

## **Chindogu: A Problem Solving Strategy for Transforming Uselessness into Fearlessness**

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### **Abstract**

In 1996, the departments of Mechanical Engineering and Art began an interdisciplinary teaching initiative aimed at strengthening problem solving skills. In this paper, we highlight one particular project from this collaborative venture that teaches students how to react to unknown factors in problem solving. This project is based on an odd Japanese art form that combines both the seriousness and playfulness of design. Chindogu is coined from “chin” meaning unusual and “dogu” meaning tool. Chingogus are literally “useless products.”

The Chindogu project is designed to promote fearlessness in problem solving by deliberately placing students in awkward circumstances. Consider that by training, engineers transform science and technology into useful products, processes, and systems. For engineering students, the parameter of uselessness represents an unfamiliar situation that demands ingenuity to overcome. While unserviceable, the products are seriously executed, requiring students to straddle between two seemingly disparate qualities. Typically, this level of contradiction inspires humorous and clever solutions that give engineering students an opportunity to exercise their intuitive and emotional faculties. Although light-hearted, chindogu is a very challenging project. From conceptualizing ideas, to realizing and fabricating products, to packaging, promoting, and presenting the outcomes, chindogus are comprehensive in scope.

Teams are interdisciplinary in nature, combining the skills, biases, and backgrounds of engineering and art students. This makes for dynamic group interaction that exposes both groups to the value of “creative abrasion.” In other words, different points of view working collectively on the same problem add a unique dimension to outcomes. The use of collaboration helps to break down barriers between two seemingly disparate cultures and synthesizes different modes of processing.

## Introduction

The search for answers requires a journey through the gray zone, a vague and undefined area that harbors solutions. On our way to knowing, the more we languish in the gap between the material and immaterial realms, the more vital and dynamic our ideas become. But traversing this region requires a willingness to feel lost, groping in the dark for answers.

Although engineers speak an abstract language (i.e., mathematics), which operates on a theoretical level, they are motivated to transform ideas into physical reality. It is in the realm of the material world that engineers have the greatest affinity. Here, the world is most recognizable and approachable, where “seeing is believing.” Here, engineers dissect, classify, and quantify the world, creating distance between the knower and the known. As the philosopher Alan Watts describes:

*The laws and hypotheses of science are not so much discoveries as instruments, like knives and hammers, for bending nature to one's will. So there is a type of personality which approaches the world with an entire armory of sharp and hard instruments by means of which it slices and sorts the universe into precise and sterile categories which will not interfere with one's peace of mind.<sup>1</sup>*

Creative thinkers, however, recognize that disrupting one's peace of mind is a prerequisite of inventiveness. Angst is an indicator of an unformed idea struggling to be born. Angst is a by-product of unsettled and undefined circumstances. By nature, we are compelled to ease our discomfort by finding a remedy as quickly as possible. However, there is tremendous value in formulating problem-solving strategies that recognize that the discomfort of the unknown is a necessary part of the process. Being fearful of and resistant to unknown situations undermines our ability to discover and invent.

## The unknown

Consider that a problem represents an unresolved set of circumstances. An unsettled state has a degree of entropy that is difficult to predict and manage. Uncertainty is typically viewed as an undesirable condition. But from the perspective of design, ambiguity presents an opportunity; it is a catalyst for moving towards a more optimal state. At the same time, design reflects a sense of order and organization that permeates the physical world. The laws of nature constitute the play of physical phenomena, giving shape and form to matter. Over the course of time, humanity has learned to interface with these forces and channel them in useful ways. From the perspective of engineering, functionality and utility are primary elements of design. Engineers are trained to be practical because engineering encompasses ideas of efficiency and serviceability.

While engineers are agents of mankind, striving to assist the human enterprise, conventional engineering education serves to sequester a student's mind, focusing it mostly on technological know-how and outcomes. Within this realm, a sense of right or wrong emerges. A solution either works or it doesn't work. This leads to a bifurcated

thought process that emphasizes absolute conditions. Problem solving methods become overly focused on the end result or performance factor, discounting the value of the process. This can lead to inflexibility and a rigid point of view. Setting the sights on the end, rather than on the in-between, limits a student's ability to explore and discover.

Design, as practiced in an art department setting, places a priority on processing. How students arrive at a solution is just as important as the subsequent outcome. There is a correlation between the process and the product. This approach serves to shift attention away from absolute values (i.e., right or wrong), cultivating a learning environment that is more conducive to exploration and creative thinking.

The Chindogu project was developed specifically to teach students how to scale the hurdle of not knowing. The Chindogu project is designed to rattle engineering students' frame of reference by confronting them with unfamiliar conditions such as uselessness and visualization. From a pedagogical standpoint, constructing this experience is necessary to foster courage and vigor in problem-solving. The idea of uselessness is challenging to engineers because it disputes their worldview. In addition, working visually is outside of their perceived range of expertise. Being off-balance has the effect of opening the awareness, provoking discussions that lead to transformation.

### **Chindogu**

When introducing the project, we spend an entire class period discussing the teaching objective. The issue of discomfort is presented directly. Students understand that they are being challenged in this particular way. Slides of existing chindogu products are shown to illustrate the idea of chindogus. Many of the products are fanciful and outrageous. The immediate response is one of delight and interest, although some students are skeptical. Most engineering exercises are serious in nature and contribute to a conservative and somber outlook. Consequently, the fanciful nature of chindogus may lack credibility for some. There is, however, a strong correlation in design between creative processing and playfulness. The Chindogu project helps to illustrate this point.

The value of showing examples is not to give students specific ideas or contribute to their level of comfort: but rather, this introduction is intended to jar them emotionally and to sanction the idea of playful thinking. In other words, chindogus are fun. The risk in establishing a visual precedent is that some students (fearful of the unknown) try to duplicate rather than originate their own ideas. When this situation occurs, it creates an opportunity to discuss how one finds ideas. Design fundamentally values original thinking.

Students are directed to consider their daily routine and ponder how a product might specifically address the dynamic between them and the material world. Rather than suggest or impose a particular set of circumstances, the project requires that students identify their own quandary. By definition a chindogu is "a gadget that has been conceived, designed, built, tested, and verified to make our lives more convenient in

some way.”<sup>2</sup> At the same time, chindogus also make “our lives inconvenient in another way.”<sup>3</sup>

For instance, a re-useable paper towel that remains in pristine condition because it is encased in plastic illustrates the chindogu paradox. Paper towels are notorious for becoming overly saturated and tearing. To address the limitations of paper towels, this design enables the paper towel to be used again and again. At the same time, however, the towel is virtually useless because it cannot absorb any solvent or liquid. In solving one problem, another problem is created.

Similarly, a different team identified the frustration of keeping up with small twisty ties, such as those used in packaging bread. The team designed a beeper system. When the tie is lost all one has to do is dial an 800 number and a beeping sound is activated to help locate the lost tie. Of course, the mechanical apparatus attached to the fragile coated wire makes the product cumbersome and absurd.

Another group identified the problem that some families encounter when different family members drink directly out of the same milk carton. This team developed a milk jug that has color-coded “nipples” inserted into it so that each family member can drink from his or her assigned spout and not spread germs.

There is also a common problem that cooks encounter when a particular recipe requires constant stirring. This everyday dilemma is solved by developing a pan that has a small animal wheel built into it. In this way, a small rodent can “treadmill” in the pan and keep the ingredients moving.

As evidenced by these solutions, in many respects, chindogus are ridiculous. What keeps us from dismissing them totally is that they are seriously conceived and well-executed products that have been given the same level of consideration that functional products receive. Students are instructed not to build mock-up models but to produce something that has the integrity of being *real*. Consider the contradiction at play here. On one hand, chindogus challenge an engineer’s sensibility because they are intrinsically dysfunctional, but on another hand, chindogus are believable because they have visual integrity. This paradox has the effect of liberating awareness because there is no rational explanation, no comfortable place for the mind to go. In this way, chindogus are very Zen.

### **The critique method**

During the visualization and production phase of the project a critique method (common in art education) is employed. The art students contribute significantly at this stage because they are more articulate on visual considerations. The critique method is an uncommon experience for many of the engineering students. During the critique, teams must present their products for input and criticism from the entire group. Because of the competitive culture that is encouraged in engineering education, many of the engineering students feel reluctant to share their ideas during a preliminary phase. Certainly it is true that teams that are floundering for an idea may use this open review as an opportunity to

“shop” for solutions. If it is found that a team is simply appropriating another team’s idea then they must work to transform the “borrowed” idea into something more original. Students are encouraged to use an “appropriated” idea as a point of departure for developing their own point of view. This often results in the formulation of a unique idea that has the capacity to exceed the idea that “inspired” the team in the first place. This situation gives additional opportunity to address processing. In other words, it illustrates how ideas continue to evolve and transform.

The critique method exposes students to collaborative thinking and builds team-oriented skills. Inherently, collaboration is built on camaraderie and sharing, individuals working towards a common goal.

### **Packaging and promotion**

Once products are developed and executed, the next step requires teams to package their products. The packaging requirement exercises visual awareness. To make something appear “real,” (i.e., manufactured quality) requires that students study and analyze packaging. We discuss visual considerations that contribute to the believability of their products. This is a good exercise for teaching visual awareness and sharpening visual acuity.

Furthering the authentic quality of chindogus, each team must consider their product in the context of marketing. Rather than a template-based PowerPoint presentation, many groups use this phase as a creative opportunity and explore other options.

This aspect of the project parallels real concerns in product design, and therefore has the value of exposing students to the full range of design considerations. But just as chindogus offer a twist on product making, the final component of this project has ulterior motives. This requirement has the consequence of confronting students with another set of unknown circumstances and places them in yet another awkward situation.

In the end, most students use skits or videos to produce “commercials.” The most successful results come from teams that carefully study the components of commercials. This again is another exercise in visual acuity as students must dissect and analyze visual considerations in order to capture the essential elements of this aspect of marketing.

It is evident from the results that this phase enables students to shed their inhibitions and let down their defenses. In a culture that is rationally predisposed, an experience that enlivens emotion by provoking personal expression helps to balance and integrate thought and feeling. It also addresses the notion of fearlessness.

The commercial represents a different medium that some students revel in. In other words, there are students who really enjoy acting out a theme in front of the group. This revelation has the consequence of altering group dynamics. Engineering is known for its composure and restraint rather than its public expressiveness. It has been the case that a

student can elevate his or her status in the group by demonstrating an ability that eludes many of his or her peers.

Some students, who misjudge this phase, deeming it trivial, ultimately regret their lack of effort. Not because they are afraid that they have compromised their grade, but because they have humiliated themselves in front of their peers. While the outcomes are often fun and humorous, it takes a lot of serious and creative effort, not to mention skill to produce a believable commercial.

In all teaching endeavors there are students who work harder than others. Because the results of the Chindogu project are visible to the entire group, from the product to the marketing presentation, students recognize, without being told, that some of the teams have exerted more effort. This form of peer pressure is valuable to those who are resistant to criticism and input or do not expend a reasonable amount of energy on their solutions.

### **Conclusion**

Usefulness is a valuable and necessary attribute when interfacing with the physical world. Practical considerations add comfort, longevity, and security to life. While projects that test a student's ability to apply mathematical and scientific constructs are necessary, a conceptually based and visually oriented project, such as, Chindogu, represents a means to affect thinking, and, therefore, enhances a student's ability to explore and invent.

In concert, the cultures of engineering and art serve to hone problem-solving skills by striking a balance between rational and intuitive processing. This approach cultivates a more comprehensive method of decision-making as it integrates thought and feeling. Despite this situation most engineering programs do little to expose the intimacy of this relationship, enabling students to maintain a narrow perspective.

The value of the Chindogu project is that it challenges students to think differently by confronting them directly with an unknown situation. Engineers prefer the linearity and steadiness of rational processing that is prized in engineering programs. By deconstructing the design process, exercises, such as this one, provide valuable insight into problem-solving. Learning to process through an awkward set of circumstances cultivates instinct and confidence. Students learn that knowing the answer is not as important as knowing how to find the answer.

It may be argued that conventional engineering design projects confront students with unknown circumstances. While this is true, the difference in a chindogu-type project is that it has the consequence of disrupting students' normal modes of processing. In doing so, this type of exercise opens their awareness and cultivates a more robust approach to problem solving.

## References

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<sup>1</sup> Watts, Alan (1970), Nature, Man, and Woman, New York: Vintage Books.

<sup>2</sup> Papia, Dan (1997), 99 More Unuseless Japanese Inventions: The Art of Chindogu, New York, W.W. Norton & Company. p. 6.

<sup>3</sup> Papia, Dan (1997). P .6.

## Biographical information

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Angela Patton is an associate professor of Art at the University of Houston. Her expertise is foundation design and design theory. Her visual work includes award winning environmental projects, products, images, electronic media, and works on paper. Her written work synthesizes design theory with other disciplines. Her most recent writing considers design in the context of digital awareness.

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Richard Bannerot is a professor of Mechanical Engineering at the University of Houston. His research interests are in the thermal science related areas, especially heat transfer and thermal system design. For the past ten years he has taught the required "Introduction to Design" course at the sophomore level to mechanical engineering students.