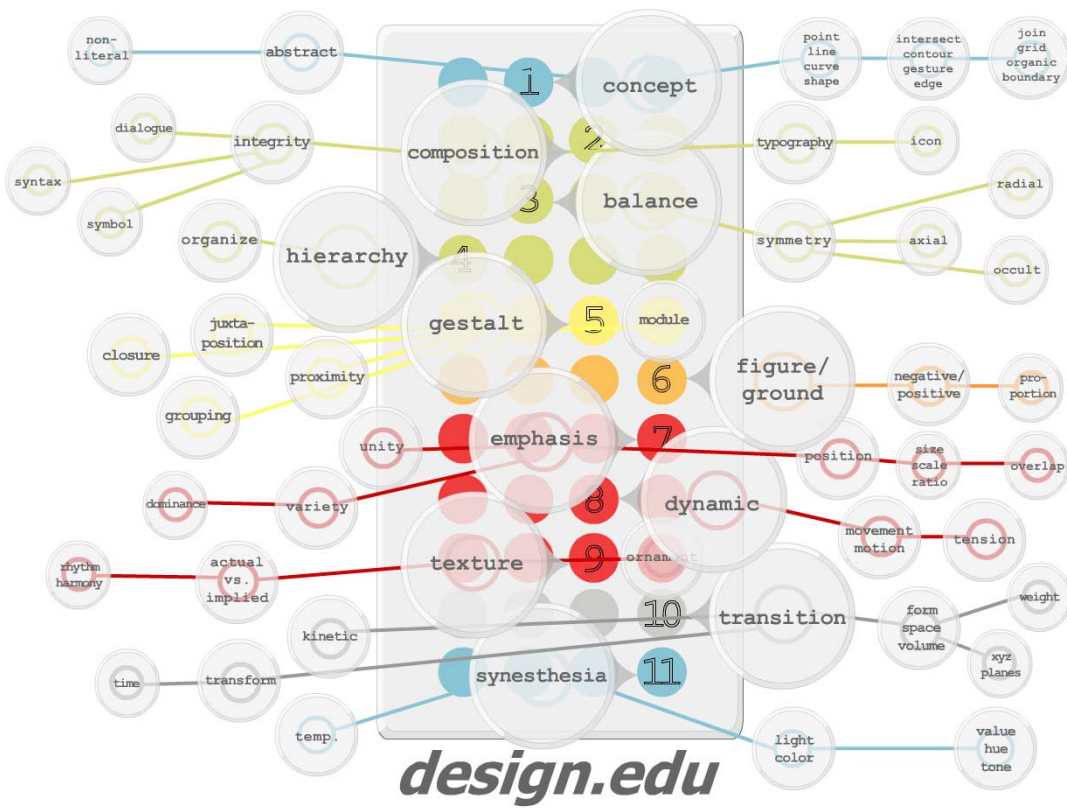


Fig. 42– design.edu map expanded

4.1.1 Concept

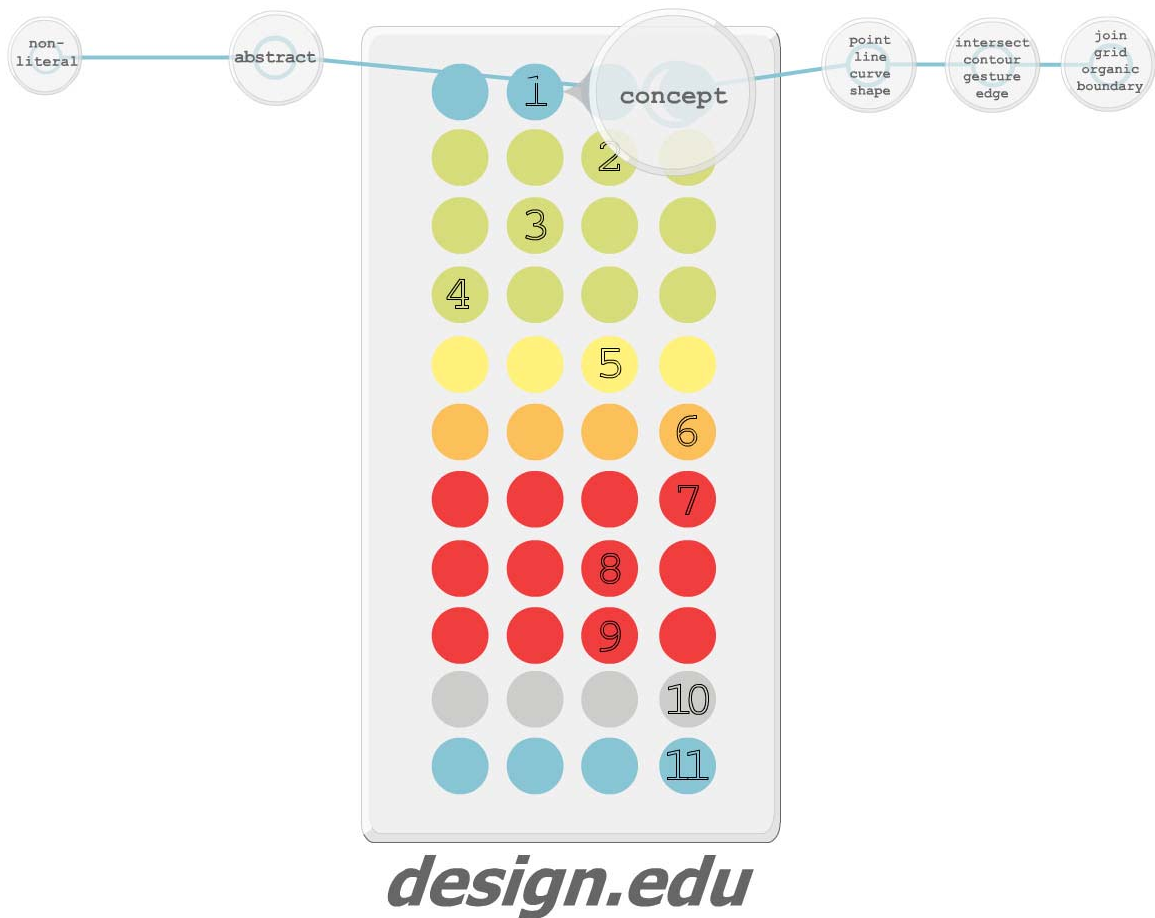


Fig. 31 – Concept, Core Concept 1

Concept, Core Concept 1, introduces the students to the notion of seeing the world through a design eye. (Fig. 31) Concepts, as discussed in the previous Understanding chapter, serve to anchor design decisions to a common idea or generator. Giving the students the tools to start making their own ‘rules’ to follow in each of their projects will give them a strong foundation for making good choices in their designs. Concepts also help students control the direction and purpose of their designs by providing a starting point; an idea, an emotion, a form generator, a problem statement, etc. all act as points of inspiration. The students should first learn how to ask themselves

questions about what their design needs to do or be in order to find the best possible solution. The secondary principles to the left of the Concept bubble serve as an introduction to ‘thinking out of the box’. Defining what abstraction means and how it is achieved allows the students to step away from the ridged thinking of what exists to the limitless possibilities of what does not exist *yet*, but can through their designs. A helpful transition into the abstract is to use the term non-literal to define when objects or images go beyond the literal reference of an object into using only the key form generators to produce an object or image with the same qualities, but not the exact representation. These form generators will give students the freedom to interpret ideas on their own, while also giving them the opportunity to begin developing concepts. The secondary elements to the right of the Concept bubble are the parts of a design distilled to their most basic forms. These primary tools are what designers use to build their ideas through sketches or contours of a form. Understanding the properties of *point*, *line*, *curve*, and *shape* allow the student to start manipulating ideas into visual compositions. These are the tools they will use to record their ideas visually.

Teaching Points Concept:

- Present projects in ways that do not limit the students’ output. Consider if examples shown push them in only one direction. Perhaps vague project outlines can force students to decide what is necessary for the end product.
- Show students how to ask questions for every design decision made in their project. Why put that there? Why use that color? What is the main problem while using this product? Etc.

- Craft is of the utmost importance in student projects and should be insisted upon from the first project onward.
- Speak to the students about how produce high quality work by considering every angle and decision made during the process of creation.

4.1.2 Composition

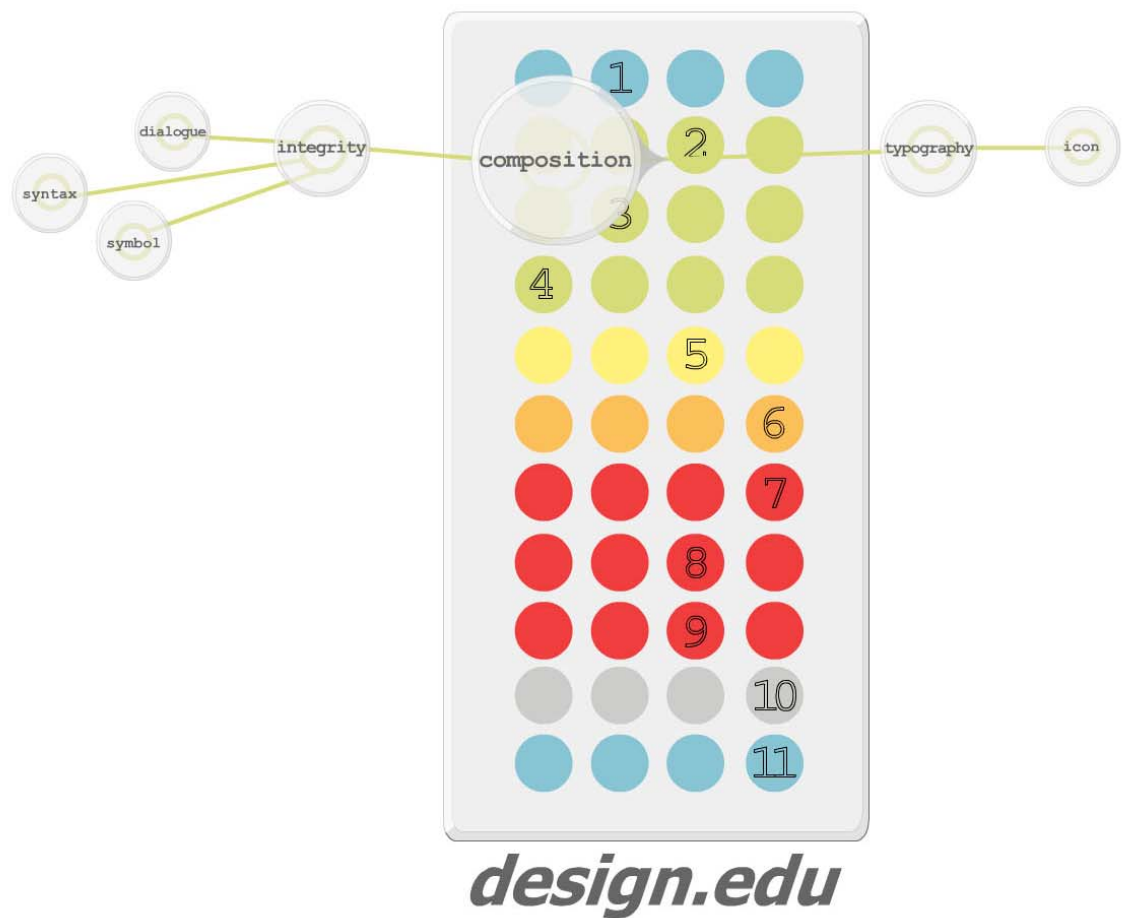


Fig. 32 – Composition, Core Concept 2

Each project the students hand in is considered a composition, which leads to the second Core Concept, Composition (Fig. 32) Any design, whether it is product, sculpture, graphic arts, etc. are meant to tell a story. Each portion of the design plays a part in the

dialogue of the work in order to direct the viewer around it visually and communicate the desired information. The integrity of the composition relies on the students understanding of what essential elements will portray the information required without adding frivolous distractions to cover up what they could not control. The designer is in control of what the viewer sees and should become familiar with what decisions can make a pleasing composition for the viewer. Typography, icons, and symbols tell stories on their own due to their meanings in society and the students need to be aware of what their presence in a composition will communicate to the viewer.

Teaching Points Composition:

- Composition is how to communicate visually
- Decide what the hierarchy of information is, what is most important for the viewer to see. Organize with relation to importance; title, images, text, your name, information, images, etc.
- How do you control how the viewer looks at your composition? Understand how people view things; left to right, top to bottom (in our culture).
- How do you control the page layout? Grid, magic points, ordering system, sight lines.
- How do you create visual interest? Interact with borders, interesting cropping, clipping masks, use of well designed backgrounds or design elements.
- Top vs. bottom orientation, size and style of font, borders and how to successfully push beyond them, anchoring vs. floating objects
- Any point has strong visual power to attract the eye

- When placed in proximity your mind connects the dots, which can lead the eye in a specific direction. The closer together, the stronger the *implied line*.
- Lines have energy. Lines can have emotion. It can be fast, slow, bold, coarse, delicate, flowing, hesitant, decisive, questioning,
- Line can be decisive, have direction and purpose. Line can be technical as a map or schematic.
- Line behaves in different ways in nature. It can be the horizon or telephone wires expressing a calm, controlled, line. It can be a crack in a sidewalk or a lightning bolt shooting in a dynamic diagonal line. It can be in the curvy contour of a high design car or in an undulating smoke trail as a sensuous line.
- The square – dullness, honesty, work. Students can learn to describe objects and shapes as living things. A square is static, balanced, and predictable. The direction associated with the square is the horizontal and vertical stemming from our reference to the world, our desire for balance, and the knowledge that the square will allow for stable construction.
- The triangle – action, conflict, tension. The points can make the viewer feel anxious or tension. Diagonal lines make this shape more dynamic because, they are the opposite of stable. Diagonal lines can make the viewer feel uncomfortable.
- The circle – endlessness, warmth, protection. Circles are comfortable because, they have no edges or points, we feel safe. An embrace, the womb, and the sun are associations we make with circles.

4.1.3 Balance

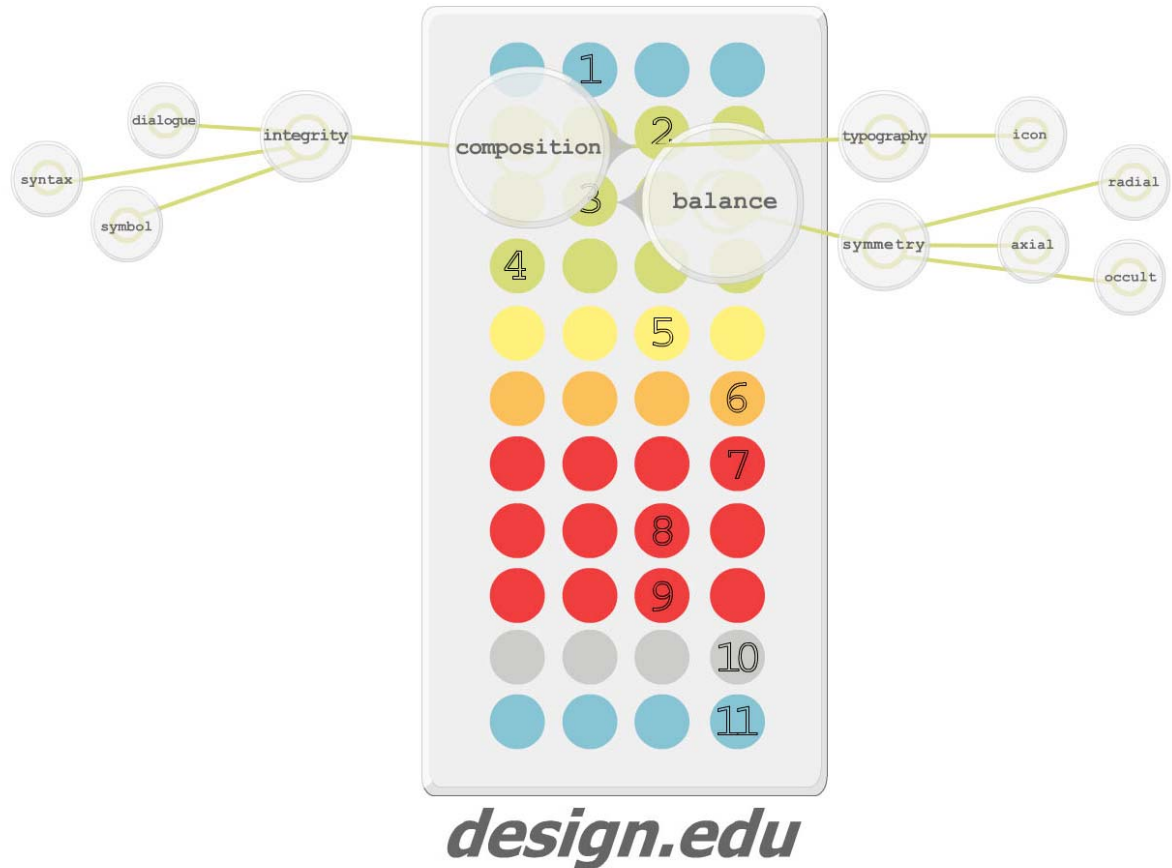


Fig. 33 – Balance, Core Concept 3

The Balance bubble will help the students to recognize how much control they have over their compositions. (Fig. 33) Balance is easily recognizable and can serve as a springboard for other principles once the students understand how each decision can alter the entire composition and how to push it in the direction of their choosing. Balance is also highly influenced by the psychological perceptions of the viewer. Recognizing how human factors affect every project is an important issue to introduce the students to early in design education; how the viewer perceives and interacts with the composition.

4.1.4 Hierarchy

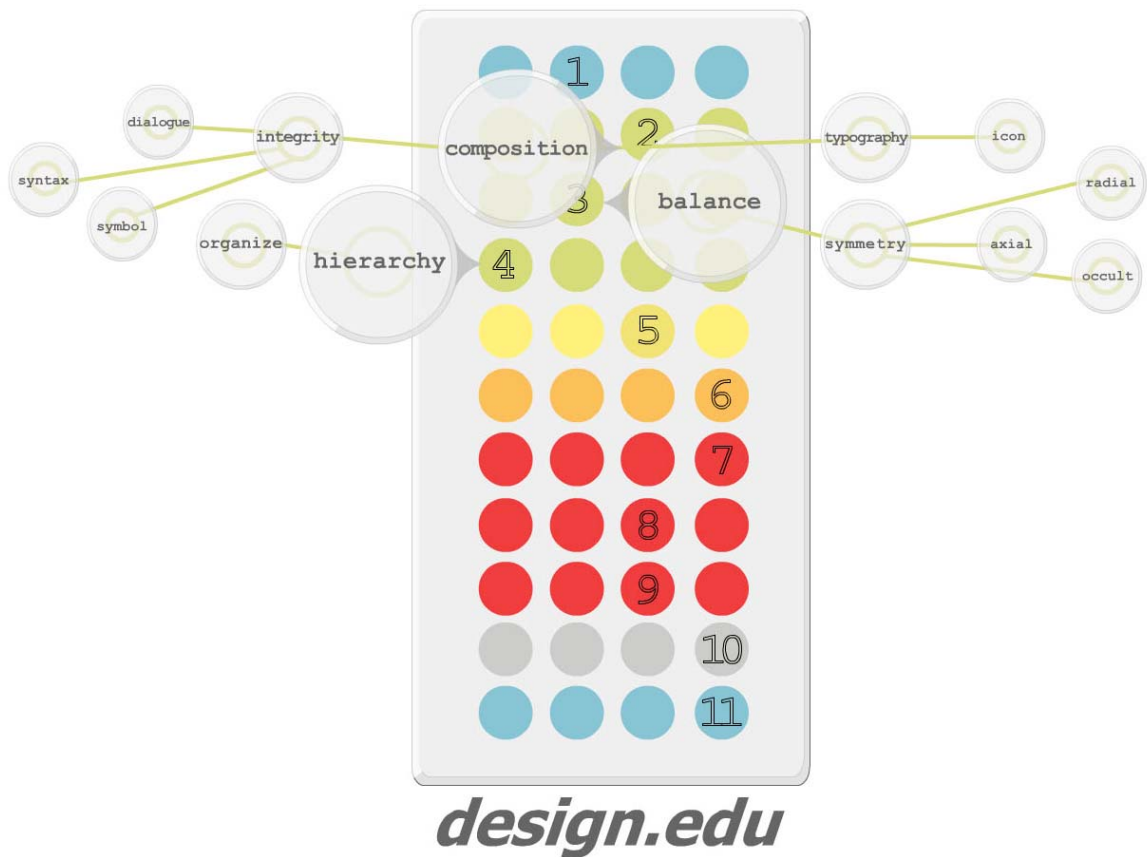


Fig. 34 – Hierarchy, Core Concept 4

The Hierarchy bubble is closely tied to the Composition bubble in that organizing information in a composition is how we communicate with the design language. (Fig. 34) The skill of deciding what informational component is most important is imperative to making good design choices regarding where the viewers' eye goes first and how it travels around a composition. Students should be able to understand how to signify the hierarchy in a composition by understanding what order the viewer will see the information presented in their project. The students should be able to rank the parts of an existing composition and demonstrate how they are highlighted, organized, and placed. If a project title and the students' names are to be included on the presentation boards the

students should be reminded to incorporate these elements into the composition according to their rank in importance and not simply written on as an after thought.

4.1.5 Gestalt

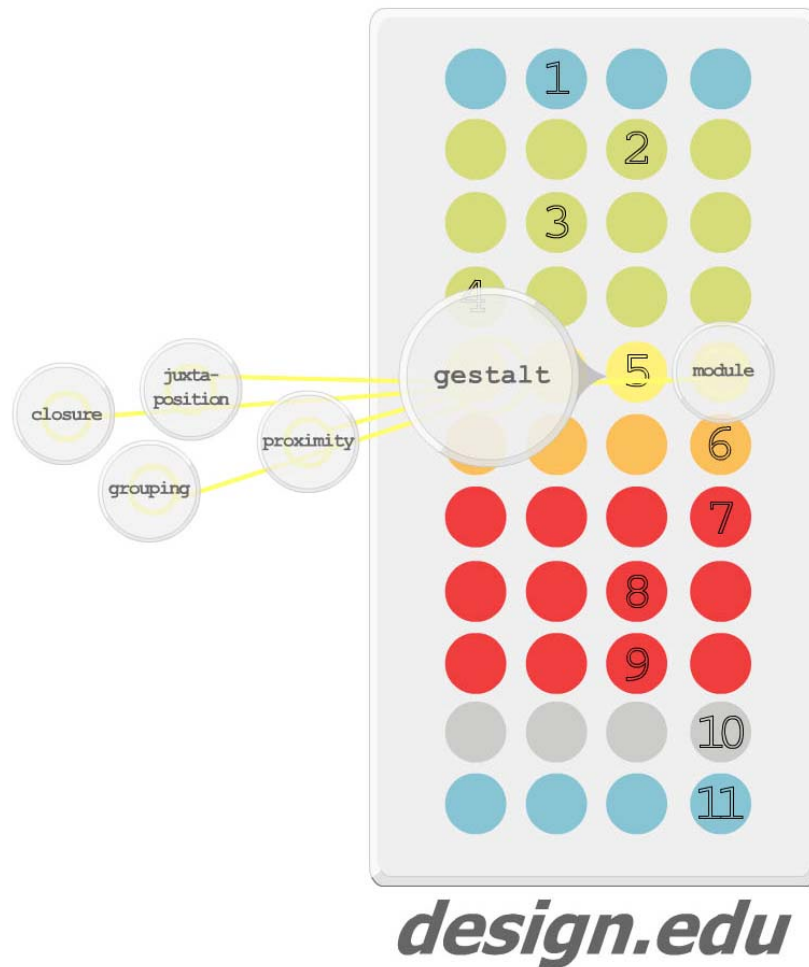


Fig. 35 – Gestalt, Core Concept 5

The Gestalt theory is an option in which to introduce students to the idea of how components of a composition work together and play off of each other. (Fig. 35) This device helps to speak about the composition in relation to parts and the whole. How parts relate to parts and how the parts relate to the whole. Giving the students key words such

as closure, continuance, similarity, alignment, grouping, proximity, and juxtaposition will help them to identify how the parts of their composition interact and how they can alter the composition to create a better whole. Modules are also important design elements to use in class as an introduction to the way parts interact and how limiting the number of parts used can be a challenge as well as a cost saver in the real world.

4.1.6 Figure/Ground

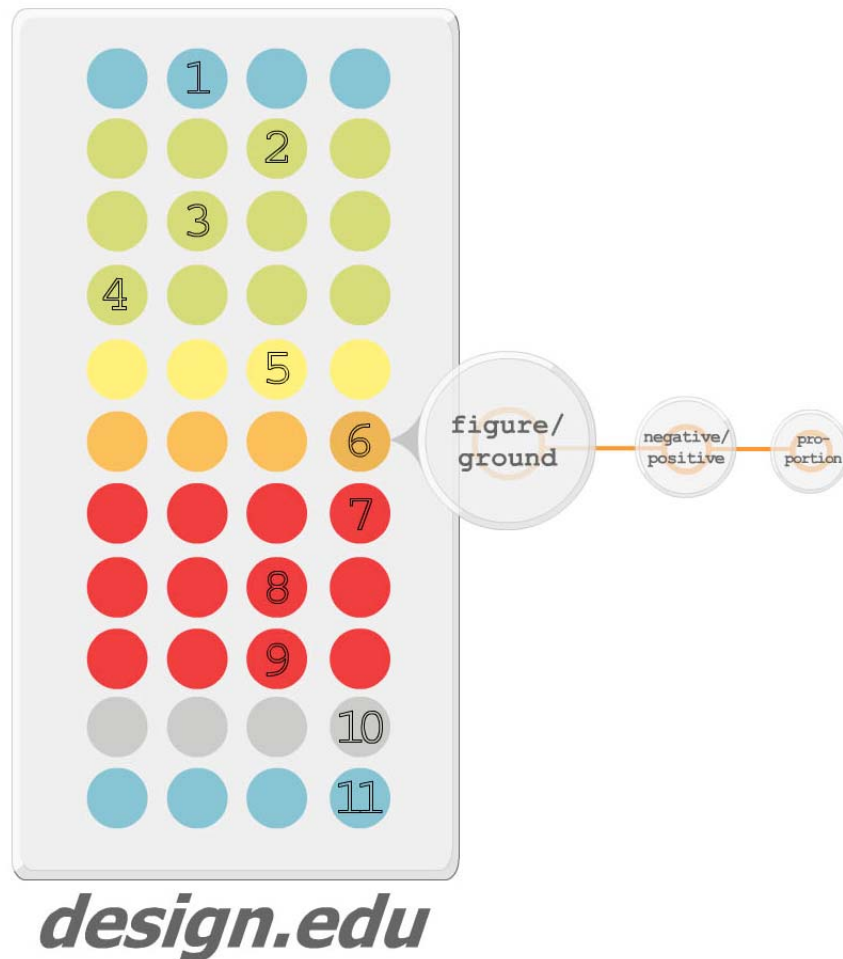


Fig. 36 – Figure/Ground, Core Concept 6

The Figure/Ground bubble addresses the essential idea of proportion in design. Blurring the line between figure and ground in a composition can add interest and also help to develop a sense of size relationships inherent in visual communication. (Fig. 36) Not only is the figure to ground relationship a way to understand how well the two-dimensional composition is proportioned and anchored, but it also relates to the need to understand how a three-dimensional product relates to its environment. Is it too big or

too small with respect to its intended surroundings, its user, or the store in which it is sold?

4.1.7 Emphasis

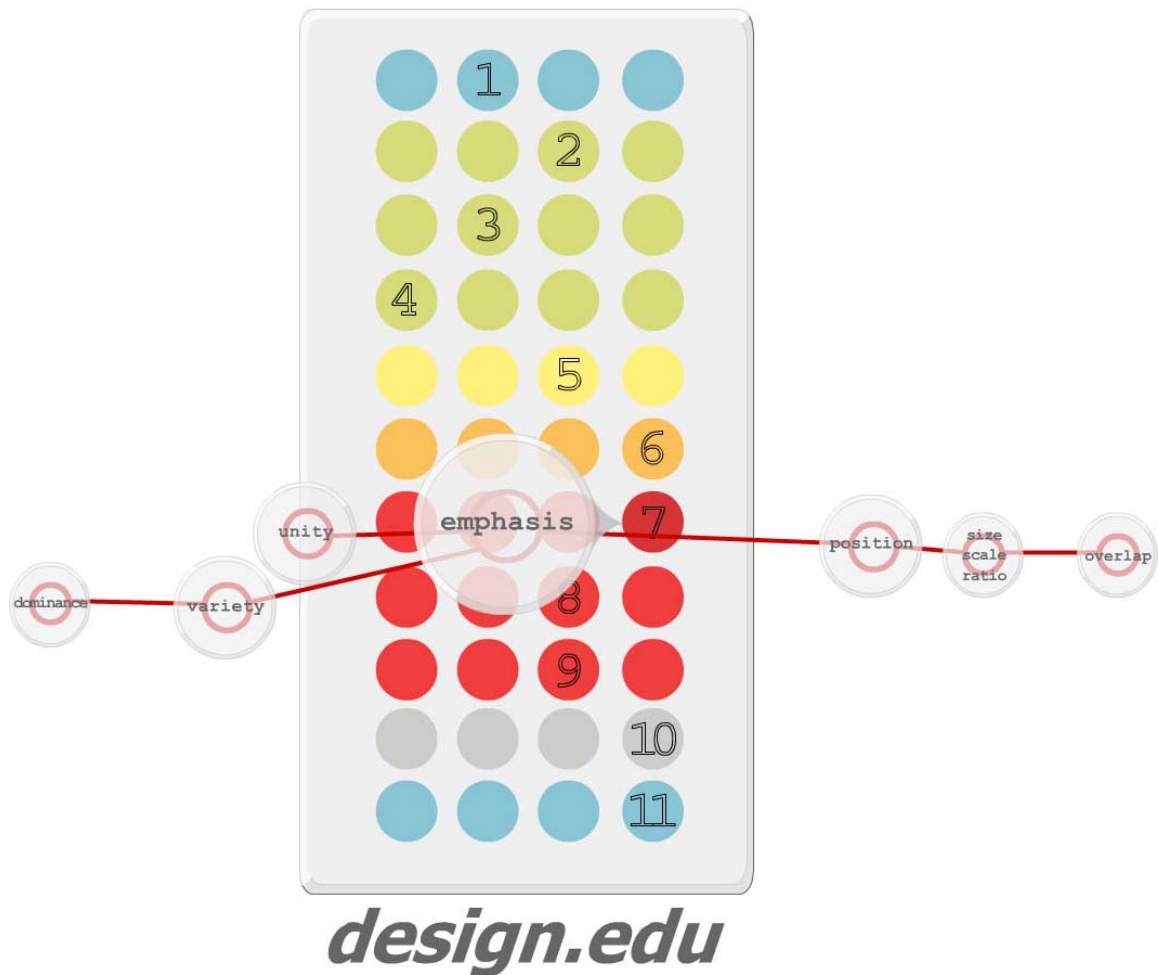


Fig. 37 – Emphasis, Core Concept 7

The Emphasis bubble serves to introduce students to the idea of aesthetics in design. (Fig. 37) How to make decisions about the way a product or composition looks is an important skill to develop in conjunction with the understanding of what makes good design good and bad design bad. Adding flashy forms or fonts to a composition can

create visual interest, but must be incorporated into the overall design and not distract from it. Learning how to create emphasis in many ways such as placement, size ratios, overlapping, color or tone differences, etc. will provide the student with a repertoire of ways to subtly influence the look and feel of a project. The principles of unity and variety enforce the idea attention-grabbing aesthetics and also offer an opportunity to discuss branding and styles used by existing products and why they work or they do not.

4.1.8 Dynamic

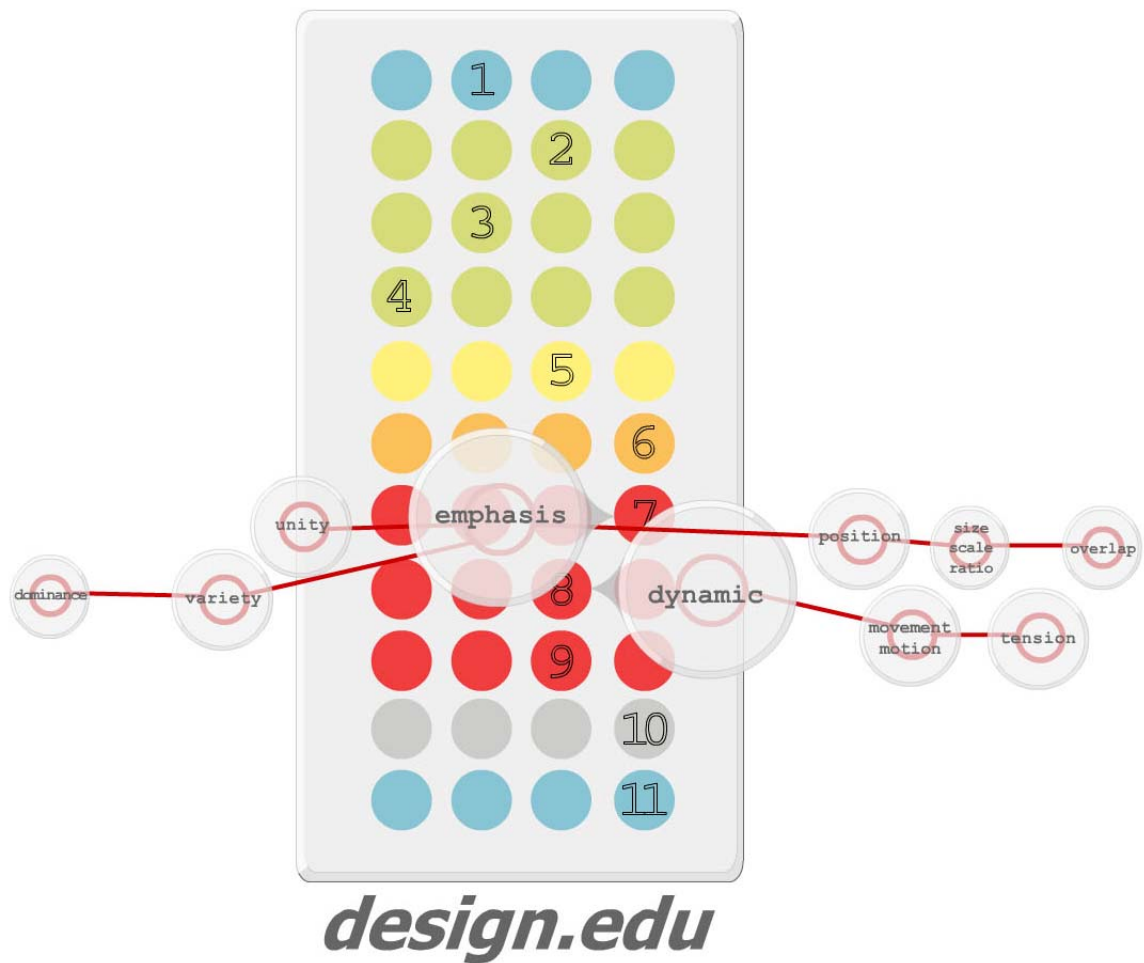


Fig. 38 – Dynamic, Core Concept 8

The Dynamic bubble also pertains to visual interest, but is associated with movement in the composition. (Fig. 38) How elements are placed in a composition as well as the forms they take directs the way the viewers' eyes flow across the page or product. To identify what gives motion to a product or understand why movement is desired in a product could help students build skills to translate emotions, ideas, or concepts into form.

4.1.9 Texture

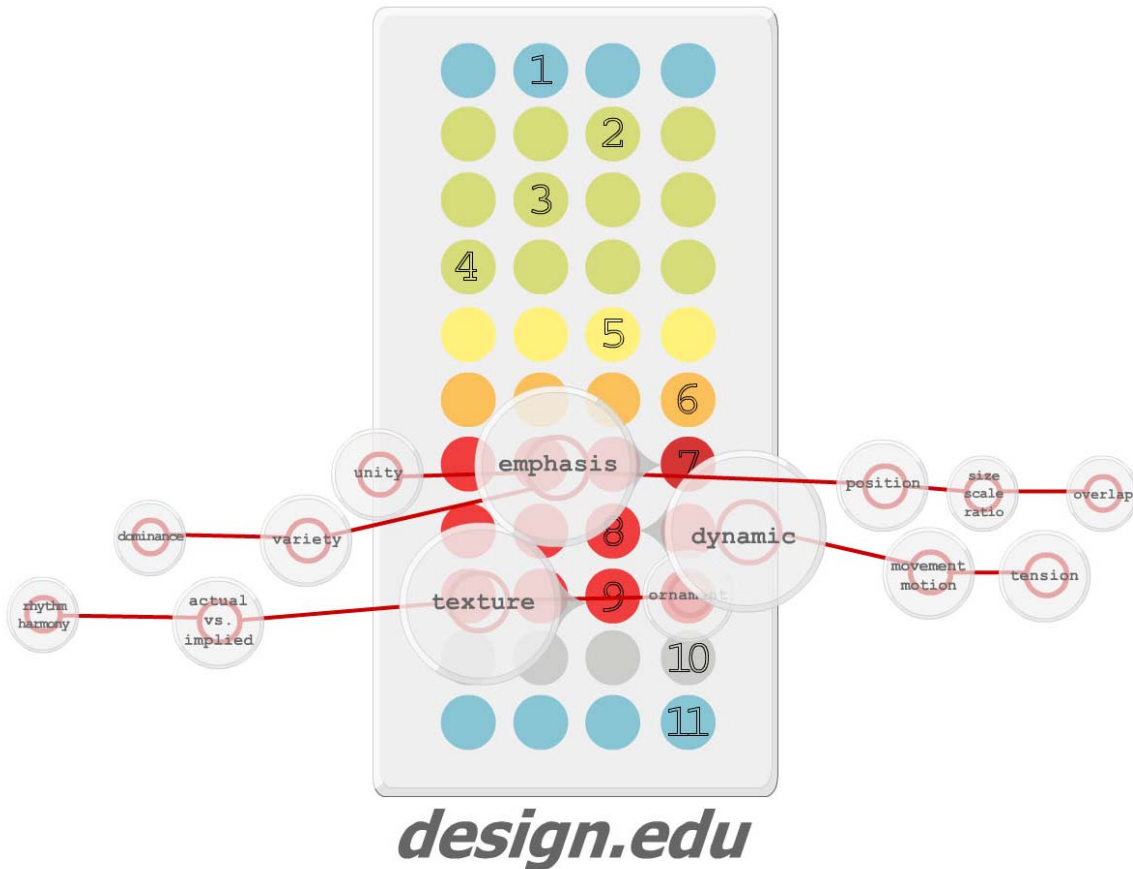


Fig. 39 – Texture, Core Concept 9

The final bubble associated with adding aesthetic interest in a project is the Texture bubble. (Fig. 39) Students should be familiar with the concept of texture and able to identify when texture should be used to attract attention or provide a gripping surface or even as ornament, as actual or implied additions. Ornament is a subject to be defined and controlled by the students and not used as an extraneous mask for poor design. The creation of a rhythm or harmony among the elements of a design can illustrate the need for a strong overall design, with no part out of place or unconsidered, while adding visual texture or interest.

4.1.10 Transition

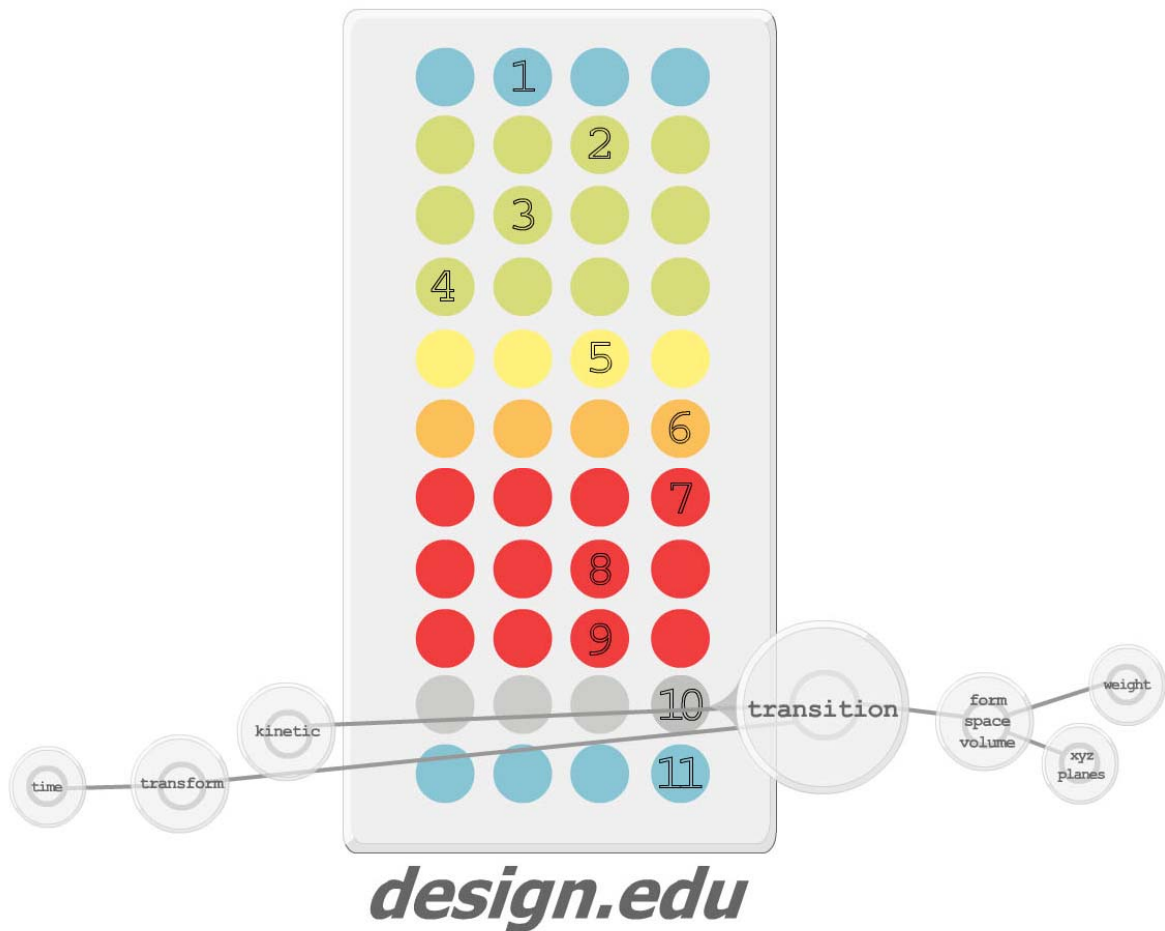


Fig. 40 – Transition, Core Concept 10

A difficult notion for students to address is the transition from one object to another, thus the Transition bubble. (Fig. 40) Two-dimensional and three-dimensional forms both encounter the instance of how one part of the composition interacts with a completely different part. For a student to fully grasp the idea of creating forms they must be well versed in how to create objects with relation to space, the volumes defined by those objects, and how forms speak to the user. Transformation from a rectilinear shape or form to a curvilinear shape or form should be addressed by discussion and

examples. The idea of having kinetic forms interacting with static forms and any other instance or opportunity to address connections would be helpful to the students. One final issue associated with this bubble is the idea of transition or transformation over time. Challenge the students to think of their projects on many levels instead of what is happening at only this moment or only this place.

4.1.11 Synesthesia

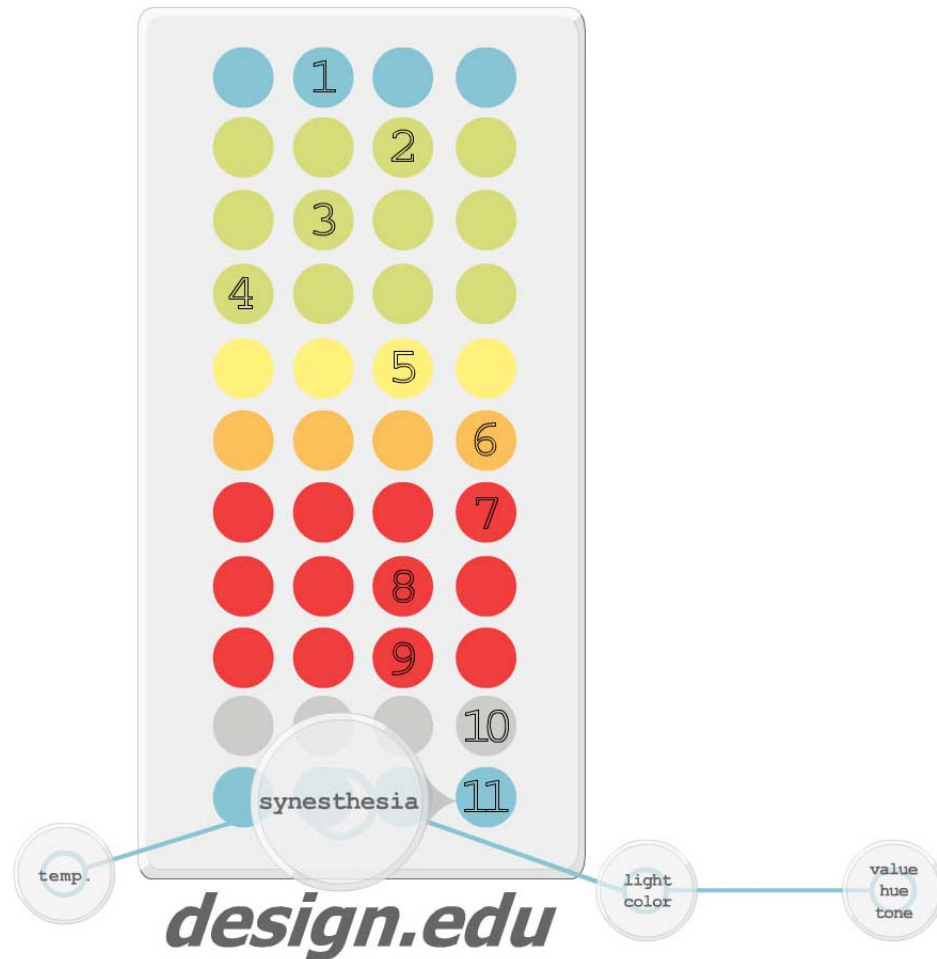


Fig. 41 – Synesthesia, Core Concept 11

As I noted in the introduction to this mapping system, the blue Core Concepts are applicable at many times during the curriculum. (Fig. 41) The Synesthesia bubble is most concerned with color theory and the very important role it plays in design. The term synesthesia illustrates the connection color has to our emotions in every instance of its use. When a project calls for the need to educate students about how to use color correctly, insert this bubble.

5. CONTEXT: TEACHER'S AID

The purpose of the previous chapters were to give the instructor the basic preparatory knowledge of some teaching techniques and an understanding of how these fundamentals relate to each other and can be presented in a chronological order of ones' choosing. This interactive Teacher's Guide can be used to organize thoughts about each concept, develop projects to communicate the fundamentals to the students, evaluate the students and the instructor, reflect on what works and what does not, and finally to document everything the students produce for future reference and the continued betterment of a foundations curriculum. The physical kit, shown in more detail in the next chapter, will house the following outlines for each of these processes.

5.1 Core Concepts: Guide to Successful Projects

The first section of the Teacher's Guide contains the teaching points listed in the previous chapter for use as a basis for creating projects that communicate the essential concepts to the students. The guide uses the chronological order presented in the last chapter but, is

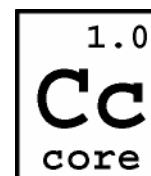


Fig. 43 – Core Concepts Logo

modular and can be arranged in an order of the instructors' choosing due to the three-ring binder system. An instructor should choose the Core Concept(s) he or she wishes to develop a project for and study the teaching points needed to communicate to the students. Remember that these concepts overlap and will eventually become clear to the

students the more they can interact with them. If an instructor feels the need to explain a new concept during the course of a discussion or critique, introduce this concept with reference to the example being discussed. The students will eventually be introduced to everything in great detail, but the more vocabulary they are introduced to, the easier it will be for them to explain why they think a product is “good or bad” and also understand what design decisions need to be made in their own projects. These Core Concepts are a stepping off point for the instructor to build a solid curriculum that ensures the students will be presented with the essential design fundamentals needed as the basis for the rest of their industrial design education.

5.2 Interactive Notes: Guide to Process

The interactive note section is where the instructor can record his or her ideas and thoughts about projects, exercises, discussions, and lectures to introduce the students to the principles and elements and help apply them in practice. The teaching points are there to

remind the instructor what exactly the students need to grasp about the visual language in lecture. An instructor can now begin to come up with projects allowing students to explore and apply the Core Concepts. Consider ways of challenging the students to produce strong concepts centered around one or more of the elements and principles. Both instructor and students can utilize several different means of recording the process of idea generation in order to get to the best solution.

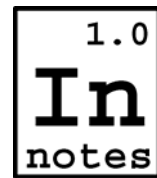


Fig. 44 – Interactive Notes Logo

Sketchbook

Develop the practice of carrying a sketchbook at all times to record sketches and ideas as they come. A sketchbook also serves as a single place for all ideas to start.

Work through problems by writing about research conducted regarding the project, what difficulties were encountered, solutions, inspirational images, or even ideas about the project that come in the night. All of these points can serve as generators for the next idea, record them all. The *design.edu* kit provides supplementary pages with the eleven Core Concepts listed in the bottom right-hand corner (Fig. 45). Circle the subject the sketches and notes pertain to and insert the page into the section of the guide discussing that particular element or principle at a later date.



Fig. 45 – *design.edu* kit, note page

Process Pages

A process page or roll can also provide a new technique for working through a problem. Start at the beginning of a large piece or roll of paper by writing down the problem statement. Continue adding thoughts, sketches, diagrams, questions, and answers filling the page from left to right until the best possible solution to the problem statement is discovered. This process page helps to record all steps of the thought process, successful or not, on a medium that can be displayed and viewed at once. Process rolls can stretch around a room and provide an insight into the thought process, while at the same time list ideas and tangents to be revisited later on.

Diagramming

Diagramming is also a good tool to use when introducing students to design process. As discussed in the *Vizability* notebook, “Diagramming is a way to capture ideas and make them visible...to show relationships and to emphasize critical points. Diagrams can act as a form of visual note taking or a pictorial conversation between ourselves and a colleague... to which we attach divergent ideas, or a more public presentation of complex data” (Hooper Woolsey et al. 2004). This definition by the team of authors for the *VizAbility* book, a guide to visual communication, explains how quick sketches devoid from the responsibility of drawing an exact, real-life object help to pull abstract ideas from one’s head onto paper without feeling the need to determine all of the details. One of the authors for *VizAbility* goes on to point out, “diagrams can be used to record a process, an even, a structure, or a body of information. They can be composed of words, images, abstract symbols, or a combination of all three” (Hooper Woolsey et al. 2004).

Diagrams can highlight ideas, emphasize relationships, make comparisons explicit, display different levels of analysis, reveal structure, group issues, encourage collaboration, reinforce memory, and so on (Hooper Woolsey et al. 2004). How do diagrams differ from basic sketching? They are similar but diagrams do more than represent an object through lines and shading, they help to tell a story. One of the team of contributors for the *VizAbility* book insists, “drawings are used to represent instances, diagrams are used to represent concepts; Drawings are often realistic, diagrams are editorial; Perception is critical for drawings, cognition is critical for diagrams” (Hooper Woolsey et al. 2004).

Diagramming is a skill to be built up in practice. Choose an object and abstract it, recording only the essential lines or shapes to define the object and still communicate its meaning. Develop symbols that describe an idea to many people without words or literal references. Draw a diagram of an action you do every day or a journey you went on. Once able to think through diagrams they can be helpful to instructors and students when struggling through a problem. The *VizAbility* interactive guide states, “Diagrams give you a place to put your ideas, to struggle with them as they develop. Diagramming can highlight a lack of preciseness in your thinking so that you go back and work out the details. It can help you avoid the unnecessary delay caused by waiting to do things until “you figure them out”” (Hooper Woolsey et al. 2004). Many designers and students struggle through the design process because, they cannot get past what they do not know yet instead of representing abstract notions through diagrams they can develop around until they are clear. The *VizAbility* guide offers, “Diagrams can be extremely helpful when you are inventing something new, when there is no “reality” you can compare an idea with” (Hooper Woolsey et al. 2004). Diagrams can be used as a tool to transition the many thoughts and possibilities in one’s head to a simple sketch to talk through with others or even revisit later on in the design process.

Whatsoever helps an instructor best record his or her thoughts and process, should be used and then documented in this Interactive Notes section. The notes in this section can be used as a helpful device for developing the more refined ideas for student projects.

5.3 Project Ideas: Guide to Inspiration

The class projects are the main source for students to gain knowledge about both the design fundamentals and the design process. The nature of this guide is to provide a resource for organizing, preparing, generating, and documenting a curriculum. An instructor will have to do some research on their own to find existing projects or use the guide to record ideas to present to the students. However, the previous chapters provided the background necessary for a direction in which these projects should take, communicating the Core Concepts and eventually all of the principles and elements to guide a designers' decision making. Included in this Project Idea section are some main objectives to keep in mind while creating class projects as well as some sources for inspiration to jumpstart creativity.

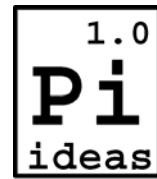


Fig. 46 – Project Ideas Logo

Project Objectives

To build a project use the notes made about the particular Core Concept to be addressed in order to layout the project objectives. A decision should be made about what type of project this will be. Is the project concerned with skill building, concrete thinking, and methodology? Or is this project meant to challenge the students to formulate their own parameters and push the boundaries of a conceptual idea? An instructor must make the parameters fit accordingly. A structured project will have many requirements to fulfill and could be presented to the students in a handout to make sure all of the parameters are known and documented. Or an instructor can choose to verbally announce the project, keeping the restraints to a minimum and allowing the students to

decide what size, format, etc. the project should be presented in according to their own design decisions. Both of these types of projects are beneficial to the students and will help them to work under different creative circumstances.

A project must also be structured with relation to deadlines and development stages. An instructor should prepare the curriculum to ensure all Core Concepts will be introduced within the years' schedule. Some projects may be only associated with skill building and will not need more class time for preliminary critiques and checkpoints, but more involved projects will have to include scheduled days for concept generation, pin-ups, fabrication days, final presentation days, etc. Recognize how long it will take the students to complete each portion of the project and what check-points and critiques they will need along the way to the final presentation.

Culture

This section addresses the issues of how one does not know what a product will look like before it is produced... you must visually create it through processes such as diagramming, sketching, etc. Students can be frustrated when they encounter creative block. It might be helpful to understand and prepare them for the following instance outlined by the *VizAbility* text and appearing in every foundation year studio,

“We continue to naively assert that people should solve problems directly, and “get it right the first time”. We often undervalue concrete representations as inappropriate and useless in addressing important abstract issues. We also think that intelligent people arrive at brilliant answers and analyses of problems very quickly, as if they simply retrieved

“the correct answer” from some pre-sorted set of solutions. We forget to acknowledge the struggles and multiple approaches that are part of ingenious work. We forget all the false starts, partial solutions, and dead ends that most of us experience. Perhaps it is psychologically healing to forget these setbacks, so that we can find the daring to take on new things, again and again. Yet ignoring this iterative and developmental approach to designing and solving important problems is shortsighted, especially in learning situations” (Hooper Woolsey et al. 2004).

Instill in the students the need to make mistakes. Process is the key to making a good project. Although, deadlines and getting finished before pin-up time is an important responsibility of a designer, pursuing the first idea without exploring the far reaches of possibility should be understood by the students as poor design process. Prepare the students to meet a problem in a way they can actively seek an answer. They will run into difficulties, but if trained to think creatively and use their resources such as peer critiques, brainstorming, inspiration exercises, upper class students, etc. they will discover their own process and eventually refine it to answer all questions that may arise in a project. Students tend to look for the instructor as their source for advice. Although, the instructor should be available and be seen as active in their studio experience, it will better serve the students if they are taught to make their own decisions based on their concepts and ideas instead of wanting only the instructor’s approval. Help them to understand how an instructor’s opinions and judgments are founded and the students may strive to exceed them.

Guide to Inspiration

An instructor should seek the drive to keep improving classes and instill a passion in students year after year. The following are interviews conducted by Bruce Hannah with prominent design educators and professionals with regards to their philosophies and mentors. Perhaps their love for industrial design will inspire a future instructor to develop their own solid pedagogy and become a mentor for students.

Interview with Craig Vogel, Carnegie Mellon University

How do you teach design?

“I teach design in three ways. I introduce first-year students to the process of visual problem solving through introductory or foundation design. Through design history, I introduce students to the emergence of design as a modern discipline and provide them with a basic literacy. Through the process of interdisciplinary design, I have seniors and graduate students work with students in business and engineering because they need to learn how to work with the other disciplines in the product development process”

(Hannah 2004)

Who was your mentor?

“I have a mentor on each shoulder. One is Rowena Reed Kostellow, who always reminds me of the need to push students to attain the highest level of visual expression – to place the role of beauty, balance, and visual order over every other factor. The other is Jay Doblin, who challenges me to see the big picture of design as a system of interactive decisions. He pushes me to search for the constants and variables and to look at how design must continually respond to change” (Hannah 2004)

Interview with Lorraine Justice, Georgia Institute of Technology

How do you teach design?

“It’s important to teach the students what good design looks and acts like, but it’s also important to teach what’s not good design and to describe why. One of my favorite studio exercises is asking students to bring in examples of bad design: appliances, tools, and websites, anything that could be improved. Students often feel more confident critiquing something bad, especially at the beginning of a studio. It gets the creative juices flowing” (Hannah 2004).

Interview with Goetz Unger, Philadelphia University

How do you teach design?

“It is a tricky task to prepare students for a profession that has become so diverse and to impart a forever widening skills and knowledge base in only four years. Teaching the process of learning and the process of design is the only strategy to prepare students for a lifetime in this profession.

While there is a generally accepted basic skill set and basic knowledge that all entry-level students should have, it is reasonable to devise a curriculum that empowers students – that allows them, especially as seniors, to explore design issues that resonate with their personal interests. Crucial to their explorations is a diverse faculty with good connections to industry. Also vitally important, especially for the last two years, is a dedicated studio space where students learn skills from one another; it encourages the design discourse needed to develop a design persona.

Eyes turn to us only when the physical and cultural relationship between the object, the environment, and the person is the issue. History and theory must be an integral part of the design studios early on so that subsequent exposure to engineering and business concerns can be understood as opportunities for better design” (Hannah 2004).

Surround yourself with inspiration and encourage your students to do the same. Design education is a unique experience and should be enjoyable, challenging, and the beginning of a life full of creativity.

Creative Sparks and IDEO cards

Also included are two sources designed for the sole purpose of generating creative ideas. *Creative Sparks*, by Jim Krause and the IDEO Method Cards offer exercises and other ideas that could help inspire an instructor and also act as possible class exercises to facilitate the practice of surrounding the students with inspiration. (Fig. 47) As Jim Krause, author of *Creative Sparks*, states in the introduction, “*Creative Sparks* is a resource book for people who equate the need to create art with the need to breathe and eat...*Creative Sparks* strives to inform and inspire without influencing the reader toward a specific method or result...*Creative Sparks* is non decaffeinated. Structured but non-linear; concise but non-specific; zealous but non-dogmatic...” (Krause 2003). This book is an amalgamation of anecdotes, strategies, tips, brainstorming techniques, creative-block-breakers, abstract exercises, and other activities designed to help people in the arts and design fields to be inspired and creative. The book is a wonderful resource to recommend to students as well as for the instructor. The following are some of the pages and exercises from *Creative Sparks* placed as a reference in this guide. Also IDEO, a

prominent design firm, offers seminars for creativity and sells sets of method cards. (Fig. 48) The cards use the same ideas for brainstorming, observing, and creating IDEO utilizes in its offices, offering short exercises to ‘Learn, Look, Ask, and Try’ suggesting ways in which a designer can see problems from different angles. Buy the book and the cards and try to include some of the content into exercises or projects.

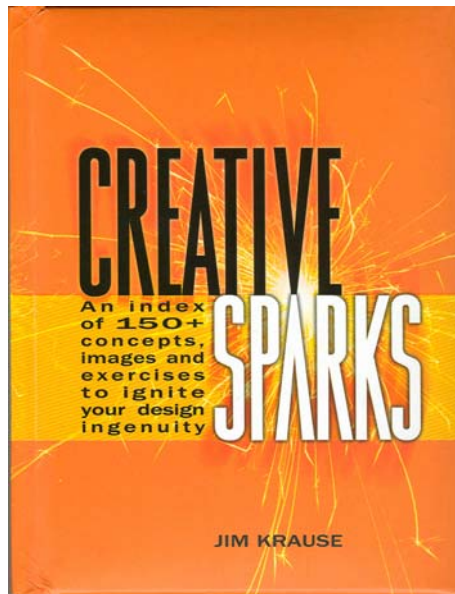


Fig. 47 – Creative Sparks cover

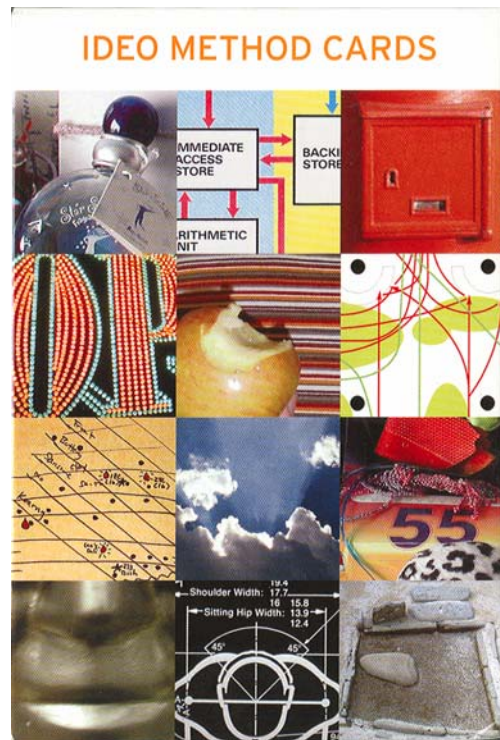


Fig. 48 – IDEO Method Cards cover

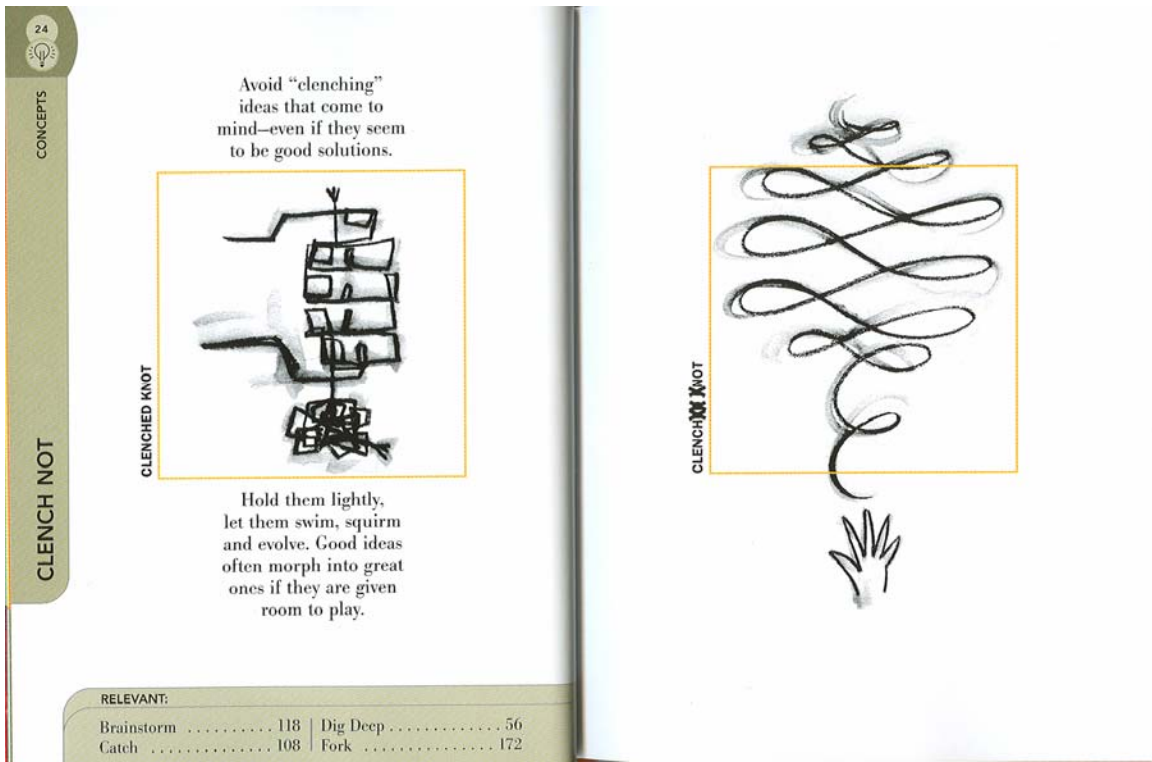


Fig. 49 – Creative Sparks, example 1

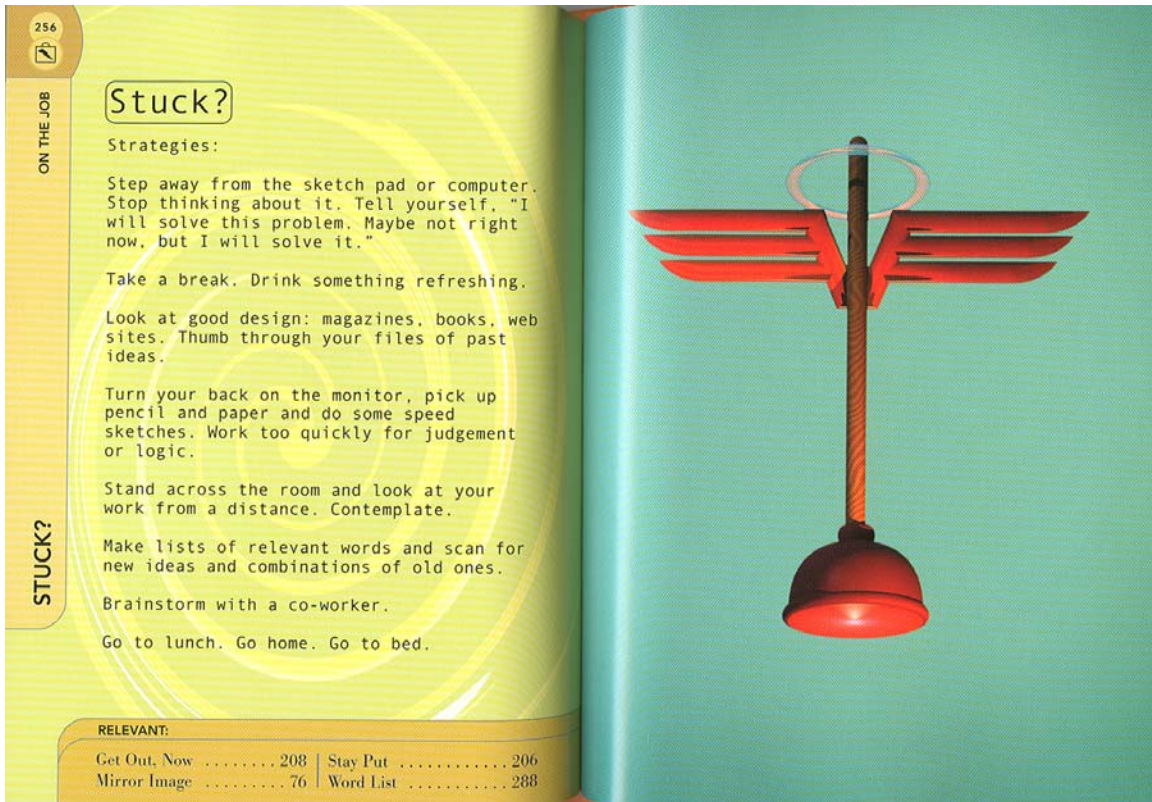


Fig. 50 – Creative Sparks, example 2

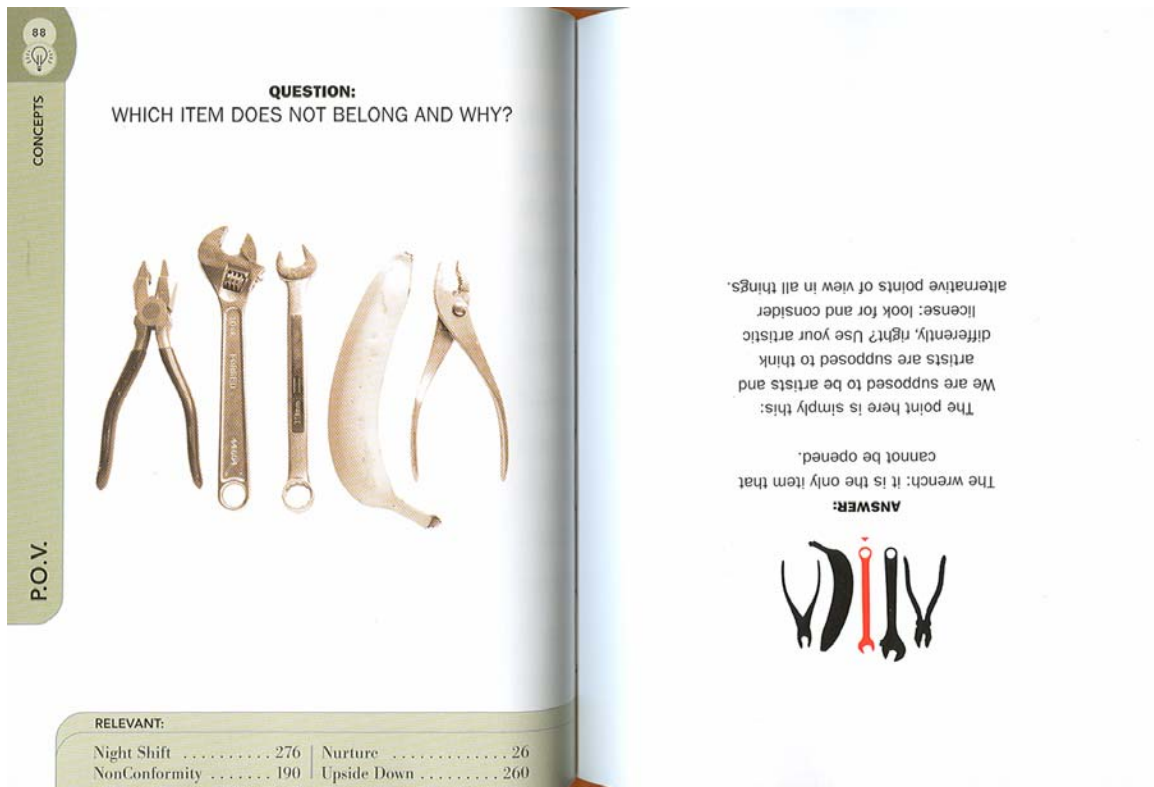


Fig. 51 – Creative Sparks, example 3

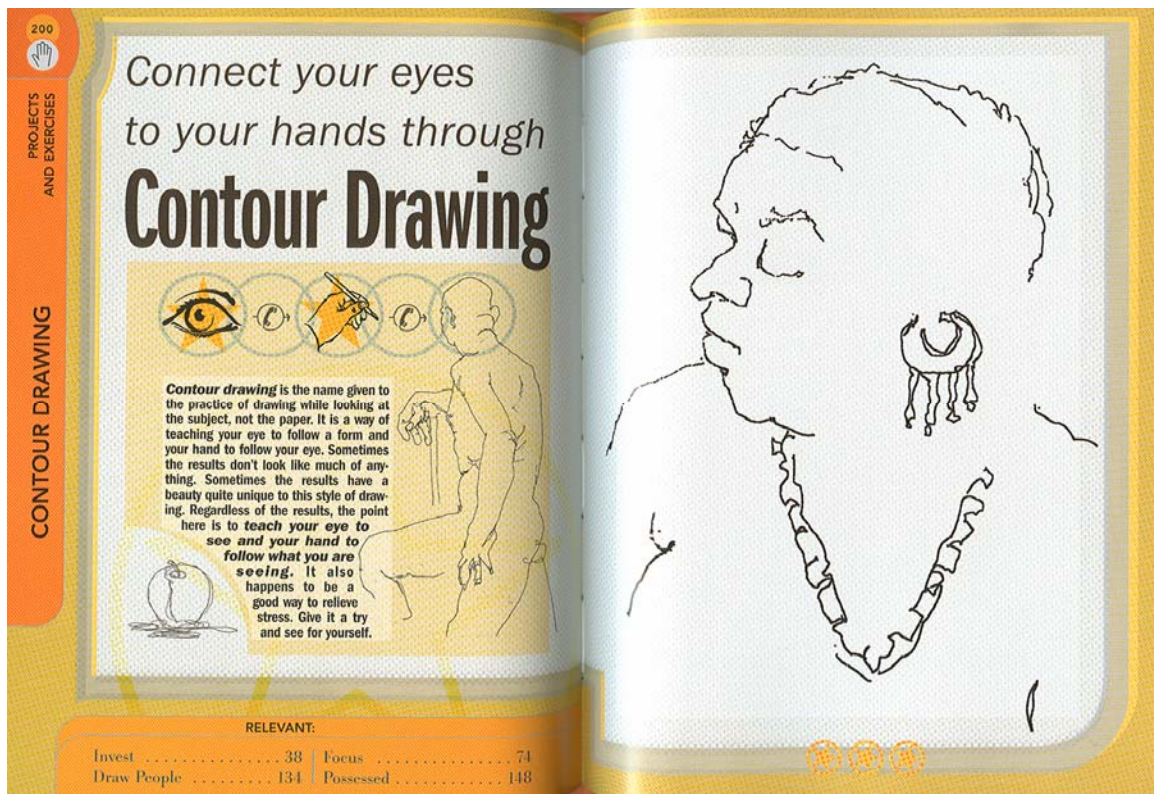


Fig. 52 – Creative Sparks, example 4

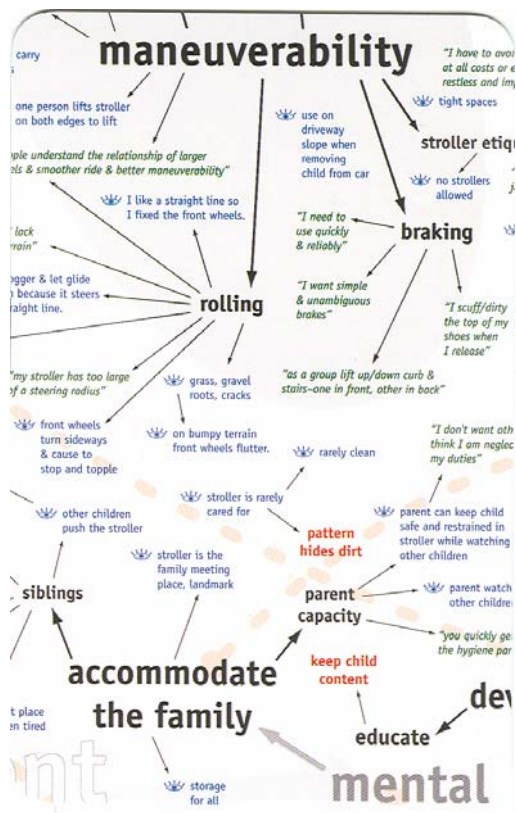


Fig. 53– IDEO cards, example 1

Learn Look Ask Try

Affinity Diagrams

HOW: Cluster design elements according to intuitive relationships such as similarity, dependence, proximity, etc.

WHY: This method is a useful way to identify connections between issues and reveal innovation opportunities.

Clustering the elements related to transporting the family helped the IDEO team to discover some significant opportunities for stroller design.

IDEO www.ideo.com



Fig. 54 – IDEO cards, example 2

Learn Look Ask Try

A Day in the Life

HOW: Catalog the activities and contexts that users experience throughout an entire day.

WHY: This is a useful way to reveal unanticipated issues inherent in the routines and circumstances people experience daily.

IDEO asked potential wearers of a drug-delivery patch to document their daily behaviors including those that might affect the function of the patch – getting wet, snagging on clothing, etc.

IDEO www.ideo.com



Fig. 55 – IDEO cards, example 3

Learn Look **Ask** Try

Card Sort

HOW: On separate cards, name possible features, functions, or design attributes. Ask people to organize the cards spatially, in ways that make sense to them.

WHY: This helps to expose people's mental models of a device or system. Their organization reveals expectations and priorities about the intended functions.

In a project to design a new digital phone service, a card-sorting exercise enabled potential users to influence the final menu structure and naming.

IDEO www.ideo.com

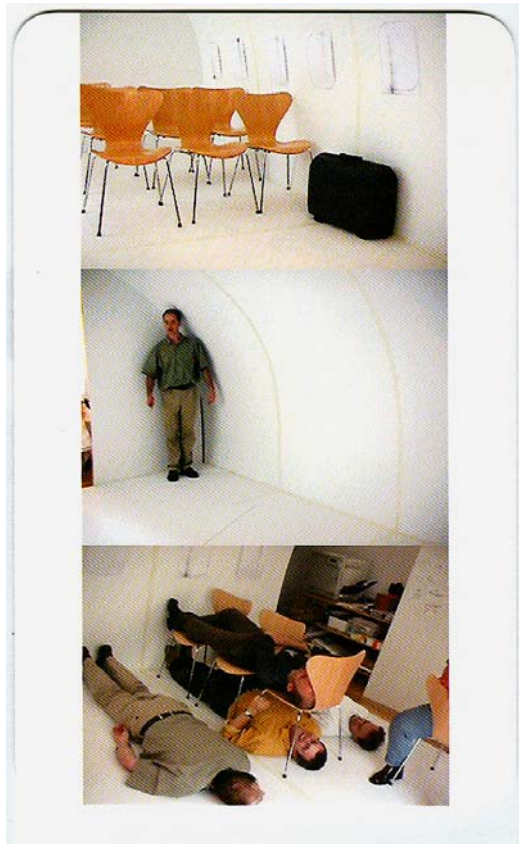


Fig. 56 – IDEO cards, example 4

Learn Look Ask **Try**

Bodystorming

HOW: Set up a scenario and act out roles, with or without props, focusing on the intuitive responses prompted by the physical enactment.

WHY: This method helps to quickly generate and test many context- and behavior-based concepts.

Bodystorming various ways of sleeping in airplanes helped the IDEO design team to generate a wide variety of concepts for an airplane interior.

IDEO www.ideo.com

5.4 Evaluation: Guide to Critique

The next portion of the teacher's aid consists of both a student and personal evaluation process. Students are often interested in how they will be judged in such a subjective environment. They will learn most from the critique but a numeric grade will have to be assigned to

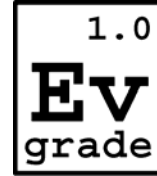


Fig. 57–
Evaluation Logo

show their progress. As discussed earlier, studio classes are not based on how well a student can remember and regurgitate information, but how far they push the boundaries of the project and creatively apply the design fundamentals. Outlined is one possible grading format. It is a grading sheet to make notes on an individual's project while critiquing and later to reflect and decide where an individual's project stands with relation to the traditional A,B,C,D, and F scale. In many cases the instructors' intuition will serve well in assigning grades if several areas of focus for each particular project have been defined. For example; craft, design insight, material use, exploration, etc. are all areas in which to judge a project. The ability to weigh the different areas of focus separately will give a grade more reflective of the students' efforts.

Critiquing

Critique is generally the most essential learning tool in a studio environment. Students will only develop if they receive the necessary constructive criticism about their work. It is the instructor's responsibility to both give helpful critiques and also to teach the students how to accept the criticism. An instructor's role is to acknowledge the effort put forth by the student and then offer suggestions or a direction to pursue to make the work better. As said in *VizAbility*, "in giving a critique, your goal is to offer good advice

in a manner that allows it to be heard... the most important of these is establishing a basic trust between you and the person who is receiving the critique” (Hooper Woolsey et al. 2004). The previous quote made the essential need to create trust between instructor and students.

An instructor cannot be so critical the students feel as if they are being personally attacked. This approach often results in stalled productivity and induces fear and anxiety in the student instead of a desire to learn and improve. On the other hand, the instructor cannot be too complacent either, constant praise without identifying what problems exist in the students’ work will not aid in the students’ advancement in their education (Hooper Woolsey et al 2004). A student will only continue to grow as a designer and develop the skills needed to recognize problems and opportunities in their designs if they learn how to be objective and not defensive. Students may spend enormous energy and effort on their projects and feel very close to them emotionally, but they must learn how to listen to and reflect on criticism that may be hurtful. Students must learn when to let go of ‘their babies’ if the criticism shows the direction they have been taking will not lead them to the best solution.

In order to prepare students to develop this skill an instructor should demand respect for his or herself and also respect for others. It is possible for the students to be more outspoken and harsh with regards to their peers, especially in a competitive environment. Instructors are usually more tolerant because they can see the potential overlooked by the inexperienced students (Bockus 1977). The instructor’s actions will be an example for students to follow. An effective way to demonstrate this attitude is to be prepared, articulate, and purposeful in critique. A rule of thumb offered by a contributor

in the *VizAbility* guide is to say two positive things about the project followed by the criticism, “In describing the positive elements of a project, the critic reveals their understanding of the work and acknowledges the effort involved in producing it. If well considered, these comments can pave the way for considering improvements to the project” (Hooper Woolsey et al 2004). To following example, given in *VizAbility* illustrates an excellent response for critiquing a student’s work, “This is a great approach to the project. I like the emphasis on the user as the center of the design, and I think that your use of color is inspiring. Now, if you can just provide the detail to the interface to explain it, you will be in great shape” (Hooper Woolsey et al. 2004). Although, the most information is gained through hearing the critical points, positive reinforcement helps to motivate the students to produce work worthy of commendation. However, do not use the praise in a patronizing way to soften the blow of hard criticism. Be honest and sincere.

Sincerity is the second rule of thumb. Even if the first attempt by the student is lacking, they can usually improve with some guidance. As an author of the *VizAbility* guide states, “the key is to say what you really think – both good and bad – and to do this in a direct manner that commands respect. If you can be honest yet courteous, this approach can be extremely effective... It is also important to be clear about what you “know for sure” versus what is simply your best guess at the moment” (Hooper Woolsey et al. 2004). The students will be more apt to respect an instructors’ advice if they know it is well founded, but even if an instructor does not know exactly what direction to point them students will usually understand good intensions if the instructors are always open and candid with them.

Once the students are familiar with the critique format they will be prepared to answer questions about their concepts as well as admitting if they had not thought of an aspect of their project brought up by someone else. Students will naturally be defensive about their work. The only way to break the students of this automatic reaction is for the instructor to clearly communicate with them about what they are saying and to help them recognize the difference between being defensive and simply defending their concept.

Bill Bockus makes an excellent point in his Designer's Notebook,

“in observing students during a crit, it often happens that the person making the criticism, if answered politely, is the first to offer a solution to his own criticism. People in general like to help other people, and the spirit of a class is often the key to the excitement and enthusiasm of learning. Students who realize their criticisms are going to be received in the spirit in which they were given (to help) will very likely work like mad to insure the success of ALL projects, not just their own. Call it what you will: empathy, pride, enthusiasm, teamwork, esprit de corps... it helps learning flower. It can happen in the classroom if students will accept criticisms, not as a crack at their intelligence, but as a road to a valid “definition of concept” (Bockus 1977).

This attitude will usually present itself among studios if the instructor can be conscious of how students are reacting and present him or herself in a credible manner. There are many options to consider when conducting a critique in class. Should it be individual or group critiques, preliminary pin-ups or final presentations, do the students describe their

process or do we define it ourselves? Look for different ways to start discussions with the students because, variety will keep the studio active.

Creative/Interactive Options

Critiques do not have to always follow a formal presentation format at the end of a project. Often in large studios the individual critiques are not as effective because, it takes an enormous length of time to listen to and critique with each student in the class. The idea of a group critique is to learn from everyone's mistakes. An instructor can be creative in how a critique is run to keep the students' interest and help them get the most out of this informative practice.

An example of a creative/interactive critique session is one as follows. Five of the best projects are chosen and pinned up on the far left side of the wall and the five least successful projects are pinned up on the far right side, leaving a large space in the middle. The students are then asked to discuss and decide where each of the remaining projects belonged on the implied rating scale. The students are often less hesitant to offer suggestions due to the group effort and class run critique. Instead of the professor being viewed as the keeper of the ultimate right answer or grade, the students are able to better understand where their work stands in comparison to their peers.

In addition, peer critique can be reinforced in order to help students critique in groups when you are not there. Once comfortable with receiving criticism from their classmates, it might prove helpful to provide the students with a critique outline. A set of questions to ask themselves about their progress may help the students to consider their own work in the larger picture of good design and not simply if the project meets the

required parameters. With the help of your critique guide, the students will feel less defensive about listening to criticism from their fellow students and will feel more confident in forming group critiques to better their projects before the class presentation.

5.5 Self Reflection: Guide to Improvement

What Works and What Does Not?

The object of this thesis is to create a reusable curriculum to be built upon every year in hopes of developing a strong foundations year curriculum for industrial design. This goal is only obtainable if the instructor uses this Self Reflection section well. Much of the class instruction is done off the cuff while speaking to the class. A good instructor will be able to improvise and add to the prepared lecture or discussion to emphasize concepts or make points clear to the students. No guide can fully prepare a novice instructor with these abilities. However, this Self Reflection section will provide a place to record these additions, experiences, and give feedback for the instructors' own benefit. An instructor should reflect after each class or project about what was successful and unsuccessful, what was not clear to the students, what they added to the lecture, what questions were raised, what examples did they use, and all of the thoughts that are crucial to remember to improve next years curriculum. As shown in an earlier section (Fig. 45) the extra note pages can be added to any section of the *design.edu* kit and are easily organized by circling the section the notes pertain to in the lower right hand corner.

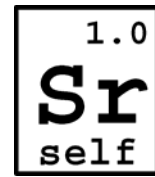


Fig. 58 – Self Reflection Logo

It could be most helpful to make working in this section a habit in order to build an efficient studio resource in a short amount of time. The simplicity of this exercise masks the importance of how much can be gained from these notes.

5.6 Student Work: Guide to Documentation

The final resource provided by the *design.edu* kit is the Student Work Documentation section. The school year can be hectic, especially when beginning instructors are working to develop an entire curriculum. Documenting the students work is often put off until the end of the year with devastating consequences. The work is lost or

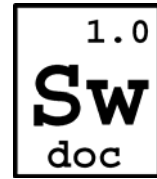


Fig. 59 – Student Work Documentation Logo

damaged which is detrimental to the students' portfolio as well as an instructor's research, future examples, and tenure track ammunition. To prevent the development of this habit, schedule portions of the studio for photography time several days after final presentation. Students will likely be exhausted after all-nighters or intensive critique so, giving them a few days to recover is helpful, but do not let the opportunity slip away.

The *design.edu* kit provides a template for placing hard copy images onto a printable document. Although, CDs are the best storage device for digital images, they are often lost among the thousands floating in instructors' offices or CD folders. Printing a contact sheet of images can serve as quick reference and a back-up method for documentation. It is helpful to dedicate a single binder for the documentation of each year's work with printed copies of all of images and writings about that particular class.

First year students are usually inexperienced with studio photography, so it will also benefit the students if the instructor sets up a proper backdrop or lighting

environment. Many students opt not to include their first year projects solely based on the poor quality of the photography, when showing these projects as a basis for improvement is desirable by professionals in portfolio reviews. Remind the students how important it is to document all of their work and process, including images of mock-ups and of themselves working on the projects. These process pictures are excellent to use in a portfolio spread and illustrate the thought development of the student instead of only 'glamour shots' of the final model. The *VizAbility* book reinforces this idea by recommending to, "at least hold on to a few for your portfolio until you get better ones. More complex and sophisticated presentations will gradually take their place. But always remember you will be hired or advanced not on what you SAY you can do but upon what you SHOW you can do. Don't throw these early problems away too soon" (Hooper Woolsey et al. 2004). It is never too soon to start building your portfolio, which is was the inspiration used to develop the personal identity and portfolio project used in the student teaching experience recorded in the Solution section, chapter seven. Many industrial design programs do not offer a portfolio class until the last few years of the program if a class is offered at all. As you will see in the Solution chapter introducing the students to portfolio development can help them get in the habit of recording their work in preparation for the ultimate tool for job placement.

6. PRODUCT: TRANSPORTATION DEVICE FOR TEACHER'S AID

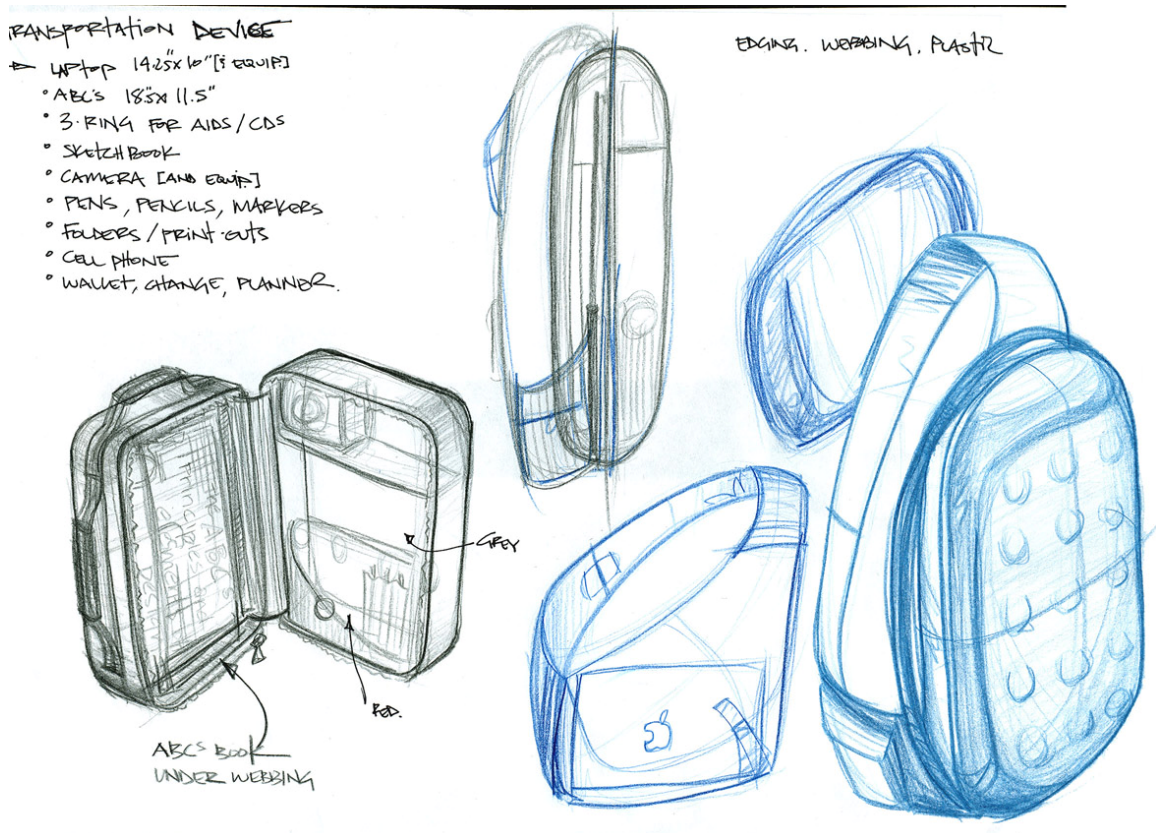
This section describes the development of an interactive transportation device to house the *design.edu* teacher's guide system and other equipment needed for foundations year studio instruction. This kit includes; an integrated binder system for the *design.edu* guide, laptop and accessory storage, a pocket for the *The ABC's Principles and Elements of Design* book, compartments for a digital camera for documentation purposes, and other storage space. The plastic exoskeleton protects the contents as well as incorporates the *design.edu* logo to identify the kit. Finally, the messenger bag strap system is fully adjustable and is fitted with outer pockets for easy access to a mobile phone, wallet, keys, etc.

The object for the creation of this physical kit was to offer a product instructors could be receive to provide a device for transportation of materials and the teacher's guide to and from the studio, office, etc. The ability to carry an assortment of teaching and personal materials offers a convenient way to organize a large amount of the resources an instructor needs to interact with.

This product offers a solution to the problems instructors' encounter when trying to collect and sort resources to supplement their classes and also provides a source for consistent interaction, documentation, and reference.

6.1 Sketches and Concept

The concept for the *design.edu* teacher's aid backpack developed from the need to collect and keep track of all of the necessary equipment an instructor may need to use while creating and teaching a foundations year studio. Below is a preliminary sketch illustrating the development of the *design.edu* kit. (Fig. 60) The inner soft-goods portion of the kit was constructed out of heavy-duty canvas material and nylon accents for durability. A wooden mold was built, laser cut details were added, and then styrene plastic was pulled with the vacuum-former to create the detailed outer layer of the kit. This plastic case serves to protect the contents and identify the kit with a raised logo. The messenger style strap offers a comfortable, adjustable, and familiar carrying system.



6.2 Prototype Images



Fig. 61 – design.edu kit, top view



Fig. 62 – design.edu kit, left view



Fig. 63 – design.edu kit, right view



Fig. 64 – design.edu kit, open



Fig. 65 – design.edu kit, computer storage



Fig. 66 – design.edu kit, camera compartment



Fig. 67 – design.edu kit, guide



Fig. 68– design.edu kit, strap



Fig. 69 – design.edu kit, in use

7. SOLUTION: TEACHERS AID IN USE

The following sections are examples of how the *design.edu* kit was used to formulate lectures, projects, and critique for a teaching experience. The following images are copies of the pages in the guide that were used to record notes and process.

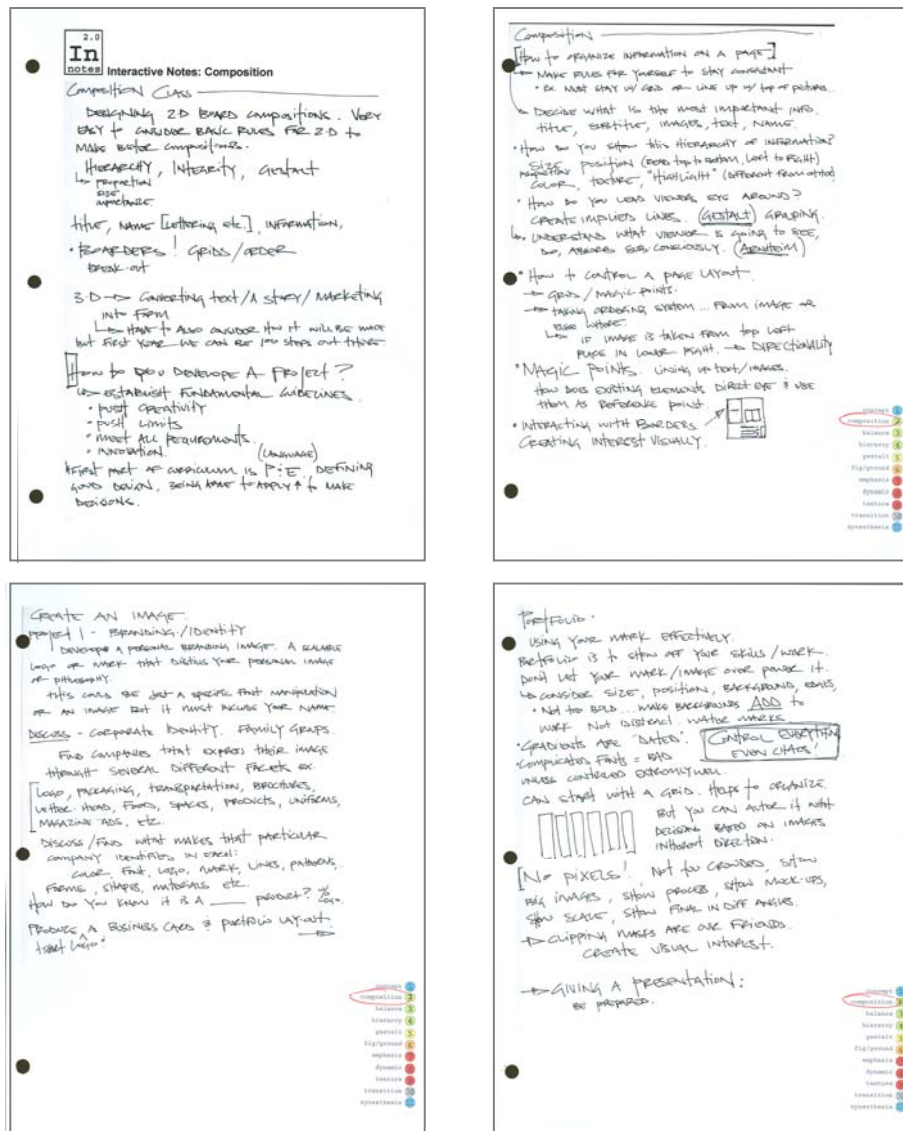
I was given the responsibility of teaching a second year studio for three weeks while the professor went to Ireland for the study abroad program. The professor had extended a project into the first week, so students were instructed in the final stages of fabrication for a mechanical toy. I was then able to lecture and present my own projects. This studio was during the second semester of the foundations year in industrial design, so the students had a firm grasp on the principles and elements, the full-time professor, and I had presented during the fall semester and into the spring.

One of the suggestions often given by students in later years is that the students were not given any instruction on how to document and save information from early projects to be used in their portfolio until their final year. It is quite difficult to show the breadth of a project when most of the information, sketches, and models have been damaged or discarded after the project was finished and graded. I decided to create two projects to help the students understand how to represent their personal identity and also how to present information on a composition board and, in turn, a portfolio layout.

7.1 Interactive Notes: the Second Year Experience

With the direction of Composition, Core Concept number two, research was begun to find what principles, elements, rules of thumb, or any design consideration needed to be expressed to the students in order for them to control their own compositions. Using the note pages (Fig. 70) to record my thoughts about what I knew already and later researched about compositions I was able to diagram and put into words what I felt needed to be presented to the students.

Fig. 70 – Interactive Notes, guide sample



7.2 Project Ideas: Outlines Used In Class

The next step was to decide the direction of the project, the deliverables, and the timeline in which these exercise would be completed (Fig. 71). The first project created involved students designing a personal identity for themselves. Creating a logo or brand that expresses your ‘personal essence’ is quite difficult in a week’s time, so the students

Project Idea Documentation: Composition

Project One – Branding/Identity
 Discuss corporate identity and family groups. What makes company branded products similar? How specific traits associated with each products, logo, packaging, transportation, brochures, letterhead, retail spaces, uniforms, accessories, etc. look like they belong together?
 Pick a brand or company and design a board to represent that company's identity through several products, etc. Use the company's identity in the board's layout.
 Presentation!!

Project Two – Personal Identity
 Decide what could be your personal branding image, logo, or mark. Design a logo or mark that identifies your personality, philosophy, etc. to place on a business card, t-shirt, and portfolio layout. This does not have to be an entire color field but you should choose a specific color combination to follow through in all of your branding. Also, all fonts, proportions, line weights, etc should remain consistent. Just like any logo your branding does not have to be complicated, just consistent. Simple marks or fonts can be very identifiable.

Project Three – Portfolio
 Apply your personal brand to a portfolio layout. Use your mark effectively. A portfolio is supposed to show off your skills and work, do not let your backgrounds take away from your work. Consider size, proportion, placement, etc. Design a layout that can be applied to each project and flow throughout your portfolio. Use layout for toy project, beginning to end, concept work, drawings, prototype, final model.

Don'ts

- gradients are 'dated'
- complicated fonts = bad unless controlled extremely well
- no pixels!! Do not use if pixelated.

Do's

- clipping masks are friends
- control everything, even chaos

Grids
 Can start with one to begin organizing. Allowed to deviate if image directs inherently. Explain grid system.

Handwritten Schedule and Checklist:

M T W T F

11 Toy Preparation → 13 → 15 Final Presentation Toy Project.

18 Intro to Personal ID, Philosophy Toy Models. — 20 Six Concepts Due. Crit. — 22 Three Concepts on Final Presentation Board.

25 Intro to Composition of Portfolio (use Toy Project Documentation) — 27 Three Concepts for Portfolio Layout Pin-up. — 29 Final Portfolio Take Due.

Deliverables:

- 2 copies of 3 business cards
- 13x11 presentation board
- 2 11x14 boards for portfolio track.
- C.D. w/ toy presentation.

Fig. 71 – Project Idea, guide sample

were allowed to bring in items or logos to use as inspiration to generate their own brand that speaks to their style, design philosophy, or personality. The students were then asked to develop six different concepts for business cards. Business cards are often used by students as contact and networking aids at the Industrial Designer Society of America regional and national conferences.

A PowerPoint slid presentation helped the students to understand what principles and elements were factored into business card and identity design. I included reference to the book, the *ABC's of Design*, to talk about Hierarchy of information, Composition, and Gestalt theories. Also, a few examples from the *Best of Business Card Design*, a series by Cheryl D. Cullen, to show how key design elements were used (Cullen 2002).

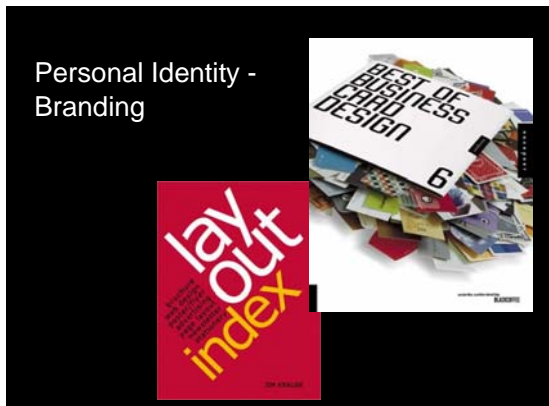
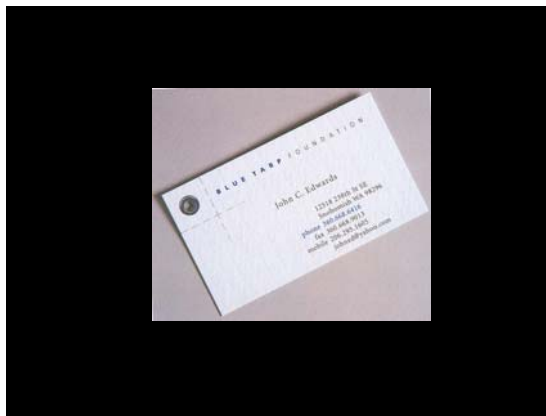


Fig. 72 – Lecture Slides, example



The students were to bring in six concepts for their business cards with their name and email being the minimal text requirements. The students explored several styles involving text, images, icons, colors, and textures. In-class critique discussed what could be improved and what was not working for the compositions. Text size, placement, activating the space, etc. were all compositional improvements that could have been made. Seeing their concepts on paper and not on a computer screen helped the students to discover some proportion issues. The students were also pushed to discard the predictable ideas and gimmicky styles to pursue a more solid and conscious approach.

The final three business card concepts were to be arranged into a composition on a presentation board. The presentation board is a tool used by many in the design industry to visually illustrate and sell an idea. The organization of the presentation board is as important as the product itself in how the viewer feels about the product. Designing a composition requires certain knowledge of the principles and elements of design and the ability to make design decisions to best show your work. The board parameters were as follows; 13” x 19” and had to relate somehow to the style of the business cards. A layout for a presentation board takes time and sensitivity to visual elements, which is important to be developed in the foundations year of design.

The students were instructed to pick elements from their business cards and reflect them in the board composition. They were told, the boards should not distract from the information, but add to it and sell the ideas presented. Distracting backgrounds do just the opposite. The students were enforced to demonstrate the importance of craft, both in image quality and craftsmanship of the board.

A number of the final concepts put forth by the students were impressive. Many of the students developed ideas to their full extent instead of settling for the first concept. The presentation boards also reflected their work well and showed that the students were able to control a composition.

7.3 Evaluation: Second Year Studio

The image below is a sample grading-sheet used in the studio taught as research for this thesis (Fig. 73). The format can be found in the *design.edu* kit on disc with the other templates. This system for grading is helpful to instructors because, it allows them to record notes while critiquing the

project and also rate the project in several categories. The instructor can then reference the grade-sheet while assigning grades and possibly provide a copy of the sheet to the student to help them understand why they received a particular grade.

The following are detailed explanations of how this project was divided up into several criteria. Each of the criteria can be weighted separately to form an overall grade

first year studio portfolio layout		INDD 2110 Spring 05	
name <u>STUDENT</u>			
Portfolio Truck	PowerPoint Presentation		
Craftsmanship A <u>B</u> . C . D . F electronic, photographic, and printing USE SHARP EXACT BLADE! IMAGES GOOD FOR MOST PART. WATCH CLIPPING MASK ACCURACY.	Craftsmanship A <u>B</u> . C . D . F electronic, photographic, and printing WATCH PIXELATION ON BIG IMAGES. USE SPELLCHECK!		
Parameters <u>A</u> . B . C . D . F format size, material, layout fundamentals o.k.	Scholarship <u>A</u> . B . C . D . F accurate and thorough citations o.k.		
Design Insight A . B . <u>B+</u> . C . D . F exploration of concept, aesthetics NICE LAYOUT CHOICES, EYE FLOWS WELL. TITLE BLOCK PROPORTIONS OVERPOWERING, TRY SCALE DOWN. I LIKE THE SMALL CIRCLE IMAGES overall <u>B+</u> @ bottom	Completeness <u>A</u> . B . C . D . F thorough coverage of the subject, insight GOOD LAYOUT, NOT TOO DISTRACTING W/ GRAYSCALE. INFORMATION GOOD. I LIKE IMAGES OF YOU? PROCESS. NICE TOUCH. overall <u>A-</u>		

Fig. 73 – Evaluation Sheet, guide sample

reflecting the students' effort, skill level, and ability to meet project requirements.

Craft and Quality

Craft and Quality of a project are of the utmost importance and should be reinforced from the first project on. Work with smudges, tears, uneven edges, dog ears, poor line quality, messy connections, sloppy lettering, shoddy organization, over-spray from glue or paint, and any other form of bad craftsmanship should be penalized while grading.

Parameters

This section allows the student to be rewarded for meeting all of the project criteria. If the requirements for a project consist of a specific layout, size limit, material use, etc. the instructor will be able to reinforce the responsibility of the students to meet all needs of the project and eventually a client.

Design Insight

Exploring the limits of a project reflects the effort the students put into the design process and is usually the most heavily weighted section once basic skills are established. The ultimate goal of a class project is to offer the chance to apply the design fundamentals in creative ways to show how much a student understands about the elements and principles of design.

7.4 Student Project Documentation: Examples

The students were to document the process and final pictures of the mechanical toy project that carried over for the first week in preparation for their portfolio layouts. The final project was introduced on Monday with a lecture on portfolio layouts. Topics discussed were the grid system, the transitioning of the logos to layout, picture formats, using text as an element, and how to tell a story through a portfolio. The students were also able to see several examples of portfolios produced by past students. While flipping through many of the examples, the class was able to point out mistakes and bad design decisions on their own. The students noticed how full-bleeds to the center were not effective and tricked the eye. They also decided pictures and sketches should appear in order from the left side with concept development, to fabrication, to prototypes, and then final models on the right side. The examples that did not follow this rule of thumb were said by the students to be confusing. They pointed out text and type discrepancies, overpowering graphics, poor picture and sketch quality, and chaotic placement without the use of a grid. Showing the students these examples was an effective portion of the class, although examples can sometimes be an ineffective tool and stifle creativity. In this case, showing alternate styles helped the students to know they can explore new ways of displaying their information. Some liked white space while some would rather have texture and a lot of information. Both are effective if controlled well.

The students were asked to design three layout concepts for Wednesday where the critique included everything from logo usage to text placement. The students were able to see what worked in their own layouts and those of their peers'. The students then

choose one layout to pursue and create the final portfolio truck, or two page spread. The final layouts were developed so well in critique the instructor needed only to point out small details to consider changing. It was apparent the students were all very happy with what they had accomplished and were thrilled to start organizing their work into a professional document. The images below reflect the work done by the students (Fig. 74 - 79).



Fig. 74 – Student Work, personal identity cards

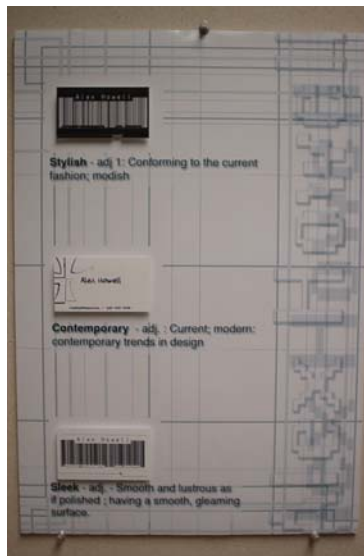
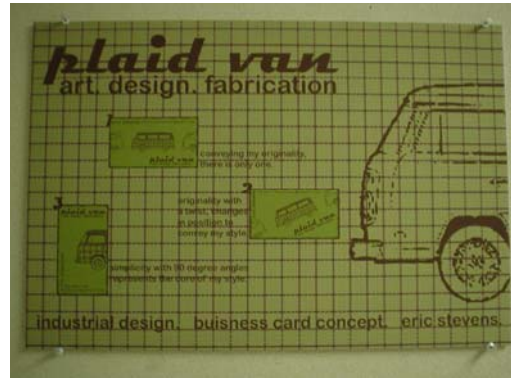


Fig. 75 – Student Work, presentation boards

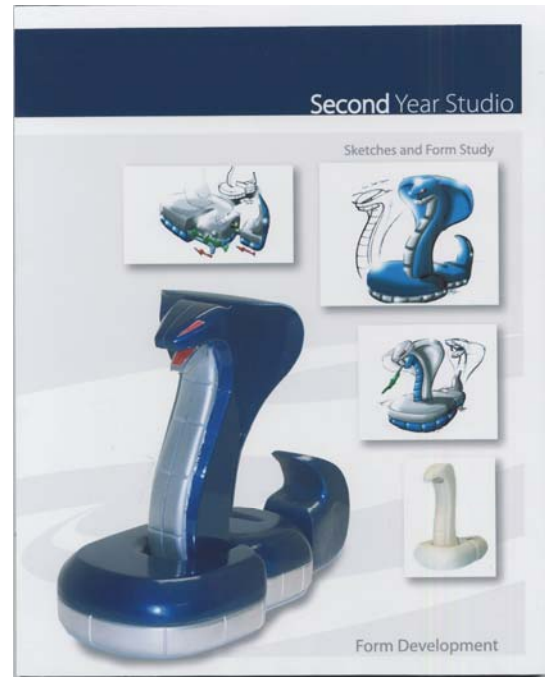
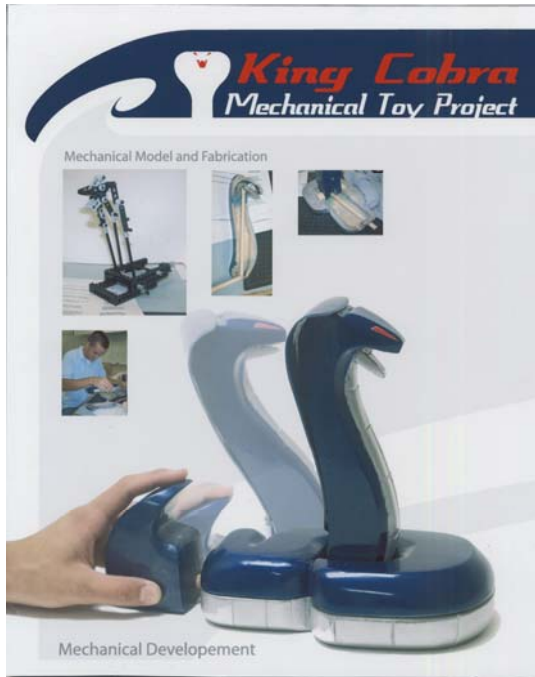


Fig. 76 – Student Work, portfolio example 1



Fig. 77 – Student Work, portfolio example 2

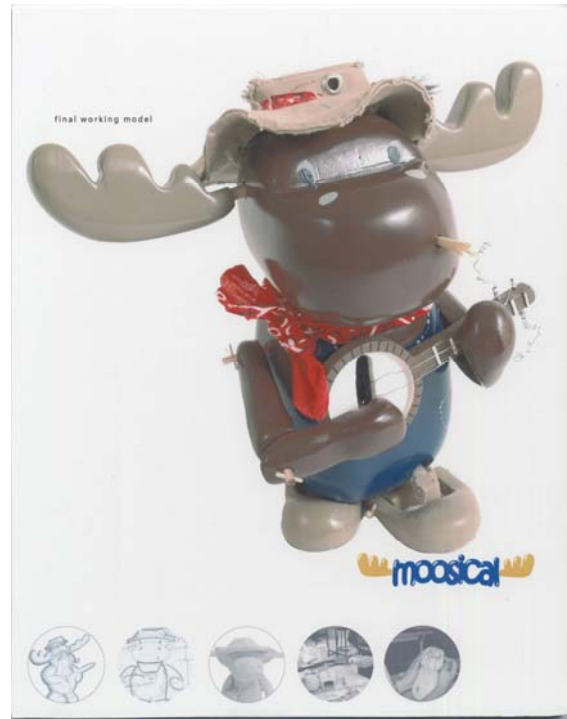


Fig. 78 – Student Work, portfolio example 3

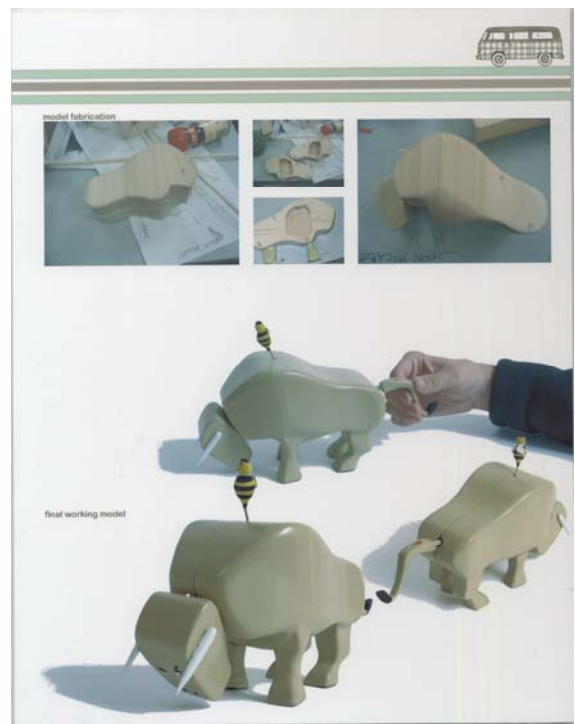
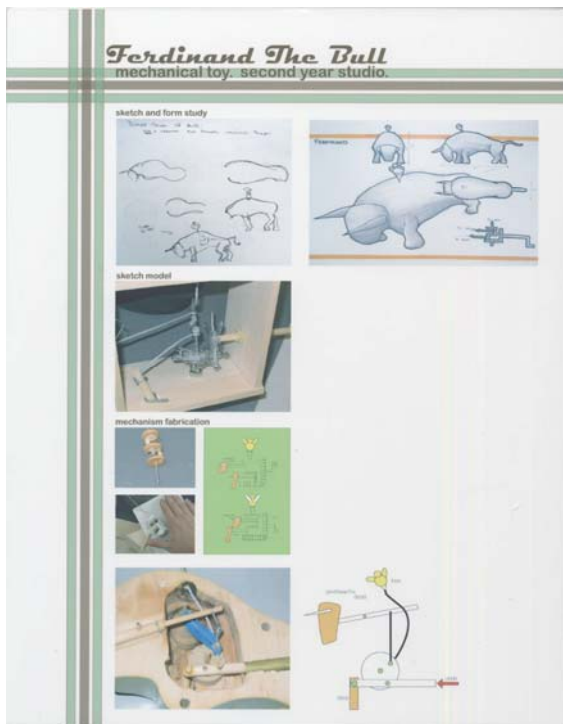


Fig. 79 – Student Work, portfolio example 4

7.5 Self Reflection: Conclusion

This section illustrates my personal interaction with the *design.edu* guide as a first-time instructor and how I used guide in my preparation and instruction of a foundations year studio for the duration of three weeks.

My relationship with the students had changed from a graduate teaching assistant and fellow student to their instructor. The potential existed that the students might not have taken me seriously due to our similar ages, but presenting myself as someone who has been in their situation, knows what will

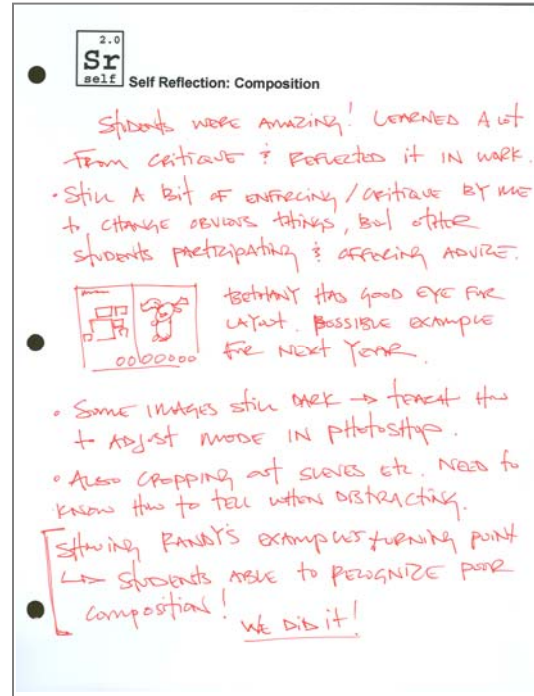


Fig. 80 – Self Reflection, guide sample

help them become better designers, and can honestly say what is working and what could be improved upon in their projects provided the respect I wanted to gain from them. I in turn offered the same respect to the students, not taking the power position as a weapon with which to talk down to them as a ‘superior’.

Design curriculums are different from many other disciplines in that the students and instructors have to open up to each other to get the most out of critiques. The students should feel that the instructor could have flaws in order to understand how learning from these imperfections is the most effective way to improve their design skills. Instructors in these programs are usually on a first name basis with the students, which makes for a possibly less formal environment.

By the end of our time together, the students often made jokes, brought in funny clips that referenced some portion or occurrence in class, which shows they have a real desire to be active in their own education. For example, a student brought in a clip from the film *American Psycho* about a discussion pertaining to business cards and the comical way the small differences in font, spacing, sizing, and paper the cards were printed on showed the status of an individual in an exaggerated corporate environment. With the students influence, I learned to loosen up and let the class show me what route they need to travel on. An instructor is there to offer direction and provide information to build skills but the students need to discover how to design through practice. Lecturing to them for the full three hours would not have been nearly as helpful as having a discussion or critiquing or even surfing the internet for examples together. This in mind, an instructor must still be prepared for the class even if it has a relaxed structure. This is where the *design.edu* guide rises to the challenge.

Following the final presentation of the portfolio layouts, I did not ask for written feedback from the students because, the nature of our relationship still involved assigning an official grade. I felt the possibility that the students could feel coercion which would taint the documented comments I would receive. However, because the students and I had built a trust and respect, I feel their voluntary responses regarding my teaching style and conduct were enough to feel I had achieved my goal. The students enjoyed the projects I asked them to complete and felt they were relevant to their development as designers. The critiques were helpful as reflected in the students' progression and involvement in discussions. Finally the students' acceptance of me as a credible resource was emphasized by the enthusiasm they brought to class and response to my lectures and

discussions. The preparatory materials I compiled in this thesis as well as the interaction with the *design.edu* kit offered me the guidance I needed to plan and instruct students for three weeks. I feel confident this guide would prepare me to continue building a strong curriculum for the first year of industrial design education.

Conclusion

The *design.edu* guide is a resource in which to gather examples, document process, and make notes about what subjects need to be covered. This guide provides a method for organizing thoughts and a system for transforming those thoughts into applicable projects. This thesis acts as the textbook for a standard structure in industrial design education and the *design.edu* kit is where an instructor is able to create an individual pedagogy and curriculum.

The *design.edu* guide can provide both novice and experienced design instructors with the direction to create informative lectures, supplementary discussion, stimulating projects, an applicable evaluation device, and a system for documenting the products developed. R.G. Scott supports the need for a change in industrial design education in his book, *Design Fundamentals*, a text dedicated to the elements and principles of design by stating,

“the shift of emphasis from design, the noun, to design, the verb, has colored our whole way of thinking. It means essentially that we have changed our focus of attention from various specific kinds of designing to the activity itself. Design is now generally recognized for what it is: a fundamental human discipline, one of the basic techniques of our

civilization. This fact has profound implications for education. It means that the old concept of pattern for pattern's sake will no longer do...Education must deal with design as a fundamental discipline" (Scott 1951).

Instructors can no longer use adapted art and architecture curriculums to educate industrial design students in the fundamentals.

Although, the elements and principles are universally applied in many design and fine arts fields, introducing them to industrial designers should be a specific and personalized endeavor. Industrial design is a hybrid of many skills and students who desire to enter this field have an amalgamation of learning styles, abilities, philosophies, and specializations. Industrial design educators should recognize this uniqueness' and strive to develop a standard structure to best communicate the very foundation industrial design is built upon. The elements and principles of design form the language we as designers speak. Developing a course in which to become fluent in this language should not have to be an entirely new discovery each new instructor must struggle to unearth. The industrial design community has offered enough discussion about what issues surround the development of an industrial design education. It is time to start providing solutions. This thesis can serve as an experiment, a sounding board, and a first step in the long awaited journey for the development of a standard structure for the foundations year in industrial design education.

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