From the Editor

Form, Function, Faucets, and Design

Humankind has used vessels to transfer liquids for several thousand years. Despite all this cumulative experience by artisans and engineers in designing pouring vessels, I cannot pour coffee from the carafe of our current coffee maker to a cup without spilling it. The only successful pours I have made occur when the carafe is about half full. If it is on the full side or the empty side, a spill is sure to occur. I have ruled out my waning psychomotor skills and steadiness that come with aging as possible causes. Even replacing the carafe with a new one did not improve its pouring performance. If the carafe had been manufactured by an upstart company, then perhaps an excuse could be conjured up, but the coffee maker was designed by one of the largest coffee maker manufacturers in the world, with over 40 years of experience.

Another personal design frustration is related to my increasing interest in learning to play the piano. It has always been a challenge to me as a novice musician to turn the pages of the music while trying to maintain a constant tempo. The only solution I have come up with is to memorize the notes that need to be played during the page turning activity. I do not have a solution, though, to the annoyance of trying to keep the pages from turning by themselves as I play, since most music books are "perfect bound" and the pages do not stay put. Thus, when I purchase a new music book, I go through a routine of opening the book and then pressing the pages down in an attempt to get them to lay flat. This is an inadequate solution at best. What's more, it causes premature failure of the binding. I am not sure how long spiral book binding has existed, but it surely seems that it should be the *de facto* standard for music books.

A third frustration is related to the trend, at least in the US, toward "super-sizing" consumer products. The fast food industry is perhaps the most well-known example of this phenomenon, whereby consumers can request that their meal be super-sized, adding to the amount of food and the number of calories. Super-sizing has even occurred in paper products, with most brands of paper towels and toilet paper offering super-sized rolls of their products. I am confident that many consumers think that they are getting more for their money in the super sizing, but in fact the cost per sheet is typically the same, regardless of the size of the roll. The problem here is that neither the toilet paper nor the paper towels can be easily removed from the rolls using the typical paper holders that are available until the roll is reduced to a "regular" size through use. Until that point, the act of pulling a towel from the roll and tearing it off requires two hands. I decided that the paper manufacturers and the paper holder

manufacturers had collaborated in a conspiracy to force consumers to upgrade their holders to the new sized rolls. However, in taking some preliminary measurements in my admittedly unscientific "study" in the marketplace, I discovered that nearly all the paper holders properly accommodate a standard-sized roll of the paper product. The exceptions that I found to this were rare and many of those were non-functional for other reasons.

Considering how well-developed our designing and engineering practices and accomplishments are, it is truly amazing that these design and engineering foibles continue to exist. There are many lessons for our students that can come from an analysis of the functionality of even the simplest of the products that we use each day. The opportunities include design, engineering, history, and economics. Moreover, learning opportunities along these lines are either directly or implicitly included in the *Standards for Technological Literacy* (International Technology Education Association, 2000).

As students of design, we are no doubt familiar with the relationship between function and form and the classical axiom that "form follows function." In other words, if a product does not serve its utilitarian purpose, the fact that it looks good is of no significance – *sine qua non*. I recently had the occasion to learn quite a lot about an artifact most of us use everyday and usually take for granted: the humble and mundane water faucet. At the lowest level of functionality, the water faucet must control the flow of hot and cold water. At the next level, the technology allows the user to control the water with either two separate valves or just a single valve. In the average home, faucets are used in three primary applications: the kitchen, the lavatory, and the bath. Thus, there are really six fundamental choices: single versus double handles and three sites in the home where faucets are used. Yet, I counted 158 different faucets on display at our local home center store. Designs ranged from ultramodern to classical and finishes ranged from traditional chrome to copper with a patina reminiscent of an ancient bronze statue. Even more possibilities are available by special order. Beneath their outward appearance, though, the faucets of a particular manufacturer are functionally identical and use the same set of repair parts.

There is little difference in the functional performance of faucets these days. By and large, they all perform excellently and will provide carefree service for a number of years. What sells faucets is how pleasing their appearance is in the eyes of the consumer. In effect, good performance is expected and the products are distinguished from one another by how good they look. Aesthetics have become the principal venue of competition among manufacturers of a wide range of products. Manufacturing products that are aesthetically pleasing to the consumers and are competitive in price and performance at the same time is a significant challenge to engineers and designers. Yet, meeting this challenge is essential for an enterprise to remain viable.

I once learned that the difference between humans and other living entities was that humans could use tools to make things – *homo faber.* This notion has been dispelled if only through observing the behavior of primates on television

documentaries such as those sponsored by *National Geographic*. For example, monkeys can remove the branches from a small tree and fashion it into a device to fetch food floating on a pond, thus making a tool.

One of the characteristics that separate humans from lower life forms is our ability to design objects that are beautiful. Some of these objects are simply pleasant to look at while others are both pleasing to look at and also serve some utilitarian purpose. Humans' ability to create beauty and to seek environments in which beauty exists are arguably definitive elements in determining the condition of being "civilized."

When the industrial revolution occurred in the US there was increasing concern about the sameness of the products produced by the evolving system of mass production. This similarity of product was a logical outcome of the revolution since it took a huge investment in the production system required to mass produce a given product. But once in place, the system could produce products very cheaply and competitors who were custom-producing the same products were driven out of the market place. In addition, the challenge of mass producing products was formidable in itself and aesthetics were clearly compromised.

The absence of beauty in these early products, in fact, was a springboard to increased concern for teaching students about aesthetics in the educational programs, some of which had an historical lineage to the technology education programs of today. In fact there is evidence that can be found that concern over the lack of aesthetics in the early industrial system influenced a change in name from manual training to manual arts.

At roughly the peak of the industrial revolution, the 1876 Centennial Exposition was held. Most of the exhibits that were set up for this event are now on display at the Smithsonian Museum in Washington, DC. In the exhibit are examples of the "prime movers" of technology of that day such as steam engines, mechanical conversion systems, and milling machines. One is taken aback at how much effort went into making these exclusively functional artifacts of technology into objects that were also very beautiful. Pin stripping, brass adornments, and polished mechanical fasteners are examples of the accoutrements. Today, the engine compartment of the automobile has a parallel emphasis on aesthetics, with obvious attention to form along with efficiency.

The *Standards for Technological Literacy* (International Technology Education Association, 2000) distinguishes between technological design and artistic design, emphasizing that the former is driven by efficiency and the latter by aesthetics (p. 90). The Standards nearly exclusively focus upon technological or engineering design. There are practical reasons for bifurcating the two in order to make the scope of the Standards manageable, especially considering that they represent a pioneering, prototypical effort.

Ignoring aesthetic considerations certainly makes the engineering design process simpler. On the other hand, it disregards a very significant aspect of design, especially considering the free market economy toward which the world continues to move. Moreover, the synergism that occurs from collaboration,

cooperation, and communication among the members of an organization clearly leads to increased results and creativity. Modern management theory clearly dispels the notion that accomplishment comes from individuals and disciplines working in isolation from one another. Fortunately, the Standards are considered to be a working document and there is considerable flexibility to at least include aesthetics as a constraint in the design process.

As is so often the case in my conclusions to these editorials over the years, I must once again point out that we have little research to inform us about how the consideration of aesthetics might attract the interest of more students and enhance the overall learning process. For sure, we are unique in our ability to provide a learning environment in which students can not only design solutions to technological problems that function efficiently, but look good as well. Arguably, this is just as important as the application of science and mathematic principles. Moreover, this is one way that we can make the educational experience of our students much richer than might be the case in a traditional classroom. Separating aesthetics from function, separating the industrial designer from the engineer, does not seem either plausible or logical in either the real world or in technology education. The two are inseparable partners in the design process and joining them in our educational programs is consistent with our general education intentions. This desire for beauty in our human-made environment has driven us to seek aesthetic qualities in the automobiles we drive, the homes in which we live, the shelter by which we are protected, and the fabrics that clothe us.

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Reference

International Technology Education Association. (2000). *Standards for technological literacy: Content for the study of technology.* Reston, Virginia: Author.