

# Chapter 16

## Humanities in Engineering Education

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### ABSTRACT

*The difficulty in defining who the engineer is, in our times, is due to the increasing complexity of technical progress, which seems endless. The engineer's professionalism nowadays requires not only technical skills, but also a deep sense of responsibility towards human society and the environment. It is necessary to answer more adequately to this complexity by providing the engineer a more comprehensive education. The inclusion of Humanities in the curriculum of the Engineering Faculties—specifically that of Anthropology, Ethics, Literature, and History of Technology—is indispensable for regaining the human factor in technological questions and for educating responsible and competent professionals.*

### INTRODUCTION

The chapter analyses the need for improving a liberal education of engineers in order to humanize technology. Technology today is no longer a possession, a set of instruments utilized by man; instead, it has become a dynamic process that has given rise to a new world vision modifying the notion that man has of himself. This evolu-

tion has also produced a change in the role and responsibilities of engineering's activity.

The challenge of the so-called *Human-Centered Technology* is that of recovering categories such as human and not-human, as natural and artificial, words whose authentic senses have been blurred.

This chapter aims to investigate the following issues: 1) what are the current implications of the evolution of technology; 2) problematic aspects of the current engineering role; 3) the importance

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of *Engineering Humanities*, such as philosophy, literature and history of technology.

## BACKGROUND

### Technique, Technology, “Technoscience”: Approaching a Definition

To understand the issues of the current technological horizon, it is useful to briefly trace the origin and changes in the very concept of technology.

Traditionally, the term *technique* in a wider sense refers to the methods, rules, and processes which are used for production, as well as to the necessary abilities for its realization, and also to the products as a result of these abilities. This means that technique is applicable both to human beings and to animals, recalling, for example, the ability of beavers when they build dikes, or the perfect technique used by the bees for their apiaries.

In a strict sense, instead, the term *technique* refers exclusively to human beings. It indicates the relation which man, since he appeared on earth, has established with his environment, characterized by innovation and creativity (Facchini, 1995). It includes two abilities characterizing exclusively human intelligence: planning and symbolizing, that is, the ability to act intentionally in order to reach a future object and to attribute an immaterial meaning to a material sign. Under this aspect, to the term *technique* is preferred the term *technology*, because the Greek word *lógos* implicates that type of ability of practical reasoning, that “way of thinking in view of doing,” which philosophy since ancient times has identified as the feature of man’s technical intelligence (Parente, 1966).

In the Greek culture, *technique* went along with knowledge, as a necessary and indispensable condition for any activity, which was not pure routine or simple praxis. But knowledge used by technique was considered a science of the universal which included inseparably its practical application, so

it was much different from the so-called *epistème* not being finalized to any kind of transformation of the physical world.

During the scientific revolution of the 16th century, one can observe the fusion of theory and praxis, of science and technique. On one hand, considering the new scientific discoveries, the technical instrument assumes particular importance, not only in order to obtain the formulation of a scientific theory, but also to carry out the control of it; on the other hand, because of the major technical demand, the craftsmen were asked to appeal to scientists for the solution of new problems.

However, this kind of relation is defined as mere interaction, and therefore much different from the systematic and practical utilization of scientific knowledge, which, on the contrary, is characteristic of the technology in the modern age.

The term *technology* of Greek origin has appeared in the modern age in the work of the French rhetorician Petrus Ramus (1515-1572) and has been included in the *Encyclopédie* of Diderot and D’Alembert (1751-1722), as well as in the title of an essay by the German pedagogue Beckmann, *Anleitung zur Technologie* (1777), where the meaning of science is teaching how to manipulate the natural products, and also knowledge of methods and procedures. The term appears more complex compared with the word technique because it indicates *technical science* as well as *science as part of technique* and *science of technique*. The word technology contains therefore four meanings: 1) knowledge of rules and processing for production; 2) planning, manufacturing and maintenance activity; 3) will of control and manipulation; 4) product, tool, or machine.

The beginning of the industrial society, with mass production and distribution, modifies radically the vision of *téchne* as known in ancient Greece which did not aim at the fabrication of many articles of the same type nor at the solution of general problems. The division of work and

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