A SERIES OF UNFORTUNATE CONSEQUENCES
13 GUIDELINES OVERLOOKED BY NEW ID STUDENTS

Percy Hooper
North Carolina State University
Percy_hooper@ncsu.edu

A new Industrial Design student may hear repeated reminders to apply the basic design thinking skills he or she has been taught. But, it is an easy thing to overlook guidelines when the repercussions are not clear, or not considered by the student to be particularly consequential. In this consideration, thirteen design practices often undervalued by new ID students are examined along with the reasons to observe them.

Identifying and documenting design opportunities
Seeking multiple solutions to design problems
Sketching what the mind sees
Organizing one's work
Recognizing the flow of the design process
Expressing ideas with confidence
Sketching to discover
Researching what exists
Becoming the user
Translating an idea into 3-D
Understanding how and why it works
Telling a good story
Presenting oneself as a professional

1   IDENTIFYING AND DOCUMENTING DESIGN OPPORTUNITIES

The ability of a designer to recognize a problem when he sees it is a skill of unmatched value. By observing the challenges of others, the design student is gifted with a valid problem to solve. Documenting the challenges one observes is not only a good way to generate project ideas, but it allows the student to examine the challenges even closer to discover and capture important details.

What could go wrong
Asking the student to seek out and OBSERVE a person wrestling with a problem, then strive to HELP that person, counteracts a common tendency among a few new students. It is very easy to **imagine** that a problem exists, when in reality, it may not be a problem at all. Or, the "nuisance factor" of the problem may be so small that no one is really interested in a solution. If a student actually observes the problem, not only does he foresee his future market, he can carefully assess the level of hindrance the user is experiencing. Does the student ever find himself without a meaningful project to pursue? If he has been documenting the needs he observes around him on a regular basis, he will have more design-worthy problems to solve than he can manage in a lifetime. The goal is for the student to remain alert to design opportunities at every turn, whether these are personal frustrations or serious impediments in the lives of others. Then, record them.

2   SEEK MULTIPLE SOLUTIONS

Seeking a range of solutions to a single design challenge is an essential Design Thinking skill that the design student uses at various points in the Design Process. This strategy is used to broaden the student's choices and multiply the chances of creating an effective and successful solution.

What could go wrong
The novice design student when challenged to find a solution to a problem, could easily fall into one of two snares. In the first case, the student might hurl himself into the assignment with an explosion of activity, in an attempt to make the biggest impact, and be the first to finish. The problem is that by leaping at the first solution that comes along and declaring the problem solved, the student deprives himself of the opportunity to explore a range of fertile directions, from the most practical to the most unexpected and adventurous. By collecting such a wealth of alternatives before him, the student is able to analyze the most useful features of each idea to create a new hybrid solution that may surpass all others, including that first cherished idea that came to mind. In the second case, a new industrial design student may, upon receiving an assignment, recognize that the challenge is quite open-ended, allowing for many possible solutions. He discerns no single, direct path to a definite answer. So, he freezes, unwilling to risk following a path he fears may not lead to "the right answer". Why? He may come from a scholastic environment where there is always one "right answer" to any given problem. And, above all, he does not want to be found "wrong". For him, starting down an unknown pathway only to hit a dead end means failure. As the farmer knows, not every seed will germinate. But, by sewing seed copiously, he has a much better chance of a bountiful crop. So, by cultivating diverse ideas, the student is simultaneously seeking a clear path forward and preparing himself against an unforeseen future detour.

3   ORGANIZING ONE'S WORK

The power of the Design Thinker is the ability to generate a multitude of ideas. But, those ideas are of little value if they are not recorded and organized for access, comparison and retrieval. This skill is an outstanding aid, not only for keeping track of one's ideas, but as a strategy for creating new ones.

What could go wrong
Just as a file cabinet with no sense of order is more of a headache than a repository of information, scribbled ideas with no sense of structure can lead to debilitating frustration, hours of fruitless searching and mental grid-lock. Organization saves time. A design student who keeps his sketched ideas on scattered napkins and the backs of envelopes may spend untold hours trying to locate them again. The use of one designated notebook or sketchpad is an anxiety reliever because the student always knows where his work is. The same is true of maintaining a designated computer file labeled for his work. When collecting research, documenting the original source of any web-based information avoids the frustration and wasted time of going back to retrace one's steps to locate a lost source. Conceptually, organization just makes sense.

4   SKETCHING WHAT THE MIND SEES

An Industrial Designer must be able to visualize an object in his mind, and document it on paper. Sketching is essential to this Design Thinking skill.

What could go wrong
Many young ID students have images in their minds that are frankly easier to talk about than to sketch. Without this critical skill, however, a designer would be reduced to waving his hands about in a vain attempt to describe a concept. The gesticulating method becomes even more cumbersome when trying to compare features of several concepts. Sketching the images and displaying the various concepts side-by-side would solve the problem. For this reason, many an educator has responded to a student who is trying to gesture his way through a critique, with the refrain, "Don't tell me. Show me." Sketching helps the

student capture, organize and share his fleeting thoughts. Without this skill, the designer is severely hindered in his documentation and communication.

5   RECOGNIZING THE FLOW OF THE DESIGN PROCESS

A design process has a structure like a story. There is a beginning, a middle and an end. When a design student recognizes the flow of this process, it becomes easier for him to visualize his own process and follow the story thread to a successful conclusion.

While design processes differ from school to school and from office to office, a good basic process might include:

Identifying the Problem, who it affects, how, when, where and why it happens
Research to determine the existing state of the art
Goal-setting based on current needs and prior art
Ideation or extensive sketching to explore the possible design directions
Analysis and Selection to choose one clear design direction
Design Development in 2 and 3-D to make the concept practical, functional and aesthetically pleasing
Final Design to demonstrate the integration and resolution of all the original goals
Design Details highlighting the significant selling points (Why will people want this?)
Product In-Context, or how it seamlessly fits into the user's lifestyle

While more advanced students will include in their process the selection of materials, appropriate choice of manufacture and cost analysis, we will reserve this review for our newcomers.

What could go wrong
When a designated design process is not observed, a student may omit a critical step that becomes painfully apparent in the final presentation. He may be asked a commonsense question that should have been recognized at the start, and could have been discovered at several key steps along the way. He might be asked, "How do you get it in the house? Where do the batteries go? Or, how to you hold it?" And, the embarrassing answer returns, "I guess I didn't think about that." A reliable design process not only brings to fore critical questions for consideration early in the development, but provides numerous safeguards to keep a student from overlooking important issues for which he is responsible. It is an unsurpassed method of guiding one towards a successful design outcome.

6   EXPRESSING IDEAS WITH CONFIDENCE

Industrial Design is not only about creating exciting new product ideas. It's also about communicating those to others. Whether verbally, graphically or in physical form, the designer must make his ideas concrete both to himself and to others.

What could go wrong
Clarity of thought is essential. It is difficult to clearly express something that hasn't clearly been thought through. It is often in a class critique that this lack of clear focus is revealed, much to the chagrin of the presenter. Even a clear thought that is not clearly articulated will be lost on an audience. So, proper design vocabulary is needed. Every profession has its specialized and specific language intended to communicate with precision what the professional wants to convey. For example: a design student presenting his research on dental instruments to a room of oral surgeons would lose all credibility if he were to refer to "extracting dental forceps" as "tooth pliers". So, the designer is responsible to learn and use the vocabulary both of his own profession and that of the client he is serving.
In the studio, if the student cannot relate clearly what his product does or how it does it, this fuzziness of communication might mask obvious oversights that could have been identified and corrected during a critique. This missed opportunity would deprive the student of the necessary feedback to make his project

successful. Confidence is based on the certainty that the information that the student is presenting is well researched, thoughtfully developed and skillfully presented. When either of these elements is missing, the student's confidence may not be warranted. Prepare to communicate concepts clearly and articulately, using good organization and appropriate vocabulary. Build confidence by diligent, thoughtful work, and careful crafting of all communication.

7   SKETCHING TO DISCOVER

Sketching to Discover is more than drawing to capture a mental image on paper. It is using drawing to explore an idea, to examine a form, to visually compare evolving versions of a form, to reason through the parts of a mechanism to see how they work with, and alongside of, its neighboring parts. It is the ability to graphically record an idea with sufficient accuracy to test its viability. It is bringing an idea into an approximation of reality so it can be examined, and so that gaps of continuity can be identified and corrected.

What could go wrong
The point of view makes a difference. More than one inexperienced design student has sketched a product repeatedly from one angle only. He may alter the color, the proportions and details. Thinking he is making fine progress, he refines the form so that it looks fresh and appealing. But, in the critique, when he is asked what the product looks like on the back or the bottom, the student has no idea. His exploration ended with his first view. The lesson is: Document from every significant viewpoint. Sketching is a valuable tool of exploration and discovery.

8   RESEARCHING WHAT EXISTS

This process includes seeking how close others have already come to solving the problem the student is about to address, and learning from their attempts. Additionally, it is seeking examples of products that perform similar functions in diverse fields to help the student's product development.

What could go wrong
To bypass this step could leave a designer in the position of a student who had worked for days designing a new product, and had prepared an impressive presentation of his concept. But, as he was beaming with satisfaction at the end of his presentation, another student raised his hand to say his family bought one of those several years ago. If the research is done diligently, the designer may very well discover earlier attempts to address the problem he is striving to resolve. If the prior work he discovers is extensive and diverse, he might at this point decide to bypass the project direction in favor of a path that has been less travelled. Or, as many outstanding designers have done, he might use the collected body of product references merely as previously documented attempts, and utilize these stepping stones as guides to create an even better solution.

9   BECOMING THE USER

This entails putting oneself in the position of the person who will use the product. This is done to better understanding the needs of the user, as well as the challenges the user will encounter before, during and after using the new product. Similarly, it is wise to ask who else deserves to be included in this solution?

What could go wrong
An example of a failure to observe this important step is a student who designed a walking aid with all the bells and whistles he thought would be appreciated by a mobility-challenged population. He invited several individuals who use wheelchairs to attend the final presentation. When he was finished, he

addressed one of the wheelchair users with a big smile and asked if he would like to own a similar product. The gentleman responded, "I would never use that. How do you expect me to get it in my car?" If the student had consulted the users during the research phase of the project, he would have had this valuable insight early enough to have made the needed adjustments to his product. Similarly, imagine a student who designs an impressive-looking kitchen appliance intended to reduce vegetable preparation time by half. The processor looks beautiful and works flawlessly. But, at the end of his presentation a member of the audience asks, "Doesn't the position of the lever on the right side make it harder for a left-handed person to operate?" Another student comments, "My Grandmother is the cook for our family. But, she couldn't use that appliance because it requires a pinch-grip to change the blades, and she has arthritis." Yet another points out, "Your appliance displays the variable rotational speed on the product's dial. But, I would need my glasses and good lighting to read it." The inexperienced student had unintentionally created a product that shut out a high percentage of potential users. As designers, it's true that we depend largely upon our personal experiences. But, when we design for the public, they are the ones who must be satisfied. Similarly, when designing for a populace that has needs that are different from ours, or those who work in environments or circumstances different from our own, the voice of the user is critical to our design approach. By thinking inclusively, we not only make life easier for a greater number of potential users, but, we increase the size of the market that determines the product's economic success. The goal is to design with sensitivity and compassion.

10   TRANSLATING AN IDEA INTO 3-D

This is the practice of building tangible physical models of the product being proposed.

What could go wrong
The pitfalls of refraining from building models are grave and numerous. While design sketches can be informative and even compelling, many a student has deluded himself about the size and proportion of the product he is proposing. Scale is the key. On a drawing, it is difficult to determine exactly how large a product is. Though some product sketches are drawn with a familiar object in the scene for comparison like a coffee cup or an ink pen, this is not the same as holding a properly scaled model in one's hand.

The issue can be more pronounced using digital media. A digital model is more problematic because it is so convincing. A student can completely delude himself with the beauty of the image, and just assume that the scale and proportions of the product fit the user and his environment. Because of this, on occasion, a studio of design students is asked to stop what they are doing and go build a true-scale model of what they are trying to develop. Upon measuring and building the scaled model, many in the class are generally shocked to discover that the scale of the product they had fashioned in their imagination had no link to reality or environmental context. Holding even a rough physical model in hand can make it abundantly clear that the resizing or redesign of the product is necessary. Similarly, it is difficult to depict subtle surface changes in a sketch. Just the feeling of the roundness or crispness of an edge or corner can make a tremendous difference in how a product feels and is received by a user. Is the surface flat? How would the feel of the surface change if the surface bulged ever so slightly? What if it were concave? The student will never know if he only depends upon a sketch. Models teach us. They inform us. They help us communicate with ourselves and communicate with others. They warn us of missteps that might not be clear in the sketches. They help other people understand our intensions and allow them to provide us valuable feedback.

11   UNDERSTANDING HOW AND WHY IT WORKS

This step includes providing evidence and reason as a solid basis that a product will function as expected.

What could go wrong

Claims without practical support are little more than hopeful daydreams. Or, at worse, an attempt to divert attention away from possibly troubling realities. The problem arises when the designer asserts that a product concept will perform in a certain manner, with no credible explanation as to how the operation might take place. Example: "My new lawn mower can cut anybody's grass all by itself. All you have to do is click this button." Such an assertion is sure to raise questions. How can the lawn mower know which grass has, and has not, been cut? How does the machine avoid striking obstacles? How does it stay in the yard? How does it recognize and avoid dangerous inclines? How does it distinguish between tall grass and a flower bed? While it may be possible to envision a machine carrying out the described operation, the confident assertion that the machine can do this is not admissible without compelling evidence based either on comparisons with existing proven technology or demonstrations that the designer has access to technology that is capable of the task. There is an important difference between HOW a product works and WHY it works. HOW explains the principles and functions that make the operation feasible. WHY looks at the operation of the finished mechanism and demonstrates the inevitable, inarguable result of employing such a mechanism.

12   TELLING A GOOD STORY

This is the art of involving the audience in the designers' sojourn to develop a new product.

What could go wrong
On occasion a new student will attempt to present a product for which there does not seem to be a reason. Or, the development does not follow a logical order, leaving the audience puzzling over how the student got from point "A" to point "Z". Sometimes the student will talk through a presentation without illustrating his speaking points. Voice and visuals must be mutually supportive. And, worst of all is a story without an ending. Here the student claims that he didn't have time to finish the final images, so he describes them to the audience. Each of these is a violation of story-telling protocol. One of the easiest ways for a design student to guide his story-telling well is to ask himself continually, "What would make this connection clear?" Or, he may pretend he is relating the process to his grandmother to see if it is understandable. It wouldn't hurt to make the presentation to a first-grader to see if the telling is exciting enough to hold his attention. Without a clear and engaging means to communicate the product creation process to others, much of the value of the designer's long hours of work will be lost. To avoid regressions or out-of-sequence episodes in the story-telling, it is useful to follow note cards, slides or a well-trained memory.

13   DESIGN STUDIO STRATEGY: PRESENTING ONESELF AS A PROFESSIONAL

The stage presence and manner that an audience associates with professionalism.

Students are directed to address their audience with confidence and clarity. If the students know their subject matter well, have developed it logically and have thought through the answers to potential questions of concern, the student has reason for confidence in his logic. If the visuals are clear, descriptive and well composed, the student has further reason for confidence. But, if the speech is halting, punctuated by "And, uh's", and muttered as if it doesn't matter whether the audience hears it or not, the value of the work will be lost.

When students give a presentation of their work they are encouraged to "OWN THE STAGE", using the following guidelines:
      Stand with a confident posture
      Speak with a clear, projected voice
      Use precise and descriptive vocabulary
      Use the full body to speak, including facial expressions

      Speak in a natural, conversational tone
      Speak with the confidence that nobody knows as much about this project as the student does,
      and that the audience is anxious to hear every word

Clothing and grooming is also important. For better or worse, the audience will perceive the speaker differently if he or she is wearing office attire as opposed to a soiled and torn T-shirt. Nothing should detract from the professional appearance of the presentation.

What could go wrong
A shadow may be cast over the presentation if the speaker never looks at the audience. Sometimes a new student may spend the entire presentation with his back turned to the audience, so he can read directly from his PowerPoint slides. By maintaining audience contact and looking at the audience, the speaker can more easily discern if his audience is following the flow of the presentation, allowing him to determine if more clarifying details are in order. The audience expects a clear message that is understandable and easy to follow. The designer can enhance how that communication is received by using his body in a way that conveys confidence, poise and authority.

If Industrial Design students understand early in their education the value of following their instructors' sound design guidelines, they will make the path before them smoother, and save themselves a series of unfortunate consequences.

Key Words:

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