provides the best opportunity for detecting, once in a long while, stubborn discrepancies between fact and theory, which lead to better or new theories. Furthermore, in education, Kuhn says, a class would become chaos if we freely allowed the questioning of basic principles. But if the student master these, and the principles and techniques of scientific proof, he will be in the best position later to perceive and exploit those little, crucial discrepancies.

[630] Some progress has been made since most of our authorities wrote, in the occasional appearance above noted (¶ 621) of courses in creativity, and much more in the growth of graduate education, wherein second engineering degrees have become 18% as numerous as first, and doctorates crown 1.9% of the first degrees (charts 1 and 3, ¶ 61).[632.8] With its general superiority, and its thesis work on more or less original projects, graduate engineering education is much more to the point for training an inventor, and is similar to the advanced training in physics and chemistry, which we have said has not aroused complaints of uncreativity.[633] But still there will remain a large part of the recruits for the invention laboratories who come with only B.S. in Engineering degrees; hence remains a great need for undergraduate engineering training for inventors.

[631] The only sufficient remedy both for the baccalaureate engineer inventor, and for a much better start for his fellow student who goes on to a higher degree, would be, we think, to recognize that an ordinary engineer and an inventor are two different species of men, as Admiral Fiske said. We should solve the dilemma of the ambivalence of knowledge by splitting the inventor into two men, as per ¶ 582, one an engineer with technical proficiency and the calculating, conservative and other virtues needed in that profession, and the other an inventor type, having the peculiar psychology discussed in the previous chapter, and educated throughout his university course and if possible long before that, specifically to become that most extraordinary, rare, and precious type who questions old and finds out new truths, the inventor. Perhaps also the discoverer in physical science. We do not train a preacher, a writer, and a naval officer in the same schools and curriculum, nor from the same type of youth, just because they all are to deal with people. The cooperation needed between inventor and engineer can be provided later in the laboratory, where many professions work together. And of course there is room not just for the two contrasted types, engineer versus inventor, of which we have been writing to make one point, but for the infinite gradation of types which nature and our heterogeneous schools provide.

[632] If this plan for cooperating talents be right, then our first great problem is to find good means for identifying and assigning potential inventors to college courses for their precious ilk, and if possible, to high school classes too (¶ 611). R. Q. Wilson says,[621] "In industry, it is generally recognized that approximately 50% of university-

[632.8] Among the scientists, other than engineers, in research, development or design, a better grade reporting through the scientific societies to the National Register of Scientific and Technical Personnel, 37% held the doctoral degree, 26% the master's, 32% only the bachelor's, and 1.6% not that. In addition there were ⅓ as many administering R&D, with a few less degrees.

The physicists and astronomers in research had a median age of 36 and salaries of $11,000, chemists 39 and $10,000. N 671.

[633] President DuBridge says we should encourage postgraduate engineering study and "give these men experience with the frontiers of engineering and with the techniques of creative work," especially mathematics and theory. N 634, its p. 49.