

Dartmouth College
Environmental Health & Safety
Spaulding Auditorium

An Animation Premier

Original Title: Chemical Fume Hood: How it Works to Protect You

Nationality of Film: USA, Netherlands

Languages (as Subtitles)

Arabic
Chinese
Dutch
English

French
German
Russian
Spanish

Narrated in English

Year: 2009

Length: 7.5 minutes

Format:

- Individual (by language) MP4 Compressions for YouTube®
- Compilation of High Definition (HD) versions on DVD with language selection via menu. Each disk also contains screen shots (in English) as PDFs allowing anyone with a computer to create handouts
- A special four-quadrant Blu-ray® High Definition demonstration version.

Credits: Adapted from the Biomedical Training Program entitled: Risk, Rules and Ratio written by Michael Blayney & Jos van den Eijnde (Trustees of Dartmouth College © 2007)

Original content adapted from training materials developed at the NIH (dates unknown) and supplemented by other authoritative, referenced sources

Summary

This short HD animation video demonstrates best practices in the safe use of a conventional by-pass chemical fume hood. The animation is subtitled in uses the languages of the United Nations plus Dutch and German.

This is the first of approximately five to seven short subject animation projects on laboratory safety. The next two projects (under concurrent development) are the proper use of an autoclave and a biological safety cabinet.

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Technique

The programs used to create this program:

1. Autodesk 3ds Max 2009®, with mental ray® (for 3D animation)
2. Adobe Photoshop CS4® (for textures)
3. Adobe Illustrator CS4 ®(for textures)
4. Adobe After Effects CS4® (for 2D animation)
5. Poser Pro ®(for animated people)

The sound is in stereo.

Frequently Asked Questions

Why is the animation rather slow—why don't you speed it up?

This is a fair question to ask, especially when scientists are the intended audience. First some context . . .

The study of health and safety education spans more than fifty years and has largely focused on industrial workers in high hazard industries and occupations. Little has been done to study the health and safety education of scientists. In the last twenty years, the challenge of low-literacy or limited English skills is recognized as posing a significant barrier in effective safety communication.

English is the de facto language of the biomedical sciences. The ability to read English is a requisite for success for any scientist not already

fluent. For these individuals, spoken English tied to abstract concepts, is challenging for even highly educated individuals, particularly when newly arrived.

Over the last ten years, published work on the use (and pitfalls) of animation as an instructional tool has appeared in the literature. Animation today is amazing complex either as a visual form or made interactive (so-called gaming technology).

With insights gleaned from recent literature, our approach in creating this animation builds on three interrelated aspects. First, we tie what the viewer sees to its basic labeled parts (knowing that the viewer has inevitably seen or worked in a chemical fume hood). Second, we tie the labeled parts to the dynamic aspect of the device (airflow, for example) or phenomena (too many containers occludes airflow). Finally, we illustrate, then summarize, what we feel are the most essential human/device safety interactions. For the final aspect, we believe that simple or generic is best for communicating what is most important--attempting to cover every particular nuance or circumstance lessens its usefulness.

My own opinion on "how fast" to present something has been shaped by the work of others in education and psychology and my observations and conversations with visiting scientists, many of whom were not yet comfortable with conversational English. In developing this animation project, I have asked various audiences over several years to comment on early content prototypes, including 35mm slide sets and PowerPoint® presentations. While subjective in my approach, visiting scientists have often told me that a slower delivery helped reduce the inevitable stress that occurs when trying to understanding a concept in a new language.

Deliberate pauses and the cinematic technique "point of view" in the animation are intended to reduce distraction and refocus the viewer during each transition. Lastly, the good fortune of having a professional musician and professor of film score compose the sound track the project highlighted and emphasized "right" from "wrong" along the way.

References

Wallerstein, N. (1992). "Health and Safety Education for Workers with Low-Literacy or Limited English Skills" *American Journal of Industrial Medicine*, 22: 751-765

Wouters, P., Paas, F., & van Merriënboer, J. (2008). "How to Optimize Learning From Animated Models: A Review of Guidelines Based on Cognitive Load" *Review of Educational Research*, 78(3), 645-675.

How will you use this animation piece in the future?

This and future animation projects are part of an ambitious effort with Dutch colleagues to develop an internationally standardized biomedical laboratory safety training program. This and future animation pieces will be occupy strategic spots in the international program—serving as material best "seen" than described.

Appended below is part of the executive summary of a grant proposal developed in 2008. With this first animation piece now complete, our intent is to combine the grant proposal with a DVD and request for approximately \$250,000. The grant would fund an eighteen-month project at Dartmouth and include colleagues at the University of Amsterdam Medical Center in the Netherlands.

Project Overview

The completion and delivery of an introductory laboratory safety program for biomedical research scientists. The intended audience includes large and small biomedical research companies, government, academic and private research institutions. Additionally, the program would help small hospitals, colleges and universities in the United States (U.S.) and around the world. Fully implemented, we will be able to train tens of thousands of scientists and allied personnel for less than a dollar per trainee.

Project Summary

The goal of this project is to further refine and deliver a web-based training program using a standardized curriculum for biomedical research scientists. The curriculum, script and program elements have

been in development for several years--derived from primary sources. We completed a thorough first draft in January 2007.

A quick look at any biomedical research facility reveals the diversity of human experience in the faces of scientists today. Scientists today transcend distinctions based on gender, nationality, language and social convention. The personalities of life scientists in general, the rapid exchange of information, frequent travel and common goals shape the international culture of biomedical science. While the methods and techniques used in biomedical laboratory science (those of biotechnology) are largely standardized, a universal approach in training biomedical scientists on the basics of laboratory safety is lacking. Existing training materials are nearly 20 years old and do not reflect the social and cultural diversity of scientists today. Scientists today are also technology, media and communication savvy.

An effective and successful safety-training program today must be all of the following: relevant and useful to the participants, adaptable to new research methods and situations. It must be behavior-based emphasizing established, accepted "best-practices". The program must also be outcome-oriented where knowledge is measurable and the delivery method is multi-functional thereby lowering the barriers posed by differences in written and spoken language.

Upon completion of the proposed project, a web-based training program covering the basics of biomedical laboratory safety using new training technologies will be widely available to scientists in the U.S. and around the world. The program will include a pre- test/post-test evaluation of participant knowledge and inventory of useful demographic information. A dedicated website and registration system will deliver and track the training, with a unique identifier used for each training record created. The plan is to utilize text, animation, video and narration in a web-based application with key concepts referenced in the official languages of the United Nations.

How else will you use or promote this project?

We have already submitted a copy of the HD DVD version to the 2010 Annecy Animation Festival <http://www.annecy.org/home/>

According to the Annecy web site . . .

First founded in 1960, the International Animation Film Festival will be celebrating its 50th anniversary in 2010.

As the world's largest event dedicated to animation, Annecy is a fun and friendly way to discover the latest in animation masterpieces, meet major players and young talents, check out new trends, and find ideal business partners, all in one place.

This spring we will also submit the HD DVD version to the 2010 International Film and Video Festival <http://www.filmfestawards.com/>

In the summer we will submit to the 2010 Holland Animation Film Festival <http://haff.awn.com/>

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The Office of Environmental Health & Safety

My family--Edward, Elizabeth, Elliot, Rebecca and Sarah

The countless scientists I have had in class yet known only in passing for nearly 22 years of teaching laboratory safety. I hope that something I presented made science safer for them, their families, colleagues and the environment.

Michael B. Blayney, Ph.D.
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