

Author Tips for Effective Engineering Messaging

At TeachEngineering, one of our primary goals is to increase teachers' and students' understanding of all the amazing things engineers do for society. One way we do this is by incorporating messages and taglines designed for communicating with the public, as developed and tested by the *National Academy of Engineering* and outlined in its report, [*Changing the Conversation: Messages for Improving Public Understanding of Engineering*](#). In the TeachEngineering collection, you can see these messages in graphic format, near the top of every curricular document. We also work with contributors to add these messages, through images and text, to their own documents. Below are a few guidelines for incorporating these same messages into your curricular write-ups. While not a requirement, the more ways in which we can incorporate these messages into our engineering communications, the more students, families and educators these well-tested messages will reach.

Part 1: Messaging with Images

Finding and Using Images

For images included in TeachEngineering documents, remember that you must either create the image yourself, obtain permission to use it, or find it from a website that allows the reuse of images for educational purposes. For more details, see our guidelines in the *Requirements & Tips for Using Images* pdf document linked on the [*Submit Curriculum*](#) page. To save time obtaining copyrights for images from private organizations or individuals, we recommend you use images from .gov website, which can be used for educational purposes without prior authorization; however, check each website carefully for suggested citations and/or restrictions.

Good Images vs. Not-So-Great Images

Dispel the Engineering is for Nerds Stereotype — To do this, limit your use of images that depict (Caucasian) males as engineers doing things alone or sitting at computer terminals. And, leave out of your documents entirely any images that imply engineering is for nerds. Both of these ideas—only (white) males can be engineers and engineering is for nerds—are already hurdles that the engineering community must overcome. See Figures 1 and 2 for examples of what to use and what not to use. Images of (Caucasian) males *doing* engineering can be used of course—just not time and time again. Figure 2 is a well-messaged depiction of engineering, showing that engineers are diverse and enjoy their careers—a better image choice.



Figure 1. Example BAD image.

Source: <http://spaceflight1.nasa.gov/gallery/images/apollo/apollo11/html/s69-40740.html>



Figure 2. Example GOOD image of an engineer (and working with kids!).

Source: http://blogs.nasa.gov/cm/blog/3686/posts/post_1297455345362.html

Portray (Lots of) Women Engineers — Many pictures exist depicting women engineers doing exciting work—it's just a matter of finding them. In Google Images®, *be creative* and *expand your search* to include words that get to the heart of what you want to illustrate. Notice the difference in Figures 3 and 4 in their telling of a story. Although the text found on the source website for Figure 4 is about a microbiologist, the TE unit *Cells* refers to chemical and biological engineering, which makes the photograph an appropriate choice.



Figure 3. Example BAD (boring) image in the *Cells* unit.



Figure 4. Example GOOD image of a female engineer working with cells (for the *Cells* unit).

Source: http://science.nasa.gov/science-news/science-at-nasa/2002/29mar_antibiotics/

In addition to looking for engineering images showing people who are engineers, also look for images of *engineering inventions being used by women or diverse populations*. Figures 5 and 6 illustrate other good images of females *doing* or *using* engineering.



Figure 5. Example GOOD image of a female engineer (using a sextant).

Source: <http://walrus.wr.usgs.gov/infobank/programs/html/definition/nav.html>

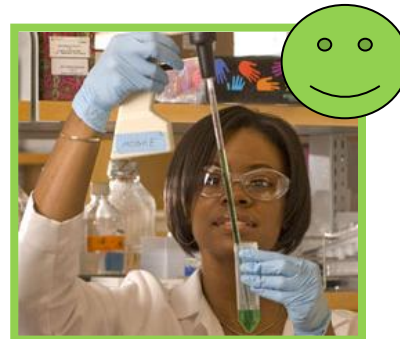


Figure 6. Example GOOD image of a female engineer (working with lab equipment).

Source: http://www.nsf.gov/news/news_images.jsp?cntn_id=116094&org=NSF

Engineering is Fun — Look for images that show how engineering is a fun, rewarding career. Choose images that reflect the wonder of engineering over those that depict engineering as a boring, too-hard-to-achieve field.



Figure 7. Example BAD (boring) image in the *TE Simple Machines* unit.



Figure 8. Example better image for the *Simple Machines* unit illustrating a lever at work.

Source: <http://www.nps.gov/stea/planyourvisit/tour01.htm>

Images with Real Humans — Find images that speak to engineering as being a career that real *people* do, as opposed to machines and equipment. Be creative in finding humans in action using engineering. See Figs. 7-9.

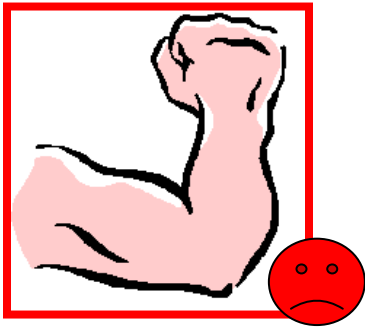


Figure 7. Example BAD (boring) image in the TE *Mission to Mars* unit.



Figure 8. Example better image illustrating a “strong arm” with a female in the picture.
Source: http://www.nasa.gov/multimedia/imagegallery/image_feature_282.html

Part 2: Messaging with Language

All About Words — You may have noticed a sprinkling of “word images” (such as, “engineering... because dreams need doing”; see below) on the first pages of TE unit, lesson and activity documents. Research on the public perception of engineering, conducted in 2008 by the [National Academy of Engineering](#), reveals that most of society is unaware that engineering is an exciting, rewarding career that benefits humans. Therefore, eight different tested messages—consistent in color and style—are randomly placed on pages (auto-generated by the *TeachEngineering* interface) to subtly and effectively “message” engineering to users.



However, effective imagery is only the first step; “messaged” language interspersed throughout documents that speaks to the *enjoyment of engineering* and *its benefit to society* also subtly informs readers about the *wonder of engineering*. For example, consider the following:

“Today, we are going to talk about cells and how important they are. Even though most cells are much too small for us to see, they are still very important. *Engineers use their knowledge of cells to benefit our health and safety, by creating disinfectants, medicines, materials and many other ‘things’ that rely on cells.*”

The last sentence tells readers why engineers must know about cells and how their knowledge contributes to the safety of humankind. Without the last sentence, the subject matter lacks a real-world engineering connection.

Who Can Become an Engineer? — The field of engineering is seen by the public as a difficult profession and a not-so-rewarding career. TeachEngineering, accessed monthly by more than 60,000 users, offers an easily-accessible venue to help *change the conversation about engineering*. By consciously steering clear of words such as *rigorous*, *difficult*, and *hard*, and avoiding the description of engineers as *nerdy*, *super smart*, *geeky*, and *in love with math*, you can slowly begin to affect change with the people who teach using your documents. Learn more in a Yowell & Sullivan article, [Who Should Be an Engineer? Messaging as a Tool for Student Recruitment and Retention](#), in the *National Academy of Engineering’s The Bridge*, summer 2011 edition.

Science vs. Engineering — Take the opportunity to compare/contrast science and engineering through your language and imagery. Figure 9 uses two images to illustrate the concept that engineers must know the science behind landforms to perform their jobs. Combining images is simple to do through any image software (such as Photoshop® or Paint®) and visually tells readers that *humans do engineering*, yet they use science. Refer to our *Suggestions & Tips* document for a comparison of the engineering design process to the scientific method: http://teachengineering.org/submit_curricula.php.



Figure 9. Example alternative image style for the *Engineering for the Earth* unit illustrating the science behind landforms and the engineering application of knowledge of landforms.

You CAN Make a Difference

These subtle, easy-to-do changes to your document imagery and language allow you to author a document that is well “messed” and effectively informs its readers about the creative nature of engineering. Your documents will help inspire students and adults from all walks of life to better understand engineering and its pervasiveness in their lives.

version: July 2011