

imaginative, and humorous turn of mind. Such a boy is likely to make a right poor impression on ordinary teachers, so that they are less inclined to give him encouragement or recommendations, than to a normal, bright, well-to-do, industrious child who duly ingests and regurgitates the whole school diet regardless. Getzels & Jackson⁶⁰² compared the children shown by five tests to be in the top fifth for creativity, but not in IQ, with their schoolmates of high intelligence and not highest creativity. They found the creatives a humorous lot, and doing a trifle better in school achievement than their smarter opposites, but ranking somewhat lower in their teacher's preference. The high IQ's in turn gave a correlation of +0.67 between the qualities they wanted for themselves and those they thought the teacher wanted. For the creatives this correlation was *minus* 0.25—they were resigned to displeasing the teacher, more often than not, doubtless from experience, and they stuck by their discordant ideals. And they saw but little connection (+0.10) between the traits they admired and those that lead to adult success.⁶⁰³ MacKinnon's⁵⁷⁹ research scientists tended to have been honor students in high school, but unhappy there and at home. Their performance worsened in college, usually to C+ or B—, which would hardly admit them to graduate study today. They had their own interests and opinions. Torrance says that scholarships for good grades assure nothing for the future beyond good class grades; the youth's creativity may be nil.⁶⁰⁴

[610] This conflict or boredom with teachers and schooling is particularly unfortunate in boys who must get so much schooling to meet modern needs. Together with anti-inventive traits of engineering education (§ 633–7) it is an explanation of the claim frequent a generation or more ago, before science became so vital for invention, that good inventors hardly needed engineering nor advanced science training, but did as well without.⁶⁰⁵ As we said in § 602, all our schools repress originality and the questioning of authority, or doubting the excellence of anything customarily approved. The only problems recognized are those that the text book calls on you to solve, and “these have but one correct answer, and you had better be right.” Convergent thinking, the psychologists call it, contrasted with the divergent thinking about various possible truths or solutions, which the inventor needs and which his mind is apt for, as the psychologists find. So some propose that all our schools be shaken up, to free the children's thinking

⁶⁰² Presumably the ideal inventor would rank high in *both* creativity and IQ: but such people are rare, and are much needed for other posts of leadership. In turn, a study of how mathematics and science teachers were rated by their principals, showed in all aspects appraised, negative correlations with the teachers' tested *ingenuity*. Jex, F. B.: *Negative Validities for Two Different Ingenuity Tests*; in Taylor, N 600, 1959, pp. 124–7.

Among MIT students in a product design course the AC Test for Creative Ability indicated the A scholarship group to be distinctly better than the B, but the C and D were a little better than B, and included the best of all. N 613.

⁶⁰³ Schmookler found his responding patentees of 1953 to be 69% college graduates; but Rossman's of 1927–9, who held 4 or more patents, were 55% graduates, and their education appeared to have no influence on the number of their patents. However, this would be more or less accounted for by the older men having less education and more years in which to accumulate patents. Smith's data of 1931 likewise showed little relation between invention and undergraduate or postgraduate education, or scholarship evidenced by Phi Beta Kappa or Tau Beta Pi. But Sigma Xi, given primarily for promise or achievement of research, raised the percent of the graduates who were inventors from 17% to 22%, and a Ph. D. to 25%. N 606.

A book of a century ago on invention said science was of no use to inventors! Emile With: *Les Inventeurs et leurs inventions*, 1864. Cf. Schmookler, *ftN*⁵²; Rossman N 595. Stevenson and Ryan wrote in 1940, that the really ingenious designers usually had come up through the shop and drafting room, not through college. N 614, its p. 673.