

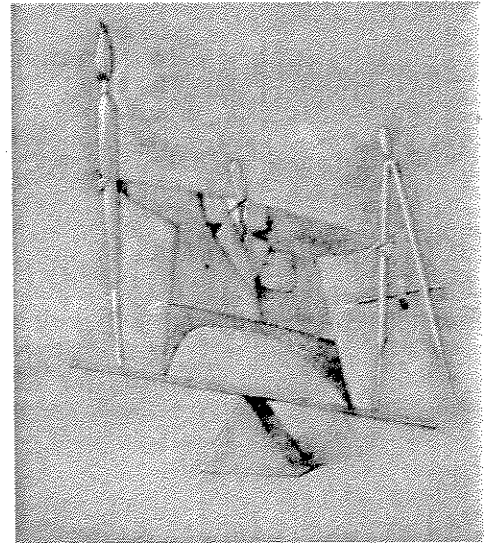
A Creative Balance

*Know-where,
know-when, and
even know-why will
become as important
as know-how.*

The human brain consists of two halves merged into a marvelous whole. Unfortunately, today's university does not respect the beauty of this structure. Instead it reflects Western culture's predisposition to value and develop the quantitative, logical, black-and-white skills of the left cerebellum at the expense of the qualitative, intuitive, technicolor skills of the right. The resulting imbalance leaves the modern university and its graduates remarkably unprepared to deal successfully with the complex problems facing mankind in the twenty-first century. This imbalance is prevalent and counterproductive in every academic discipline from literature to medicine. It is particularly pronounced and damaging in engineering.

Since real engineering involves working on open-ended and often interdisciplinary problems that have no 'right' answers, the engineer, and particularly the design engineer, must combine the mathematical skill and knowledge of the scientist with the intuition and qualitative sensitivity of the artist. Unfortunately, conventional instructional strategies for delivering engineering "content" discourage healthy design values and misrepresent the practice of engineering. To give just a few examples: Problem sets always have right answers, specialist course topics never allude to the interdisciplinary and messy nature of real problems, evaluation methods value secrecy and competition over teamwork and sharing.

There are subtle and growing pressures for change. The international shift from military to economic competition is forcing engineers to become more knowledgeable about consumer product issues like manufacturing, environmental impact, and cost, and even "fuzzy" subjects like "interaction design," aesthetics, quality, and human need. As a result of the ongoing information revolution,



multimedia hyperlearning will make specialist knowledge easier to acquire on an as-needed basis. At the same time, increasingly sophisticated software applications will require the user to better comprehend the big picture. Know-where, know-when, and even know-why will become as important as know-how.

Closer to home, huge tuition burdens may cause students, and their parents, to demand more personal attention from faculty. Overall, it will become clearer that accelerating societal problems require thoughtful action that incorporates right-brain wisdom as well as left-brain knowledge.

Unfortunately, immediate incentives for change are small. Industry complains about current engineering education, but doesn't appear inclined to invest sufficient money to play a role. Government funding for military research is decreasing but not precipitously enough to force major rethinking. Finally, university leaders are talking about valuing teaching as much as research, but in the trenches it is business as usual.

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