

1965

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Recommended Citation

Noice, F. M. (1965). A Call for Leadership. *Journal of the Minnesota Academy of Science*, Vol. 32 No.2, 84-85.

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A Call for Leadership

FRANK M. NOICE

President-Elect, Minnesota Academy of Science

Few of us who are presently engaged in higher education would deny our dependence upon the primary and secondary schools. Our students entering college must have adequate preparation in the liberal arts and sciences if we are to fulfill our roles in higher education. As of late, a few college and university professors in the natural sciences have demonstrated their concern for precollege education by contributing to the development of the "new" science curricula, i.e. PSSC, BSCS, CHEMS, CBA and others. These scientists are to be commended for their efforts. We can hope that they will continue to be involved in these programs and that the "experimental" curriculum will not become staid, as may surely occur in a few short years unless they continue to up-grade the up-graded curriculum. This example is just one bit of evidence to show that some of our college and university professors in the natural sciences are truly concerned with education on the pre-college level and surely one could cite other worthy contributions.

The vast majority of us, however, have offered little more than sharp, unconstructive criticism. We have, by and large, stood back and denounced the product of our high-school counterparts in the sciences, usually through the voices of a few of our more articulate scientific spokesmen. We have acted in a highly unobjective manner, without a clear view, because the vision of high schools from our laboratories is just as cloudy as our lines of oral communication. All too often we have held to the aloof attitude that we are somehow above the problems that exist in the primary and secondary schools. But we are brought into the focus of reality with a start when a substantial segment of our entering college and university freshmen evidence that they have less than adequate exposure to the sciences. This annual autumn trauma on our campuses stirs us to indignation but we do little more than condemn the student, his former teachers and the school curricula. And, after the shock wave recedes, we revert once again to our same indifference toward the schools. This is not a mere passive indifference, but rather a self-centered form that has become legion in the scientific communities of higher education.

The excuses for our indifference are doubtless manifold but, I dare say, seldom of any legitimate merit. It might be claimed that the efforts of the scientist in higher education are so concentrated on scholarly study and research that he cannot, and should not, be expected to involve himself in precollege science education. Yet, even the most influential scientist would be hard put to rationalize the presumptive delusion that all he stands for could not be ultimately and adversely affected by his indifference to scholarship at any educational strata.

We cannot escape the reality of less than adequate education in our primary and high schools by taking refuge in our scholarly research laboratories and, fortunately, more and more of our scientific leaders have accepted this fact. We in higher education know the despair of spending our energies on making up educational deficiencies in entering students. This means that many students are destined to a form of deficit learning throughout their higher education and some of this even filters into our graduate schools. No one in higher education can be absolutely immune to this syndrome.

We are also prone to find a convenient excuse for our dissatisfaction with this state of affairs, in the teachers of precollege science by condemning them for inadequate scientific knowledge. And yet these teachers come from our universities and colleges where we have set up their teacher preparation curricula or, at least, should have done so. But, too often, few of us even know the required college courses, or their relevance, to teaching science. We have done little to insure that we are giving the prospective teacher the training he will need. To a large extent, we have passed the curriculum planning for teacher training to a department or division of professional education and, having done so, severed the lines of communication with the students, the curriculum content, and our rights to actively direct their training. We have but a nominal liaison with the departments of education and thus with our prospective science teachers, and these prospective teachers are aware of this situation. They become sensitive to our lack of active participation in their education and many have gone from our institutions with somewhat justified resentment toward the scientists.

We also base our defense for indifference on the Professional Educator, we claim he controls the educational establishment of our public schools. We say he has manipulated himself into a position where he directs the training of our prospective teachers—science teachers included. We fail to recall, or admit, that he took over the job because we—the professors of subject matter—gave it to him lock, stock and barrel. We lost our directive position by simple default. Someone had to set up a somewhat uniform curriculum with minimal standards and, since we could not be bothered to do so, the educator took up the reins. In some respects we may have strong, valid disagreements with professional educators but, on this particular matter, their blame cannot be nearly as great as our own. We not only relinquished our responsibilities and potential satisfactions, to the educators but now use them as scapegoats for much that we claim is wrong with the system of teacher training.

I ask that we all come from behind whatever excuse we may have rationalized and face our professional

scientific obligations; let us give some time and energy to putting our own house in order. None can deny that we have a responsibility, represented by thousands of school children, to prompt our attention. We have many fine examples of contribution and cooperation by some of our outstanding scientific leaders to emulate; we have the several programs of the Minnesota Academy of Science to assist us in the work. I am confident that we will find that the professional educators are receptive to our sincere efforts to become more active in the planning and administration of a better curriculum for training our prospective science teachers. I know, from experience, the gratitude of science teachers in the field for assistance offered them. They are even tremendously encouraged by our demonstrated concern, represented

in merely visiting them at their schools to see how the task appears from their classrooms. The widely employed N.S.F. Institutes, beneficial as they are, do not answer the problem as I see it. We must maintain our relations with these teachers after they leave our campuses; these relations must be maintained on their own grounds, that is, with respect for their side of the science education complex. We college and university professors of the sciences, regardless of our academic or scholarly functions, must assume the leadership in all levels of science education. The developments of the past decade or two along the entire scientific spectrum makes it mandatory that we do not leave our job to be done by someone less aware of the direction, magnitude and implications of scientific thought and progress.

A Matter of Syntax

Would all scientists who write research reports or review articles in English kindly consider the syntactical dilemma represented by the following sentence:

We are investigating anaerobic bacteria (A B) from contaminated dermestids (C D) requiring exogenous factors (E F),

and its variant,

We are investigating A B requiring E F from C D.

The problem in the first version is, Is it the *bacteria* or the *dermestids* that require the *factors*? Similarly in the second, is it the *bacteria* or the *factors* that come from *dermestids*? A number of ways out of the dilemma may be considered:

1) Substantival adjective:

We are investigating contaminated-dermestid A B requiring E F.

This is a variant of German word order — from contaminated dermestid anaerobic bacteria but is not acceptable English.

2) Compound adjective:

. . . anaerobic, E-F-requiring bacteria from C D.

The compound adjective is clumsy. Accurate placement of hyphens is essential; note that we are dealing not with *exogenous factor-requiring bacteria* or with *exogenous-factor requiring bacteria*, but with *bacteria requiring exogenous factors*.

3) Parenthetical phrase:

a) . . . A B, requiring E F, from C D.

b) . . . A B (from C D) requiring E F.

In these versions the commas or parentheses are indispensable.

4) Two "which" clauses:

. . . A B, which were isolated from C D and which require E F.

Note that the "and" is indispensable here.

5) Two sentences:

. . . certain A B from C D. These bacteria all require E. F.

This is of course unambiguous.

Ralph A. Lewin

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(The above letter is reprinted in its entirety from the pages of SCIENCE, 1965, 147:3656, pp. 357-58.)