Petroski argues engineers, scientists equally important

Working desk calculators were as important to the Manhattan Project as the fundamental physics."

This quote – attributed to Richard Feynman, the Nobel-winning physicist who worked on the development of the first atomic bomb – pretty much sums up the argument Henry Petroski makes in his latest best-seller, "The Essential Engineer: Why Science Alone Will Not Solve Our Global Problems."

One of the most significant technological achievements of the 20th century – for better or for worse – was undoubtedly the development of a nuclear weapon by the scientists and engineers who worked at Los Alamos during the early to mid-1940s.

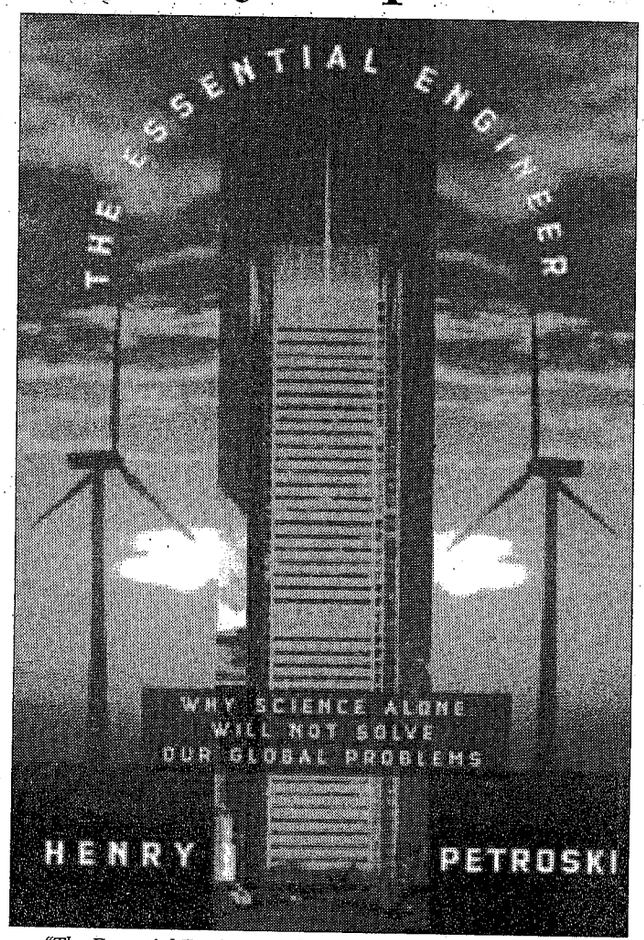
"Given that the Manhattan Project would have been considered a failure had it not resulted in the successful detonation of an actual atomic bomb, engineering was at least as important to it as was science," Petroski notes. "But the dominant positions and personalities of the scientists and the effective subsumption of 'engineering' within 'science' assured that the latter would surpass the former in visibility influence, and research spoils after the war."

Petroski is the Aleksandar S. Vesic Professor of Civil Engineering as well as a professor in the Department of History at Duke University. His previous books include "Success Through Failure: The Paradox of Design, The Evolution of Useful Things" and "The Pencil: A History of Design and Circumstance."

The assertion Petroski makes repeatedly throughout "The Essential Engineer" is that his field has often been unfairly relegated to second-class status when it comes time to hand out the accolades for a technological breakthrough or other major achievement. He sees both science and engineering as equally important whenever anything noteworthy is accomplished. Whereas science may provide the initial spark for solving a particularly challenging problem, it typically falls to the engineer to make the solution operational.

"There is certainly nothing wrong with scientists pursuing basic research in search of basic knowledge," Petroski writes. "But it is not necessarily the way to spend money allocated for attacking a particular problem. The basic science of fuel cells, for example, has been known for over a century, but that has not been at all sufficient to lead the way to mass-producing an efficiently functioning cell."

Petroski makes a powerful and convincing case that, in the overall scheme of things, engineering is as important as science and therefore should receive equal recognition. To support this argument, he dissects a fairly comprehensive list of past achievements, including the invention of the steamship, the development of the airplane, and the moon landing. He argues passionately that none of these triumphs would have been possible without a marriage of science and engineering.



"The Essential Engineer: Why Science Alone Will Not Solve Our Global Problems," by Henry Petroski. New York: Alfred A. Knopf, 2010, 274 pages, $26.95.

The author also observes that many scientists seem to naturally assume their contributions are intrinsically more important than those of engineers; i.e., they tend to see themselves as higher on the proverbial pecking order when it comes to assessing their relevance. Without being either condescending or overtly patronizing, Petroski eloquently rebuffs this counterproductive notion, demonstrating how this presumptuous and self-serving attitude significantly hinders our ability to solve important problems.

"In some dictionaries, engineering is defined simply as 'applied science,' he explains. "Science is a tool of engineering, and as no one claims that the chisel creates the sculpture, so no one should claim that science makes the rocket. Relying on nothing but scientific knowledge to produce an engineering solution is to invite frustration at best and failure at worst."

Petroski's main point is that the real value of an idea is often found not so much in its original inception, but in the ability to flesh it out and make it actually work. Developing a vaccine against a deadly disease, for instance, is not really the part of the process that helps other human beings. It is obviously necessary – but insufficient by itself – to make a substantive difference in the lives of others. Its potential benefit is realized only by those who are able to produce and make it available to people on a large scale and in an economically feasible manner.

"The Essential Engineer" covers a wide range of topics, from the increasingly important role of engineering in the medical profession to the growing use of financial engineering to solve our complex economic problems. The author sees most of the enormous challenges facing society in both the near as well as the long-term as primarily engineering problems.

One of his better chapters focuses on the pursuit of alternative energies. Petroski does a marvelous job of laying out the pros and cons of virtually every potential contender for replacing our almost total reliance on fossil fuels. An underlying theme is that all the identified options are filled with promise as well as fraught with difficulties – obstacles which he feels can only be overcome by engineers working in concert with scientists.

In the final analysis, Petroski is guardedly optimistic about the future.

"Not all engineered systems, especially those complicated by challenging ulterior social and economic motives, necessarily evolve for the better," he cautions. "With an increasing understanding of each other's distinguishing capabilities, scientists and engineers are likely to come together and work as the team that they naturally should be."

— Reviewed by Aaron W. Hughey, Department of Counseling and Student Affairs, Western Kentucky University.