

1957. Others⁶²¹ add Colorado at Denver,⁶²³ Stanford, the Air Force, University of Ill.,⁶²⁴ Carnegie Institute of Technology;⁶²⁵ the latter bringing together principles of mathematics, physics and engineering, for inventors' use, and Pennsylvania State with a textbook.⁶²⁶

INSTILLING OR ALLOWING CREATIVITY IN ENGINEERING EDUCATION

[622] How far such courses in engineering schools have gone and could go, we cannot say⁶²⁷. The only theses we feel able and obliged to present here are that the traditional undergraduate engineering course almost totally omits invention, stifles the inventive gift by non-use during the years when the young engineer who has it should be using and developing it, and imparts an actual distaste for invention. Under our next subtitle (§ 635) we shall show that this very bad start has been continued by a perverse scheduling of the engineer's later work. Yet these tragic blunders are committed with full knowledge that invention is of supreme importance, and increasingly dependent upon engineering (and other scientific) education, so that the engineering undergraduates of today, whatever their miseducation, will have to be the main sources for invention some years hence.

[623] The beginning of learning is the wish for it, an admiration for the knowledge and profession to be acquired. And yet, strangely and most unfortunately, all engineers are taught to shun the word *invent* and its derivatives as if they were dirty words.⁶²⁸ The only exceptions are in connection with patenting, or bygone history. Except in patent matters, an engineer whose main work and honor are inventing had as lief call himself a tinkerer, fakir, or sage, as an inventor. He will use any substitute word in the language, suitable or not: research, development, product improvement, engineering, chemistry, creativity, anything but that dreadful word *invention*. Yet it is a perfectly good and current word in the language of other citizens, and has a meaning not accurately translated by any of its substitutes. Typically one of our quoted experts, a leader in teaching invention to engineers, never uses any form of the tabued word in his 6-page article on invention, except once "The hair-brained inventor" [*sic*] in derision. That is their idea—an *inventor* (patenting and history aside) is an untrained crack-pot, who works in his own basement and loses his shirt. How vastly better to be an *engineer* in a laboratory, lose the *company's* \$100,000 on an unsuccessful project, and go right back to the drawing-board with a good salary continuing. Call me an inventor? Call me a fool and a failure! But yet that word *invent* remains an important one in the English language, without an exact substitute, of necessity used throughout this book. Teaching to abhor the word must to some extent estrange the engineer from what the word uniquely names, something that *ought* to be his dearest ambition, if born inventive.

[624] Allen⁶²⁵ found one engineering dean who was definitely against invention, for his students or his graduates. For it is far safer, the dean said, to follow proven practice, than to experiment. And

⁶²³ H. von Hortenau teaches a semester course in the psychology, sociology, problems, and techniques of invention, with students' projects included; 1962.

⁶²⁷ One method reported successful was for a professor to give certain undergraduates a summer job assisting him in research. They later became top research men, in other fields, attributed to this early rousing of their interest. Wilson, N 621, its p. 10.