

Letters

Bias in Standardized Tests

Although I cannot agree with Wolfe's editorial (20 Dec. 1963, p. 1529) on multiple-choice testing, I think it served a useful purpose in opening up a subject which the scientific community must surely explore in the next year or two. One of the charges made against multiple-choice tests is that they have an inherent bias in favor of students who have a kind of uncaring and approximate facility; if this is true, the bias cannot be allowed for by inspired guesswork on the part of admissions officers, and will therefore tend to bias the choice that colleges make between students competing for admission. Another charge against these tests is that, regardless of how they should or should not be used by guidance counselors and admissions officers, they tend to distort the educational values of the students who take them, because there are certain valuable kinds of thought and sensitivity which cannot by any feats of ingenuity be embodied in multiple-choice questions. The scientific community should be particularly anxious about these two alleged faults of the tests, because the academic pathways controlled in large measure by these tests are the *only* paths a potential scientist can follow, whereas it is sometimes possible to make contributions in the arts after following other kinds of education and experience.

It seems to me that, instead of committing *Science* to a particular defensive position on these tests, it would be much more constructive to allow the magazine to function as a forum for serious but free discussion of the matter of which the excerpts from letters published in the 6 March issue constitute only the feeblest of beginnings.

One very important element in such a discussion would be the exploration of alternatives to multiple-choice testing. It is widely assumed that no economically feasible alternatives exist,

even though the Educational Testing Service itself has successfully constructed and administered an alternative kind of test in English which could be used in any other subject.

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Cover Recognition: A Parlor Game for Scientists

Recently I have utilized the *Science* cover pictures for an interesting parlor game—a type of *Science* Rorschach test. Before discarding an issue I detach the front cover and fasten the legend, cut from the index page, to the back of the picture. About 20 numbered pictures are used in the game, and these are graded from generally recognizable by any intelligent person to absolutely unrecognizable except to an expert in the specialized field. To play the game, the guests are provided with pencil and paper, and as the pictures are passed around they write down either a title or a description of what they think each one represents. After the participants have had an opportunity to record their findings, we call off the number of each picture and ask for their interpretations. Many times the answers are completely hilarious, and the shocked expressions when the actual legends are read to the audience add to the fun.

A psychologist friend who has played the game with us has borrowed a set of pictures for experimental use. He was particularly interested in the diversity of the responses to a single illustration and the varying degrees of frustration shown by a “scientifically oriented group” who on being tested found that they could not understand or interpret common objects in scientific areas only slightly removed from their own.

This interesting result from a simple

game of pictures should indicate to the editors of *Science* (which is read by a considerable cross section of the scientific community) the necessity for careful description of illustrations and figures. It is increasingly important that scientists in different fields begin to understand each other. This can be achieved by better explanations of highly technical nomenclature, technical terms, and scientific classification of animal or plant species.

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Why Science Loses Students

In his article “Career decisions of very able students” (12 June, p. 1315), Nichols observes that “the interest of able students in physical sciences and engineering has been decreasing . . . and . . . interest in the social sciences and humanities has been correspondingly increasing.” He admits to perplexity in trying to account for this phenomenon.

I should like to suggest that one factor might be the difference in pedagogical enthusiasm of today's college teachers in these two categories. While humanists and social scientists tend to see teaching as a facet of their professional activities from which they derive prestige and often valuable insights, too many physical scientists and engineers look upon the responsibilities of teaching as distracting chores offering little professional reward. Teaching for these men is always beneath and never quickly enough behind them.

Yet how often outstanding scientists were themselves once taught by outstanding teacher-scientists eager to communicate their own enthusiasm and dedication along with their knowledge and providing, in the process, the crucial experience in their students' careers. By contrast, today we are often content to replace mature professors with inexperienced graduate students in precisely those courses which offer a student his first real taste of the subject.

We must stop acting as if we believe scientists and engineers are born with a professional dedication developed enough to surmount all obstacles. When we fail to provide teachers genuinely committed to establishing that personal rapport which is the mark of the educational process at its best, we should not be surprised to find talented

young men and women responding to other teachers in other fields who believe sufficiently in the importance of their work to offer not only mind, but heart and spirit as well.

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Abelson's editorial "Science drop-outs" (26 June, p. 1535) presented the statistics to corroborate what has been apparent for some time in the classrooms on college campuses across the nation. . . .

Undoubtedly, poor graduate teaching assistants in beginning courses do make their unwholesome contributions to this malady, but it is difficult to place more than a very minor part of the blame on these people.

Faculty members who do little or no research (research can, by my definition, take various forms, including good literature review) are soon obsolete and stimulate no one. However, the strongly research-oriented faculty member who cannot spare the time from his research to meet his classes consistently, prepare or refine his lectures, attend his labs, compose fresh and stimulating examinations, or lower his lofty intellect to discuss and explain the all-important basic facts (upon which concepts are built, not vice versa) to the beginners is, I believe, much more the contributor to the science-dropout problem. Read the literature in nearly any field and see the pathetic results of research motivated by pressure for publication, prestige, promotion, and even fame. Much of this allegedly scientific literature is not only useless but so poorly written and based upon such inadequate research as to be just plain bunk. Take this product of poorly motivated and executed investigations and add to it the poor faculty classroom performance, and the sum is the high science-dropout rate. . . .

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It has been pointed out repeatedly that the liberal arts college (not related to a university) contributes more than its share of men and women who climb the ladder of success as scientists. One of the by-products of the National Merit Scholarship system is the channeling of an ever-increasing percentage of the top college prospects into a relatively small number of institutions of

higher learning, virtually all of them multipurpose universities, virtually all of them institutions graced by the presence of distinguished scientists who are deeply enmeshed in research and in the training of doctoral students.

The situation is not very much different with regard to graduate students. Here again, the national programs tend to bring ever larger numbers of the most deserving students into a few institutions where, not infrequently, they become "lost souls," frustrated and disappointed. Since, additionally, it is to a graduate student's advantage to be a research assistant rather than a teaching assistant, as he may thus embark upon dissertation research while being financially supported, the graduate assistant whom the undergraduate encounters is likely to communicate to him a sense of disillusionment, rarely a spirit of unbounded enthusiasm with the career upon which he has attempted to embark. . . . We would be doing our students a favor and we would be contributing significantly to the supply of future scientists if we were to encourage them to seek institutions of higher learning, whether undergraduate or graduate, where it is not only still possible but quite likely that they will find themselves exposed to enthusiastic teaching. This takes some very candid counseling, but it would be in all our best interests if there were more people who had the courage of candor.

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I think I want to take issue with the editorial. I'm not sure, because it isn't clear what Abelson (or Nichols in his article) includes in the concept of science. If he includes the social sciences, I would not disagree, but if he is referring to the physical and biological sciences as science, I would like to call attention to the fact that the problems which must be solved in the coming two or three decades are not in the physical-biological realm. The pressing problems are those dealing with the functioning of personality, interpersonal and intergroup relations, and national and world political problems and economic problems. The biological and physical sciences have, at least comparatively, already solved their problems, and those that remain are not especially pressing. Furthermore, the problems in the social sciences are more complex and their methodologies more difficult.

For these reasons, I see no cause for alarm if the physical sciences are not getting a majority of the top high school students. I don't know what proportion are electing sociology, psychology, anthropology, economics, and political science, but it is in these disciplines that the best minds of tomorrow are required.

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One very significant factor in the trend away from science and engineering among students already in college is that, administratively, such changes of program are generally not difficult, whereas changes in the opposite direction usually require a student to forfeit most of his previous academic career.

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New Textbooks on Old Subjects

Hoening's statement (3 July, p. 7) that the high cost of textbooks is caused by "the greed of publishers" who are not content to see only one book in existence on a given subject is not only unfair but is based upon a completely invalid premise. Since the production cost (hence selling price) of a volume is a function of the size and complexity of the manuscript, it costs the same to produce (sell) a book whether it is one of a kind or one of many.

A textbook has two justifications for its existence. One is that it covers completely fresh material, never before presented in book form. The other (and who is to say that it is less compelling?) is that the book, while covering standard material, offers a unique arrangement of the topics, is unusually clearly written, or in some other way benefits the teacher and makes learning easier for the student. Would every professor be content to teach his course in the same way for 20 years and to use the same textbook every year? The answer to this lies in the ready acceptance of new textbooks and in the existence of *authors who write new textbooks*.

For, as every publisher knows, it is not we who "talk faculty members into writing unneeded textbooks." In 99 out of 100 cases, it is the faculty member who takes the initiative, who de-