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# Evaluating Contributions of University Professors

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## Abstract

Five segments have been proposed to describe the research contributions of a university professor. They are to: solve important problems pertinent to your area of expertise; disseminate information gained from research; develop extramural sources of funding for research; recruit and develop graduate students; and develop a service component that utilizes the knowledge and skills of the faculty member. Information is presented to aid in developing standards of performance for each segment. Job segments, relative importance of job segments, and standards for evaluating job segments should be known prior to an objective evaluation.

A major concern of college students enrolled in a new course is how the grade will be determined. Students want to know how much of their grade will be based on tests, quizzes, final exams, papers or presentations. Prior to tests, they want to know if the test will be true-false, multiple choice or essay. Straight forward answers to such questions develop a trust between instructor and students that helps motivate the student to learn. A basic assumption is that evaluation will be objective and that it will be impartial.

When the tables are turned, when university professors are being evaluated, expectations are the same. Proper evaluation can assist the development of a professor and improve performance (Kirkpatrick, 1982; Senge, 1990). Improper evaluation can cause a professor to become frustrated and resentful (Fisher, 1977).

Most appointments for university professors include expectations for research and teaching. The research component includes two missions. One is to add value by solving problems. Applied research is aimed at removing obstacles that have an immediate economic impact. Basic research is focused on answering questions that may not have immediate or foreseeable economic significance.

A second mission is to train future scientists. Graduate students must be guided in acquiring knowledge that is already known in a discipline. They must be coached in learning skills and procedures that will enable them to acquire new knowledge and make it available to others. Adviser assistance is usually needed in procuring their first position.

For classroom instruction, university professors develop learning objectives and provide them in a course syllabus. Students are evaluated on their ability to master these objectives. In a similar manner, job segments can be identified (Kirkpatrick, 1982) for research efforts. Such segments might be to:

1. Solve important problems pertinent to your area of expertise.
2. Disseminate information gained from research through journals, books and magazines and by presentations at meetings.
3. Develop extramural sources of funding to offset costs.
4. Recruit and develop graduate students.
5. Develop a service component by serving on appropriate committees and editorial boards.

Job segments and their relative importance within the academic unit should not be left to chance. They should be clearly presented by the evaluator (dean or chairperson) and understood by all of the faculty.

## Standards for Evaluation

All students in a class should be evaluated by the same standards, and all faculty in an academic unit should be evaluated by the same standards. Eight characteristics of effective standards of performance (Kirkpatrick, 1982) are:

1. based on the job and not the person(s) in the job.
2. achievable.
3. understood.
4. agreed on.
5. as specific and measurable as possible.
6. time-oriented.
7. written.
8. subject to change.

Standards of performance that relate to job segments can be developed for faculty engaged in research. Some administrators and faculty may avoid objective evaluations, labeling them "bean counting". However, researchers are bean counters by aptitude and training, because they evaluate and solve problems by counting and measuring. During evaluation, beans are always being counted to assess performance and distribute rewards. It is important that the evaluator dis-

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tinguish between a lima bean and a soybean and that the one being evaluated know what the criteria are.

## Evaluating Results

When estimating the value added by research, it is important to distinguish between activities and results (Raia, 1974). Planning research, writing grant proposals, conducting experiments and preparing manuscripts are examples of activities. Being awarded a grant, solving a research problem and publishing a journal article are examples of results. Standards of performance should focus on results rather than activities.

An objective tool has recently become available to aid the evaluation of a researcher's ability to solve important problems. The Citation Index provides a count of how often an author's research has been cited by other researchers and also by his own research group (Anonymous, 1993b; Garfield, 1992). Approximately half of published scientific articles are never cited, while a select few are cited hundreds of times. This form of counting permits an assessment of the impact of research. It can aid in discovering whose research in the academic world is establishing new paradigms. The genesis of a recent high-impact discovery has been documented (Mullis, 1990).

Other indicators are also available to assess the impact of a researcher's contributions. Some discoveries may be the basis for application in industry. Such discoveries may not result in a high citation rate but result in widespread industrial acceptance: they should be rated high in impact. Other discoveries can lead to patents: they become important, in terms of impact, only when the royalties exceed the expense of obtaining the patent.

## Dissemination of Information

Authorship of scientific publications is usually the main standard to estimate quantity of research. If this is done, the relative value of different types of publications should be stated. For certification purposes, the relative value assigned to different types of publications (Anonymous, 1993a) is as follows:

Research/review paper in peer-reviewed journal	1
Commercial books (>96 pages)	2
Book chapters	.8
Abstracts/posters at meetings or conference	.4
Case report	.3

Concerns have been expressed about the importance that is sometimes attached to numbers of publications. Reviews of an individual for promotion and tenure, for a grant proposal, or for recognition are often greatly influenced by numbers of publications. A desire to expand the publication list leads to questionable practices. One has been a significant increase in number of authors per journal article (Ben-Shlomo and Goodman, 1988). A way to deflate authorship numbers is to assign a fractional value to each author of a

publication. This could be done by having each author included on a publication evaluate the contribution of all authors. An average of these values can be used to credit each individual. For a peer-reviewed journal article, each author would receive a fraction of 1. This procedure is recommended for evaluating student group projects and should also work equally well for faculty group projects. Deflating the number of publications provides an equitable basis for comparing research and other types of scholarship (Boyer, 1990).

## Ability to Develop Funding

Research is expensive. Minimum costs include the salary and fringe benefits of the researcher. Almost certainly there will be additional personnel costs for secretarial and technical assistance. Properly equipping a laboratory for some types of research is a major expense. Ongoing research consumes supplies and services which may be very expensive.

Money for research activities may come from intramural or extramural sources (Ruttan, 1982). Intramural funds, mostly from tax sources, are received by the institution and distributed to support research. They typically support the barest essentials of a research program. Some researchers are able to solve problems and add to knowledge with only a meager budget, while others require a much larger budget. Those who require additional funds to conduct research usually must acquire them from extramural funds. Competitive grants from government agencies supply most of this money, but lesser amounts are received from business and industry and other private sources.

The ideal situation for an institution is to be affiliated with a researcher who can attract enough extramural funds to pay all costs of research. To determine the costs incurred by each researcher, a system of record keeping is required. Costs of personnel, equipment, supplies and space must be determined. The ability of a researcher to offset these costs with extramural funds can be determined. In this manner a researcher can be compared to his peers for efficiency of using funds. One who expends a lot of intramural funds receives a low rating and vice versa.

The researcher then has choices. Spending more time to attract extramural funds may detract from excelling in other job segments. Building a larger research program will cost more than building a smaller one. The researcher must make choices about the combination of effort and money that will result in a most advantageous evaluation. For the evaluator and researcher, this part of the evaluation adds the dimension of accountability for the use of financial resources.

## Contributions to Graduate Education

Developing the next generation of advanced degree holders is also a mission of researchers that should be evaluated on the basis of quantity and quality. The adviser is important in guiding a student through the transition from an undergraduate student to an advanced degree holder. Many undergraduates are passive consumers of information. As they de-

velop during graduate study they become producers of information. The adviser needs to provide individual attention so that the student can succeed in his/her academic program, can contribute to projects within the academic unit, and can learn the process of solving problems.

The ability to recruit well-qualified students is an important attribute of a researcher. A student with a good academic background, good intellectual abilities and good people skills can quickly make contributions within the academic unit. Students with deficiencies in one or more of these areas take longer to develop to the point where they are net contributors to the system. More adviser effort is required to assist the progress.

Another characteristic of a good adviser is the ability and willingness to develop the talent a student has. Students should not be accepted for graduate study if they do not appear capable of completing a degree. However, once accepted, the student should receive appropriate advice and encouragement that will enhance the probability of successfully completing a degree.

The adviser can also be judged on the success of former students. If quality students enter a quality graduate program, receive quality advising, and enter a job market that has a scarcity of people, chances for career success are very high. If one or more of those conditions is less than optimal, chances for career success decrease. The adviser can have an important influence during the period of graduate study and in the assistance to acquire a first position. Some of the success of former students should rightfully be attributed to the adviser.

### Evaluating Service

A portion of the evaluation should be based on service activities. There are tasks in organizations that may benefit others more than the one who completes the job. These contributions tend to be overlooked or undervalued in the process of evaluation (Nieto and Henderson, 1994). If such tasks are evenly distributed, then no one is burdened. If some fail to do their fair share, others may accept more than their fair share in order to accomplish what is needed.

The researcher should be informed of the relative value attributed to various service activities. How does the importance of chairing the graduate studies committee in the unit compare to serving as a reviewer for a journal? What about responsibility for organizing sessions at national meetings or specialized conferences? Should one serve as a section editor or editor of a journal? How important is it to become an officer of a national or international organization? How does each compare to authorship of a journal article?

Service activities that require more time and have more responsibility require more planning. If the scientist has the desire, does the evaluator encourage such a commitment? If so, years of development and participation are usually needed before achieving such an end.

Just as in the other areas of evaluation, an individual's service performance may range from outstanding to poor. Standards for service should have dimensions for quality and quantity.

### Defining Expectations

Differences of opinion exist, and are often strongly defended, about job segments to be evaluated, standards of performance to be used in evaluating each segment, and relative weight assigned to each segment. The fairest way is to develop a common understanding before evaluation. Depending on the evaluator, this can be done by an autocratic or democratic process. A generic description of the academic unit's research mission should be formulated, broken into job segments, and standards of performance developed—all of which should be written and distributed to each individual. After an index or scorecard is developed, the research contributions of each individual should be compared to the standard. Only the exceptional individual will excel in all segments; however, all should know the academic unit's standards of performance, and all should be compared impartially to those standards.

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