Online Ethics Center
FOR ENGINEERING AND SCIENCE

TEST - Teach Early Safety Testing

Description

Curriculum materials to encourage the integration of safety into design for the undergraduate engineering student. These materials were developed by Kids In Danger, a nonprofit organization dedicated to protecting children by improving children's product safety.

Abstract

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Introduction

In 2003, Kids In Danger, a Chicago based non-profit organization, conducted a review of safety approaches among college engineering programs and found little design safety education in the undergraduate curriculum. No courses were found that emphasized safety, or even used the word "safety" in the syllabus. In June 2004, Kids In Danger surveyed 46 students in the Mechanical Engineering program at the University of Michigan. Although the sample size was small, a few trends were apparent. Only 33% felt any confidence in their ability to test their designs for safety, and about a third expressed a desire to take a class on safety standards and issues.

This gap in education about design safety was troubling in light of the numerous design flaws in the juvenile product manufacturing industry (*Why Are So Many Children Killed or Injured by Unsafe Products?* by Megan Word, *Chicago Parent,* February 2002). It suggests that engineering education could benefit from more coverage of the methods and tools necessary to ensure the safe design of products.

The National Society of Professional Engineers' Code of Ethics makes clear that professional engineers must "[h]old paramount the safety, health and welfare of the public," and yet teaching hazard analysis and risk prevention does not appear to be a major priority in engineering education. Given the myriad of other topics and facts engineering students must master, it is understandable that finding time to focus on safety in product design has been difficult. It is the hope of KID that these materials will provide easy means to incorporate this lifesaving information into engineering programs.

Until the Consumer Product Safety Improvement Act of 2008, manufacturers of most children's products were not required by the government to test their products for safety before placing them on the market. As that safety law continues to be

implemented, most safety testing or standards are still part of a voluntary system. The shortcomings of this system are clear, as many dangerous products are only discovered and recalled after injuring or even killing children. Even mandatory safety standards do not require in-depth hazard analysis or address all hazardsPublic Citizen, Hazardous Waits: CPSC Lets Crucial Time Pass Before Warning Public About Dangerous Products; http://www.citizen.org/documents/HazardousWaits.pdf January 2008.. It is up to the engineers who design products to ensure that their designs are as safe as possible.

To ensure safe product development, engineers need to employ comprehensive, scientific hazard analysis techniques. No standard methodology exists, but many techniques reach an objective estimate of risk, thereby preventing design flaws and product failure. It is the purpose of this curriculum to challenge future engineers to design products with public safety as a primary concern. Being aware of how a product is used in daily life is an important component to making a safe product. Design cannot be done without that knowledge.

The TEST curriculum will prepare engineering students for the dynamic between professional and social responsibilities, and broaden their awareness of product interactions and safe design. The curriculum addresses ethical, health, safety, and social concerns, as well as standards and professional constraints.

KID has undertaken outreach projects on children's product safety with a variety of public constituencies. We found that caregivers, health care providers, legislators, and policymakers take action to reduce dangers once made aware of the risk. We believe the same holds true for engineering students. We envision TEST as contributing to safety-conscious product development.

Students who have participated previously with the TEST program have spoken highly of the interesting and interactive nature of the program. One student stated, “I learned to look into the smaller details of designing something safely. It is not something I had much experience with in school at the time. It is definitely a good skill to learn as a future engineer.” From TEST, students can take away a multitude of lessons and skills; a student said when asked what he learned from his experience with KID, “It is important to look deeper into how a design will be used and all possible failures of a product. Negligence in this has been disastrous in the past and such mistakes should be learned from for the future.”

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Kids In Danger (KID)

Kids In Danger (KID) is a nonprofit organization dedicated to protecting children by improving children's product safety. KID was founded in 1998 by University of Chicago professors Linda Ginzel and Boaz Keysar, after the death of their son Danny. Danny died in his Chicago child care home when a portable crib collapsed around his neck. Although the crib had been recalled five years earlier, word of its danger had not reached Danny's parents, caregiver, or the state inspector who visited the home just days before Danny's death. Subsequent legal documents show the product had not been adequately tested for safety before it was sold.The Playskool Travel-Lite Crib Case: https://onlineethics.org/cases/resources-engineering-and-science-ethics/playskool-travel-lite-crib, with more information is available from KID.

KID's vision is a system that ensures the safety of all children through stringent standards, independent testing and a commitment from government and manufacturers that safety is their priority. Our goal is to make every parent aware of how to protect children from unsafe products before they leave the hospital with their newborn. We want every manufacturer and engineer committed to strong safety standards and independent testing before any children's product reaches store shelves.

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KID's TEST Program

KID has designed the *Teach Early Safety Testing* (TEST) project to promote the development of safe products by integrating children's product safety, standards, and testing practices into the engineering curriculum. TEST has allowed students to examine product design from a unique perspective and redesign various children's products with an emphasis on user safety first and foremost. Students have redesigned numerous common child and infant products and created innovative prototypes.

Our goal is to encourage engineering students to think about safety in design from the onset of their careers. While KID's interest and this curriculum focus on children's product safety, we believe the activities and tenets can be easily

transferred to designing for any population. The topics covered are particularly applicable to other vulnerable populations such as the elderly or disabled.

The TEST curriculum focuses on understanding product design, how standards work, safety considerations at various stages of design, ethical engineering practices, human factors, end users, the importance of safety considerations, and design ethnography among other topics. Design ethnography, a key element for safety design, is the study and incorporation of foreseeable product (mis)use in daily life that helps to account for product failure and thus allows engineers to design around these issues.

Lesson plans, PowerPoints, and student projects within the program are designed to be flexible and fit the individual needs of each university and professor. Additionally, the program can easily be adapted to other groups beyond children such as the disabled and elderly. Safety considerations are an integral part in the design of any commodity. The TEST program enables future engineers to understand and develop the necessary skills to incorporate safety into their future work and prevent harmful injuries and deaths from dangerous products

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How to use these materials

These materials allow professors to integrate safety awareness easily into their courses. ***The lessons provide the materials needed to cover the basics of safety in product design*** that KID believes every engineer or product designer needs to assess risk and design safe products. The project ideas are intended as ways to evaluate the students' progress as well as to educate them about safety. The course materials can be used together as a unit or can be integrated into other lectures and class activities. Please contact KID at any time if you have any questions, suggestions, or requests for additional material. KID can also provide other services including leading discussions related to product safety design, introducing TEST, testing the unit or various parts of the program, serving as a client for design projects, offering internships for students, and other resources. Please contact KID for any help or clarification. TEST is an interesting and effective way for students to understand and actively participate in learning about the importance and significance of safety considerations in every aspect of product design.

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Teach Early Safety Testing: Curriculum

Goals

- To raise awareness of safety and introduce students to the practice of safety-conscious design
- To introduce and develop ethical issues facing engineers on the job
- To foster a sense of responsibility among future engineers to create safer products
- To provide students with the resources to create and test safe products

Objectives

1. Each student will be able to identify contemporary safety concerns and considerations and ways to address them.
2. Each student will be able to identify the ethical and business dilemmas involved with product safety and ways to address them.
3. Each student will view product safety as one of their primary goals when designing new products, while incorporating human factors and end-user considerations.
4. Each student will understand where to access available resources on voluntary and mandatory standards for products as well as other information about safe product design.

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Materials

Available from KID

- Recalled Products**:** KID has several previously recalled items available for loan and is also willing to assist schools in locating other recalled products as examples for discussion
- Case Study: The Playskool Travel-Lite Crib: A business school case examining the ethical issues in the design, marketing and recall of the Playskool Travel-Lite crib which killed at least six children. Contact KID for additional teaching notes.
- After the Recall: Dangerous Products Remain in Homes. KID, 2014: This report examines the CPSC database filings on children's product recalls in 2013 and recall effectiveness of 2012 recalls in order to identify injury patterns from the data and action steps needed from the CSPC's Saferproducts.gov. Additionally, the report examines how effective the recalls from 2012 were in removing dangerous products from homes.

Available at online bookstores

- ***It's No Accident: How Corporations Sell Dangerous Baby Products*** E. Marla Felcher, 2001. Common Courage Press.
  A thorough look at the children's product safety system. Includes in-depth reviews of product failures and analysis of the regulatory system. Included in the appendix is an *Atlantic Monthly* article, also by Felcher, which summarizes the findings of her book.

Available Online

- **Code of Ethics for Engineers.** National Society of Professional Engineers (NSPE). July 2007.
  Available at http://www.nspe.org/resources/pdfs/Ethics/CodeofEthics/Code-2007-July.pdf.
  The code of ethics outlines professional and ethical standards for engineers, many of which relate to public health and safety.
- ***Why Standards Matter***. American National Standards Institute (ANSI). Online course at www.standardslearn.org.

- ***Up to Date Child Product Recalls and Safety Standards.*** CPSC.gov
  The Consumer Product Safety Commission provides a comprehensive list of child-related recalls collected from retailers and manufactures as soon as possible. The CPSC is dedicated to informing consumers of all recalled products and continuously improving the safety of consumer products within the United States.
- ***Search for Injury Estimates.*** CPSC.gov
  CPSCs National Electronic Injury Surveillance System (NEISS) is a national probability sample of hospitals in the U.S. and its territories. From this data, product-related injuries treated in emergency rooms can be estimated. Available at https://www.cpsc.gov/cgibin/NEISSQuery/home.aspx.
- **ASTM Student resources and membership**
  ASTM International is the organization that sets voluntary standards for the juvenile products industry, among many others. They offer materials and a special free student membership. www.ASTM.org.
- **ASTM Student Resources available at**
  http://www.astm.org/studentmember/For_Students.html.
- **Juvenile products for projects and redesign assignments**
  Check freecycle.org, craigslist.com or ebay.com for low cost products.

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Goals and Objectives of Individual Lessons or Lectures

Safety Matters Lesson

Goal

Introduce students to the concepts and importance of design safety, ethics, and standards, using children's products as an example.

Objectives

Students should know where to find information on product safety and standards.
Students should be able to consider design hazards in sample products and the likely way a product will be used by consumers that might contribute to hazards.
Each student will be able to identify the standard setting agencies that apply to

children’s products.
Students will know where to look for standards that might apply to products they design in the future.

Ethics in Engineering Lesson

Goal

To make the students aware of common ethical issues that occur in engineering.

Objectives

Each student will be able to identify his or her duties as an engineer.
Students will be able to discuss ethical issues in the Playskool Case Study.
Students will be able to identify and discuss common ethical dilemmas.
Students will know how to access the full guide of ethical guidelines for engineers.

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Projects for Student Teams

This page includes project ideas for engineering students to design with safety in mind.

Example Student Prototypes

A sample of some of the prototypes designed by students studying the TEST Curriculum.

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Related Links

Federal Safety Standards for all products can be found be searching at the Code of Federal Regulations website.

Links specific to the lesson are provided below:

- Federal regulations regarding non full-size cribs

- Federal regulations regarding full-size cribs
- Federal regulations regarding bunk beds
- Federal regulations regarding pacifiers
- The NSPE code of ethics for engineers

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Product Loans

Some items such as the following may be available on loan from Kids In Danger:

1. Travel-Lite Crib
2. Recalled Baby Carrier
3. Recalled Baby Swing
4. RAM Safety Lesson (on CD)
5. Powerpoint slides for TEST Ethics and Safety Design Lectures

Please contact Kids In Danger for information on available items or to make requests.

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Notes

Curriculum materials to encourage the integration of safety into design for the undergraduate engineering student

Developed by Kids In Danger, a nonprofit organization dedicated to protecting children by improving children's product safety.

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Rights

Use of Materials on the OEC

Resource Type

Instructor Materials

Parent Collection

TEST - Teach Early Safety Testing: Curriculum and Materials

Topics

Product Liability
Safety
Public Health and Safety

Discipline(s)

Engineering
Authoring Institution
Kids in Danger