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Renewal in Engineering Research

In the annual report of the Carnegie Corporation for 1962, John W. Gardner wrote a thought-provoking piece entitled "Renewal in Societies and Men." Central to his theme is the idea that for a society to remain vigorous, men must not be bound by tradition and uniformity. They must be versatile, adaptable, and capable of self-renewal. It is interesting that this theme may be applied to the need for continued renewal in chemical engineering research. Is it strange to suggest that engineering research might be characterized as other than new and continually renewing? The evidence presented by the current research literature and by proposals for research grants suggests that some chemical engineering research does not show freshness and renewal.

In Mr. Gardner's summary three characteristics of self-renewal are proposed, which seem to be especially appropriate for consideration by the engineer in research.

The first characteristic is described as follows: "The self-renewing man is versatile and adaptive. He is not trapped in the techniques, procedures, or routines of the moment. He is not the victim of fixed habits and attitudes. He is not imprisoned by extreme specialization. The highly specialized person often loses the adaptability so essential today. He may not be able to reorient himself when technological change makes his specialty obsolete." This characteristic has significant applicability to the chemical engineer in research. The record of research in chemical engineering over the past ten years does not always reflect a trend toward innovation. Rather it reflects a trend toward imitation of science research; a plodding, ploughing of old ground to fill small gaps; or a faddism for using mathematics and computers to give an aura of complexity and glamour to trivial problems.

The second characteristic is equally detailed: "The self-renewing man is highly motivated and respects the sources of his own energy and motivation. He knows how important it is to believe in what he is doing . . . an enthusiasm for the task to be accomplished lifts him out of the ruts of habit and customary procedure. Drive and conviction give him the courage to risk failure." Is it possible that we find ourselves without sufficient courage to risk failure in engaging in new research areas? Too often we find our young Ph.D.'s continuing in obsolete research areas simply because these happen to be the areas of their theses or because many others are engaged in these areas and thus there is a greater possibility to contribute a small portion to an already large and nearly complete picture. Can we establish a climate in research which offers rewards for mistakes or failures; for an attempt at something new; for deep convictions, drive, and energy in new and unexplored areas? On the negative side in the present climate of research is the "fashion aspect." Research today is fashionable. It is the thing to do. Therefore, some individuals engage in it who are more qualified for other pursuits. Should the climate be such as to encourage and reward them for following pursuits more suited to their interests and abilities?

The third characteristic is expressed as: "For the self-renewing man the development of his own potentials and the process of self-discovery never end. It is a sad but unarguable fact that most human beings go through life only partially aware of the range of their abilities." Should not our research endeavors be the means to develop our abilities to the fullest extent? Should we not take the time to rise and look around the horizons of our research domain to determine where there are areas for more imaginative and eccentric experimentation? The responsibility to develop the full potentials in our students requires that we continue to develop our own potentials in engineering research. It would seem to be timely to ask ourselves, are we imitators or innovators in engineering research today? Do we really understand what constitutes significant and rewarding research in engineering? We must not apologize for seeking new and unusual applications for the sciences. We must reject the sophistry which regards research leading to the development of a process or a piece of equipment or hardware as being unworthy of our efforts. True engineering research can be one of the most intellectual, creative, and productive pursuits in our present technological society.

W. R. Marshall, Jr.

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