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https://www.100test.com/kao_ti2020/124/2021_2022_GRE_E5_87_BA_E5_9B_BD_E8_c86_124060.htm Many objects in daily use have clearly been influenced by science, but their form and function, their dimensions and appearance, were determined by technologists artisans, designers, inventors, and engineers---using non- (5) scientific modes of thought. Many features and qualities of the objects that a technologist thinks about cannot be reduced to unambiguous verbal descriptions. they are dealt with in the mind by a visual, nonverbal process. In the development of Western technology, it has been non- (10)verbal thinking, by and large, that has fixed the outlines and filled in the details of our material surroundings. Pyramids, cathedrals, and rockets exist not because of geometry or thermodynamics, but because they were first a picture in the minds of those who built them. (15) The creative shaping process of a technologist ’ s mind can be seen in nearly every artifact that exists. For exam- ple, in designing a diesel engine, a technologist might mpress individual ways of nonverbal thinking on the machine by continually using an intuitive sense of right- (20)ness and fitness. What would be the shape of the com- bustion chamber? Where should the valves be placed? Should it have a long or short piston? Such questions have a range of answers that are supplied by experience, by physical requirements, by limitations of available (25)space, and not least by a sense of form. Some decisions, such as wall thickness and pin diameter, may depend on scientific

calculations, but the nonscientific component of design remains primary. Design courses, then, should be an essential element (30)in engineering curricula. Nonverbal thinking, a central mechanism in engineering design, involves perceptions, the stock-in-trade of the artist, not the scientist. Because perceptive processes are not assumed to entail "hard thinking," nonverbal thought is sometimes seen as a prim- (35)itive stage in the development of cognitive processes and inferior to verbal or mathematical thought. But it is para-doxical that when the staff of the Historic American Engineering Record wished to have drawings made of machines and isometric views of industrial processes for (40)its historical record of American engineering, the only college students with the requisite abilities were not engi- neering students, but rather students attending architec- tural schools. It courses in design, which in a strongly analytical (45)engineering curriculum provide the background required for practical problem- solving, are not provided, we can expect to encounter silly but costly errors occurring in advanced engineering systems. For example, early models of high-speed railroad cars loaded with sophisticated (50)controls were unable to operate in a snowstorm because a fan sucked snow into the electrical system. Absurd ran- dom failures that plague automatic control systems are not merely trivial aberrations. they are a reflection of the chaos that results when design is assumed to be primarily a problem in mathematics. 21.In the passage, the author is primarily concerned with (A) identifying the kinds of thinking that are used by technologists B) stressing the importance of nonverbal thinking in

engineering design (C) proposing a new role for nonscientific thinking in the development of technology (D) contrasting the goals of engineers with those of technologists (E) criticizing engineering schools for emphasizing science in engineering curricula 22.It can be inferred that the author thinks engineering curricula are (A) strengthened when they include courses in design (B) weakened by the substitution of physical science courses for courses designed to develop mathematical skills (C) strong because nonverbal thinking is still emphasized by most of the courses (D) strong despite the errors that graduates of such curricula have made in the development of automatic control systems 