

Nuclear Engineering Education in the United States: The First 50 Years

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This paper will discuss recent trends in the nuclear engineering education infrastructure in the United States. In the last several years political, economic and technical issues have been addressed and nuclear technology appears poised to resume growing again. It is in this new environment that there has been a confluence of industry, government and academic interests to see that nuclear engineering education retains its vitality and ability to provide technological leadership and a well-educated workforce.

In order to understand the current situation it is important to give a brief historical perspective covering the six decades since the inception of “Atoms for Peace” in 1953. The passage of the Atomic Energy Act of 1954 established the Atomic Energy Commission and the declassification of much nuclear technology and scientific material. There was an understandable optimistic outlook as to the potential for nuclear technology in the areas of power, medicine and other industrial and scientific applications. There were commercial concepts for using nuclear energy to power ships, planes, rockets, and cars. But the most successful application, by far was in the area of electric power production. In only a few years demonstration nuclear power plants were built and the infamous quote – “two cheap to meter” was reported. In the following decade much progress was made and commercial plant orders increased substantially in number and in size. There were going to be light water reactors, gas cooled reactors, liquid metal fast reactors, reprocessing, waste buried in salt mines. There was going to be “a 1000 reactors in the year 2000”. This was the picture in the United States in the 50’s and 60’s. And it was in this environment that nuclear engineering education was birthed and grew.

The first nuclear engineering academic programs and university research reactors were established in the 1950’s at such places as North Carolina State, MIT, Penn State and others. Academic expertise was primarily in the areas of physics and in mechanical and chemical engineering. The government supported these university programs and established nuclear training schools to spread the discipline around the country. The American Nuclear Society was established as the professional society for the dissemination of scholarly work. The discipline of Nuclear Engineering became established in the engineering accreditation community. Students flocked to this new “high tech” field and pretty soon there were programs and research reactors around the country.

However, this picture changed dramatically in the 1970’s and in the following decades. Most significantly, the oil crises of the 1970’s sent the country into a deep recession and the rate of growth of electricity was suddenly and dramatically cut from 7% per year to the more sustainable 2% per year that we see even today. There was high inflation. All this led to a tremendous over supply of planned power plants and resulted in delays, cancellations, and attendant cost increases. The technological issues unveiled by the Three Mile Island accident compounded these political and economic issues.

It is in this environment that nuclear engineering education, which had been growing to meet the planned needs of industry and government was also shocked into a retrenchment. Students stopped selecting nuclear as a major field of study. Universities started investing

resources in other new high tech areas such as computer science and engineering, and more recently bio, nano and info technology. Nuclear programs and research reactors were being closed. From a high of 70 reactors, there are now only 23, and from over 50 nuclear academic programs there remain only about 24. Undergraduate enrollments, which once peaked at nearly 2000, fell to only a few hundred.

This paper will provide statistical information quantifying the aforementioned trends. It will highlight the work of various organizations including the Nuclear Engineering Department Heads Organization, NEDHO, which was formed in the early 1980's as a "forum for discussion, coordination, and collaboration on issues facing academic programs emphasizing nuclear and radiological engineering. In particular it will reference an important document that was produced by NEDHO in the early 1990's, which helped to bring the dire situation on campuses to light and set out a definition of the discipline of Nuclear Engineering. It will summarize the various efforts of the Department of Energy, the Institute for Nuclear Power Operations, the American Nuclear Society and others. Specific examples of successful programs and partnerships between universities and industry and government will be cited.