

The Invaluable Usefulness of “Useless” Knowledge

Abraham Flexner: “The Usefulness of Useless Knowledge.” With a companion essay by Robbert Dijkgraaf. €9.99 / 93 pages. Princeton University Press, Princeton 2017.

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Two great essays for the price of one: the newly released book by Abraham Flexner “The Usefulness of Useless Knowledge” (1939) complemented by an intelligent argument for basic scientific research.

When he passed away at the age of 92 in 1959, his death made the front page of the *New York Times*. Among other things, the obituary noted: “No other American of his time has contributed more to the welfare of this country and of humanity in general.” The name of this American philanthropist was Abraham Flexner, and it appears that we have forgotten him here in Germany, even though he was one of the most important reformers of universities and promoters of research in the 20th century.

In the U.S. scientific community, Flexner was mainly known for two radical innovations: in 1910, he and his brother published the famous Flexner Report about medical education in North America. Flexner had looked at several medical schools in Germany as well as the one in Vienna; he argued in favor of serious reforms in the U.S.A., which were actually implemented, and as a result, about one half of all medical schools closed.

Founder of the Institute for Advanced Study

He became even more famous as the founding Director of the legendary Institute for Advanced Study in Princeton. The Institute, which was established in 1930 and privately financed, became a refuge for researchers such as Albert Einstein, Kurt Gödel, and other scientists (as well as scholars from the humanities and social sciences) who were forced to emigrate to the United States to escape the Nazis. It remains one of the most renowned research institutions in the world.

In 1939, his last year as the Director of the Institute, Flexner published an essay in *Harper's* magazine that is among the classic texts in the research field: under the title of “The Usefulness of Useless Knowledge,” he delivered a convincing argument for science that is conducted without any specific purpose, but is solely driven by curiosity and imagination. In this short but impressive text, he illustrated his point with examples of “useless” research that resulted in unexpected technological advances.

The point of research “without a purpose”

Flexner dedicated most of his essay to the radio, which was considered an invention by Guglielmo Marconi, a fact he did not deny by any means. However, he demonstrated very clearly that Marconi's invention, honored with the Nobel Prize in 1908, would have

been impossible without the “completely purposeless” groundwork done by Maxwell and Hertz.

Under the impression that the autonomy of universities in Italy and Germany was sacrificed to the political, economic, and “racial” policies of fascism, he pointed to Humboldt’s educational ideal, the resulting university reforms, and how the latter were implemented at the Institute for Advanced Study in Princeton, where no promises are made, but where there is hope “that the unobstructed pursuit of useless knowledge will prove to have consequences in the future as in the past.”

Usefulness expressed in numbers

This hope was not unfounded, as the current Director of the Institute for Advanced Study Robbert Dijkgraaf states in his introductory essay “The World of Tomorrow.” In fact, with their theoretical research, Einstein, von Neumann, and other great minds at Princeton laid the foundation for the “digital” and the “nuclear” revolution, in other words, for the development of the computer and the atom bomb.

The theoretical physicist from the Netherlands not only provides numerous other examples for the unexpected applications of basic scientific research, such as the World Wide Web, Google, and superconductivity, but he also summarizes them in impressive numbers: according to Dijkgraaf, it is estimated that 30 percent of the current gross domestic product (GDP) of the United States comes from inventions which have only been made possible because of quantum physics, a field of research that was considered hopelessly “useless” less than one hundred years ago; and based on MIT’s calculations, its research has resulted in the creation of no less than 30,000 companies that currently employ approximately 4.6 million people.

Financing basic research

Dijkgraaf explains how he thinks basic scientific research should be funded in the future in the context of the 1939 World’s Fair, which took place in New York under the title “The World of Tomorrow.” At least in the United States, research has seen better days in terms of funding: while 2.1 percent of the GDP was dedicated to research and development at the height of the Cold War in 1964, it is less than 0.8 percent today. The budget of the National Institute of Health has shrunk by one fourth in the past ten years.

In addition, Dijkgraaf points out that corporate funding has not increased either. According to a report issued by the U.S. Congress in 2012, American corporations only financed eight percent of basic scientific research, while 53 percent came from the government, and 41 percent from universities and foundations. The times in which researchers from Bell Labs came up with breakthrough discoveries (and won Nobel Prizes) seem over for good.

The public role of science

In the end, Dijkgraaf also makes some critical comments about Flexner with regard to the public role of researchers and the relationship between science and public life. He specifically points to a rather stubborn intervention by Flexner after Einstein had joined his Institute in Princeton in 1933.

President Roosevelt immediately sent a letter to the most famous immigrant and invited him to the White House. However, it was not Einstein who answered the letter, but Flexner, who told Roosevelt that Einstein needed to conduct his research in total seclusion, without any distractions from the public domain. After this incident, Einstein made sure that he answered his own mail from that point on (and described Flexner as one of his few enemies).

Einstein's challenge in today's world

In the years that followed, the physicist became the epitome of the “popular scientist” in the United States, and he also voiced his opinion on social and political issues. Dijkgraaf follows in this tradition, and reminds us that Einstein actively promoted the popularity of science, not least because he wanted to make sure that it was appreciated and supported by the public at large.

In his speech at the 1939 World's Fair in New York, the great physicist said the following words, “If science, like art is to perform its mission totally and fully, its achievements must enter not only superficially but with their inner meaning, into the consciousness of people.”

These words are almost 80 years old, and just like Flexner's essay, as relevant as ever.

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