# REDUCING CONSUMER PRODUCT-RELATED INJURIES VIA MASS TECHNICAL EDUCATION

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Consumerism is not a new word to most of you. My guess is that in this room I am the newest member of the ranks. But "consumerism" is, in fact, a very new thing to most Americans having been introduced only 4 or 5 years ago. Much important work has gone on over the past years which has not enjoyed the fanfare surrounding the modern consumerist. I, as an electrical engineer, have always felt that my activities seem inconsistent with whatever "consumerism" was and for the longest time I remained on the fringe. But the attacks by critics of the consumer movement have been helpful for me. They claim that consumerism is nothing more than a hodge-podge of leftovers and leftouts embracing everything from better auto repair to lettuce boycotts to excessive funeral expenses to down with pollution to up with more electric power to more women's lib to down with meat to up with truth-in-lending, labeling, nutrition, pricing, and so on and on. Well, after hearing all this I knew that at last I had a home.

Now to the subject of product safety and injuries to consumers. In the interest of time and patience, I will not quote facts and figures that portray how many accidents, who gets hurt the most, when they get hurt the most, etc. I will only comment that it is indecent that this year we can expect 20 million injuries involving consumer products and requiring professional medical care. 30,000 deaths, 110,000 permanent disabilities, and an economic loss to the nation of $5.5 billion.

Instead, I will detail for you what I and my colleagues at Carnegie-Mellon University are attempting in an effort to reduce the number of product-related injuries over the long haul. First, a bit of background. NSF allotted a portion of their budget to support Research Applied to National Needs. In its infant stages, the program toddled around with maximum flexibility constrained only by the requirement that research projects should aim at solving present problems via contemporary technology--not to be confused with advancing technology. Tucked away in the corner of the last page of the announcement was a 2-paragraph section entitled consumer protection, far smaller than the columns devoted to energy consumption, ecology, etc. Here was my chance. At last a way to plug in my intense private interests into an area that was fundable.

The National Commission on Product Safety published and elaborated on the many shortcomings of 3 approaches to reducing the 20 million injuries each year to American consumers:

(1) to encourage industry on a voluntary basis to establish and conform to sound safety standards
(2) to develop strict government regulations and enforcement procedures for product safety standards

(3) to provide consumers with mass education concerning product hazards

The basic conclusion of the report is that none of the three has been successful.

Even though previous efforts have failed, I believe that there is a viable approach for reducing the number of injuries due to unsafe products and accidents. This approach is based on the concept of providing innovative technical education to high school students. The idea of educating our youth about the technical aspects of products is not entirely new, being also suggested in a report by the President's Committee on Consumer Interest.

> "Consumer education is not merely a rhetorical exercise in buymanship. It is a continuing, lifetime learning experience. For that reason, we must realize its great potential as an integral segment of our total educational system, supplemented by the informal influences of the home and community and supported by consumer organizations, Government and business.
>
> As America's Marketplace becomes more technologically sophisticated, consumer problems grow in number and complexity. Consumer Education provides our youth with a useful frame of reference not only for the future but also for the sometimes difficult and perplexing present."

In directing our attention toward the youth we utilize the diffusion of knowledge principle to eventually reach major portions of the population not presently in high school.

Our premise is that the only real hope for improved consumer protection lies with the self-protection that comes with being an intelligent consumer. The availability of safer, more reliable products is a necessary but not sufficient aspect of the solution. Also needed are consumers who have enough technical knowledge to select the safe products from "among the lot" and then to use these products properly. To obtain this technical knowledge consumers must be educated towards an approach to buying and using that not only incorporates pertinent facts about a specific product but is based also on general principles applicable to a wide variety of buying situations.

There exist many private and government groups that focus on some aspect of informing the consumer. While the services which these organizations do provide can be quite beneficial, there are two serious deficiencies. First, only a minority of consumers takes advantage of materials made available to them concerning safety. This minority is comprised mostly of technically oriented, well-educated people who are aware of the efforts of consumer groups and know how to take advantage of them. Secondly, the majority of consumers make product suitability decisions that are based solely on less safety-oriented criteria (such as color, price) simply because they do not know what safety factors need to be considered. Hence, the most serious shortcoming of the present efforts in consumer education and protection is the absence of a major effort to develop within each consumer an awareness of the many aspects of any product which could help him predict safety, along with quality and perfor-

mance. In short, consumers have not yet been educated on how to make buying decisions by using all the available information on safety, product performance, product longevity, etc.

It will not be an easy task to change the attitudes and behavior of consumers. BUT consumers armed with an understanding of even the most fundamental engineering principles will be better able to judge not only products they buy, but also the technical equipment with which the average consumer interacts daily. The present lack of technical understanding constitutes an enormous personal and economic hazard. It is vital to dimish this hazard by better acquainting society with the technology of the products it buys and uses.

RESEARCH OBJECTIVES

We are directing our research to the following problem areas:

(1) Determination of consumer attitudes concerning safety; his present knowledge of the safety aspects of the products he buys' the time at which he considers these aspects; and the measures he takes (or he would take) to protect himself from personal injury.

(2) Determination of those technical concepts and guidelines that should be transferred to consumers at large so as to enable them to both understand and develop an overall approach for intelligent buying and safe utilization of the product.

(3) Development of techniques for presenting modules of technical information (found in 2) which enable consumers to be more cognizant of basic technical and safety aspects of the products they purchase. Major emphasis will be placed on determining effective methods, materials, media and timing for educating consumers with technical information.

(4) Providing manufacturers and government agencies with descriptions of appropriate information needed by a consumer to make a more deliberate, intelligent, confident buying decision and to use the product in a safe manner.

A major focus of our research is concerned with the identification of relevant technical information needed by a consumer. A basic principle to be illuminated in our educational curriculum is that there are only a few basic questions which the consumer must learn to ask and never fail to have answered when contemplating the purchase of a product: what specifically do I want this product to do, can the product satisfy my wants, what are the potential hazards associated with the product, how can I learn to use it, are my expectations reasonable to begin with, what sources of information can I use, what product cues can I use for evaluating the product, etc.

To answer the above questions, consumers should seek appropriate information. The one source of information available to most consumers is the salesman. Unfortunately, the salesman is not likely to be a good source for product safety information since he usually does not know the information himself, or when he does he may withhold the information to avoid jeopardizing the sale. All too often the recipient of any "consumer-product information" is being sold the product at the same time and is usually not given an objective or complete presentation. To offset this imbalance and help consumers protect themselves, the efforts of our research will be to illustrate

through numerous concrete examples what kinds of technical information should be sought and where this information my be obtained. Our approach to solving the above problem is unique: in our curriculum we shall present separate modules of information, each one built around a specific technical aspect of products that is critical for product safety and is applicable for a wide range of products. This is contrary to the usual approach for consumer information transfer. We shall not begin by looking at several aspects of one product but rather we shall examine and present a single aspect as it appears in a variety of products. We envision, for example, modules on electrical insulation; bonding characteristics of glues, screws, welds, etc.; lay-out design of sharp corners, sharp edges, placement of plugs and receptacles, etc; thermal insulation; appropriateness of materials used in consumer products; toxicity; and radiation (see Table 1). Within each module, a basic understanding of a particular engineering aspect will be given and then illustrated via a wide range of consumer products so as to show exactly how this aspect is related to product safety. The same set of products will serve as illustrations for all the modules (see Table 2). It is of prime importance that we educate the consumer to gain an awareness of what aspects he should consider regardless of what product he is considering. Figure 1 illustrates the difference between our approach and that used by specific product information services such as CONSUMER REPORTS. Having created an awareness of what information should be sought prior to purchase, we will also present a module devoted to showing how the same set of questions serve as an intelligent basis for approaching every decision of purchase.

The second major focus of our research will be the design of activities for achieving the transfer of our "engineer-consumer" information to the consumer. For the engineering information to be useful, the programs for disseminating it must be designed carefully for the appropriate audience, developed with response to feedback from that audience, and evaluated to assess overall effectiveness as compared to alternative methods.

We shall direct our educational program toward high school students. Some of you may challenge these reasons but we believe young people tend to be naturally inquisitive and responsive to technical information couched in understandable language and presented via identifiable situations. They are a large, captive audience having instructional television available for daily use. Also, classes can easily be divided into test groups and control groups thereby affording the opportunity for a significant evaluation of our research. Finally, that portion of students not going to college will become major consumers the day after graduation, and it is our intent that they be given a sense of technical awareness and reasonableness in regard to their safety from product associated hazards.

The results of our research will be manifested in four tangible outputs: 1) a detailed analysis of consumer attitudes, aptitudes and behavior concerning safety aspects of products: 2) detailed outlines of effective methods, materials, uses of media, and timing for safety-oriented consumer education; 3) highly developed prototypes of multi-dimensional curriculum packages; and 4) detailed

recommendations to government agencies and manufacturers regarding technical information needed by consumers for making intelligent product performance comparisons and using safety-oriented purchase and use behaviors. Documents reporting these outputs will be sent to the Federal Trade Commission, the Food and Drug Administration, Office of Education (HEW), American Manufacturers Association, and to other users upon request.

I have defined the problem and proposed a solution. Next year I will return with our results.

Table 1. Modules of Technical Information

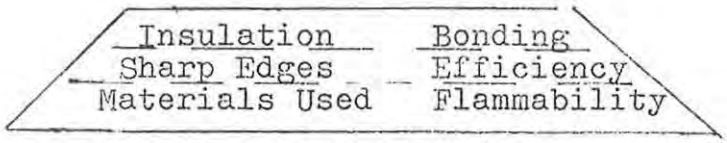
| | |
|---|---|
| MODULE I | Awareness of the problem - causes, statistics |
| MODULE II | Basic principles of Mechanics - force, stability, work, power, efficiency, pressure, stress, strain, potential energy |
| MODULE III | Basic electricity - current, voltage, generators, distribution, "ground", fuses, shorts |
| MODULE IV | Radiation, toxicity, flammability - potential hazard, prevention, combustability |
| MODULE V | Insulation and Isolation - thermal, electrical, mechanical |
| MODULE VI | Materials and fasteners - environmental stresses, fasteners, joiners, relative strengths |
| MODULE VII | Design logic - sharp objects, edges, projections, lay-out, use |
| MODULE VIII | Retrieval and Use of Safety (and Quality) Information - sources, procedures, assimilation |

EACH MODULE will contain at least 50% of its material devoted to illustrative examples with common products.

Table 2. Products to be analyzed and used as illustrations in modules.

Electric coffee pot (2)
Steam iron (2)
Hair dryer (2)
Toaster (2)
Vaporizer (2)
Air conditioner (1)
Electric range (1)
Gas range (1)
Space heater (2)
Hot water heater (2)
Clothes dryer (2)
Power drill (2)
Power saw (2)
Lawn mower (2)
Hedge trimmers (2)
Fondue pots (2)
Blenders (2)
Deep fat fryers (2)
Riding toys (8)
Children toys (5)
Bicycle (2)
Motor bike (1)
Helmet (2)
Toy oven (2)
Assorted glasses
Assorted kitchenware
Assorted toiletries
Assorted aerosol sprays (25)
Electric blanket (2)
Assorted pesticides
Ladder (2)
Playground equipment
Electrical cords and plugs (7)
Immersion heaters (5)
Food slicer
Heating pad
Sun lamps (2)

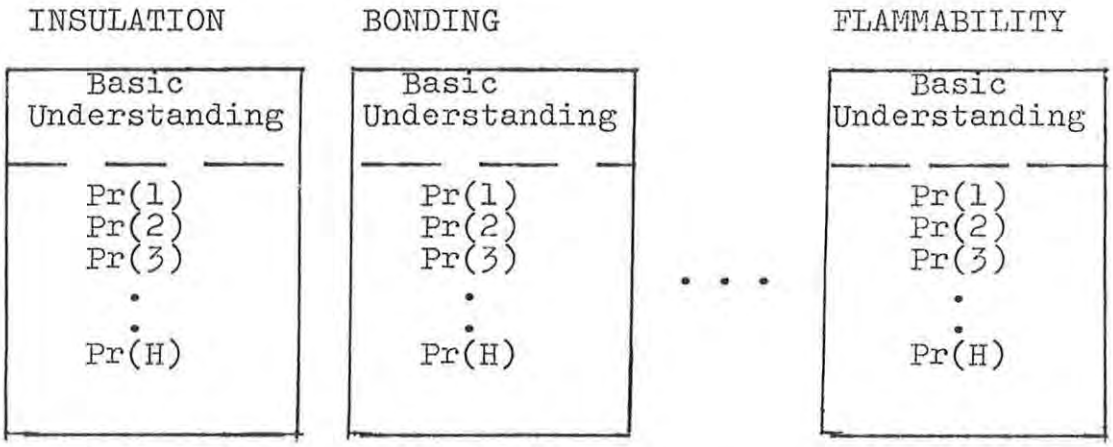
Figure 1 (transparency)




PRODUCT Pr (1)

Approach to providing technical information as used by Consumers's Reports. Each product is analyzed to show various technical aspects for consideration.

COMPARISON OF APPROACHES TO TRANSFERRING TECHNICAL INFORMATION TO CONSUMERS




MODULES OF TECHNICAL INFORMATION to be transferred to consumers

Note that the same products are used as illustrations in each module.