IS SCIENTIFIC ACHIEVEMENT A CORRELATE OF EFFECTIVE TEACHING PERFORMANCE?

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The purpose of this study was to test the hypothesis that in the context of a large health science center heavily committed to scientific activity, there would be a positive relationship between the scientific productivity of faculty members and their effectiveness as teachers. Counts of citations by others and counts of publications were used as indices of scientific productivity. The index of teaching effectiveness was derived from students' perceptions of teaching effectiveness, elicited in a questionnaire that asked students to rate teachers in terms of the presence or absence of a series of behaviors grouped under five headings called the Components of Effective Teaching.

The results of this study provide support to the notion that research and teaching are not separate and adversary phenomena each working to the disadvantage of the other, but under certain conditions are interrelated with research activity supportive of effective teaching.

At the university level the interaction of research and education is a complex phenomenon that has been described and interpreted in many different ways. A popular point of view sees the two in adversary roles competing for positions of priority and hence for resources. A consequence of this is the belief held by many university students, teachers, and administrators that research activity somehow detracts from effective teaching.

It may be assumed that in a faculty or institution heavily committed to scientific research and scholarship the opposite view would prevail. In this setting, it would be felt that scientific research would be a necessary prerequisite to effective teaching. The purpose of this study was, in the context of a large health sciences education center heavily committed to scientific activity, to determine whether in fact a positive relationship between scientific productivity and effective teaching could be observed.
The existing literature offers no support to the "adversary" hypothesis stated above but reports either no relationship between quality of teaching and research productivity (Voeks, 1962; Harry and Goldner, 1972) or positive relationships (Cohen et al., 1973; Bressler, 1968; Maslow and Zimmerman, 1956). Further supporting evidence is derived from a survey of teachers in 14 liberal arts colleges selected as outstanding by their colleagues and students (McGrath, 1962). Those teachers agreed that scholarship is a sine qua non of vital and stimulating teaching. In addition, slightly more than half of the science teachers in the sample believed that it was essential to be continuously engaged in original research to remain a good teacher.

METHOD

Two courses given by the Department of Physiology were used in this study. Both were at an advanced level and were given to third- and fourth-year Arts and Science students, respectively. The third-year course was described as "a lecture course in human physiology," and at the time of the study had an enrollment of 118. The fourth-year course was a specialized course in endocrinology entitled "functions of the endocrine glands and their regulations," and had an enrollment of 39. In the 1973 spring term, 15 instructors gave lectures in the third-year course and 10 in the fourth-year course.

The index of scientific productivity used in this study was derived from "Science Citation Index." Each instructor was assigned a score representing the total count of references by others to his or her published work during the years 1965–71. Since publications are indexed in "Science Citation Index" according to the first-named author, an initial search was made using the Source Index section to identify all papers in which the instructor's name appeared as a second or subsequent author. Citations by papers which included the cited author's name in his own list of authors (self-citations) were excluded.

Arguments against using such an index to estimate scientific achievements are 1) some publications of patently little scientific merit may achieve a high citation score, e.g., an attractive hypothesis which is easily disproved, or even a clever hoax; 2) important publications may not be recognized for several years; and 3) very high citation scores are found for publications describing a useful method or technique.

Arguments in favor of using a citation score include 1) the process is algorithmic and 2) the index has some validity as a measure of scientific achievement. In the decade 1961–71, 1.8 × 10^6 authors were listed in "Science Citation Index." Of these, 42,000 were cited at least 30 times in any one year, but only 2,100 were cited more than 1,000 times for the entire ten-year period. This list of 0.1% of all authors publishing in science, with one or two exceptions, contains all of the Nobel prizewinners in science from 1965–71 (Garfield, 1973). In a study of