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Possible Indicators of Research Quality for Colleges and Universities

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Abstract:

The move toward more public accountability of institutions of higher education has focused primarily on undergraduate education. Yet, many institutions view research as an important component of their mission. Much of the literature on assessing research quality has relied on quantitative measures such as level of outside funding and number of publications generated. Focus groups consisting of research faculty were conducted at a landgrant university. Faculty were asked to evaluate current indicators of research quality as well as to suggest additional measures. While faculty recognized the need for the traditional measures, they cautioned against over-reliance on these indicators. Additional indicators focusing on graduate education as well as external peer reviews were recommended. Developing indicators that provide evidence of long-term impact on social and scientific advancement was suggested.

The public desire for accountability of programs at institutions of higher education has contributed greatly to the assessment movement in higher education. Regional accrediting associations (e.g., Middle States, New England, North Central, Northwest, Southern and Western) expect colleges and universities to demonstrate their institutional effectiveness through an ongoing program of self-examination.

Considerable work in the area of assessing the undergraduate teaching mission has led to a growing body of literature (e.g., Astin, 1985, 1991; Bogue & Saunders, 1992; Erwin, 1991; Ewell, 1983). Less attention has been directed toward other aspects of an institution's mission including research. Adding to the body of knowledge by engaging in research and related scholarly activities is an important component of the mission for many institutions especially those with graduate programs or a substantial level of external research funding. The development of effective assessment programs for the research mission is in its early stages. A good assessment program should include quality indicators that are acceptable to the academic community.

Review of the Literature on Research Productivity

The role of research in a university environment must not be underestimated. As Dill (1986) points out, the vast majority of discoveries are made in a higher education environment. In recent years the emphasis for research universities seems to be focused on productivity. The system used by the Carnegie Foundation (1987) to classify colleges and universities, uses a measure of dollars generated by research and number of Ph.D. degrees granted as the major method of classifying institutions into categories. Additionally, the National Science Foundation annually ranks institutions based on Total and Federally Financed Research and Development Expenditures. In each of these cases, "more" is interpreted to mean "better." The research produced by those ranked higher is considered to be of better quality than that produced by those who are ranked lower.

The issue of "quality" in research has been a topic of great debate on university campuses, but it has produced very little in the way of literature which identifies the meaning of the term as it applies specifically to research. Several indicators have been identified as being useful in determining the quality of research programs. Among those are the number of dollars generated, number of publications, number of citations, and peer review (Kogan, 1989).

Productivity Dollars. Snyder et al. (1991) focused on aspects of strategic management to determine factors which were equated with research excellence. They selected a sample of institutions from the top 100 in the previously mentioned National Science Foundation rankings. The implication is that if an institution is ranked highly then excellence in research is the reason. Their finding that the number of dollars generated by research was the most often cited measurement of success should come as no surprise. They also found that while most of those surveyed could identify factors, such as dollars, which were used to measure the success of the research program, "it was not clear whether or not these factors were selected consciously as factors necessary for the attainment of objectives, or because they were the easiest factors to measure" (Snyder, et al., 1991, p. 52). Directly related is their finding that "Those universities that are ranked higher, have faculty that are adept at obtaining research grants" (p. 55). The emphasis on dollars is further illustrated by Archambault (1989) who identifies the need for quality in research but points out that, in addition, it must be "profitable."

Productivity Publications. With the emphasis on productivity, the number of publications is frequently used as an indicator of quality in research. The fact that the research is published is taken as an indication of its quality. This indicator is often further categorized and weighted by identifying the type of publication (book or research article) and if it is an article, the type of journal (refereed or non-refereed). Although it is a good indicator of how prolific the researcher or the department is in producing acceptable articles it does not address the impact of those articles. A study conducted by Moed, et al. (1989) attempted to make a distinction between what they saw as "output" (the number of publications) and the "impact" of those publications. The impact was determined by checking citations of the articles over a period of years. Their determination was that one should use caution in adopting such indicators because "Citation practices appear to differ significantly from field to field" and "Citation practices within fields

can also change during the decade" (p. 190).

Peer Evaluation. Peer evaluations of research and research programs are often cited as a method to insure the quality of the research efforts. The objective of such a review is to assemble a group of peers to review the research efforts and make a determination of the quality of those efforts. Studies conducted by Henkel (1989) list several of the concerns related to the peer review process which are often heard on a university campus. One of the concerns focuses on the idea that "group judgements of scientific quality were thought to be insufficiently acknowledged" (p. 179). The implication here is that the visiting group does not fully understand the work of the unit or individual being reviewed. These concerns are even greater when the work is multidisciplinary or covers a wide span of interest.

An additional concern also noted by Henkel (1989) is that "Scientists do not feel they belong to a republic of equal citizens" (p. 179). This perception does not readily lend itself to being reviewed. The more diverse the span of focus, the greater this concern becomes.

These concerns associated with the normal methods of determining quality in research, coupled with the pressures from our regional accrediting body, the Southern Association of Colleges and Schools (SACS), and our state Commission on Higher Education (CHE) require a closer look at how quality of research is determined. Since most of the concerns associated with how research quality is determined originate with faculty, our intent is to use those faculty, through focus groups, to identify their concerns and develop other indicators which might be more appropriate.

Assessment of Research Programs at Clemson University

Clemson University is a state-assisted, coeducational land grant university located in the northwest corner of South Carolina. The Fall 1992 enrollment included 13,197 undergraduates and 4,263 graduates. The University has nine colleges and awards bachelor's degrees in 72 programs, master's degrees in 68 programs and doctor's degrees in 34 programs. Historically, its mission has emphasized the agricultural and engineering programs.

In response to SACS requirements and state requirements on assessment, Clemson requires each of its academic departments with a research mission to have an action plan in place to evaluate its progress in the area of research and related scholarly activities. The action plan is a two- to three-page document outlining the departmental mission and expected results in the area of research. Each department is expected to include outcome measures that would demonstrate the success of the department in meeting its research goals. Narrative reports based on the plan are expected every three years.

These action plans were submitted during the 1990-91 academic year. It was clear at that time that faculty were struggling with the process of developing indicators to assess the progress of the department regarding its research mission. A variety of indicators were proposed to assess research. These indicators were grouped into one of four categories, productivity, departmental commitment to research, faculty participation, and awards and expenditures. Table 1 lists the percentage of departments listing indicators from these categories.

Table 1

Percent of Clemson University Departments Listing Indicators from Four Categories of Research Activities

<i>Category or Indicator</i>	<i>Percent of Departments</i>
Productivity Measures	100

(Journal publications	100)
(Conference presentations	78)
Authored or edited books	27
Faculty Participation in Research	41
Departmental Commitment to Research	30
Awards & Expenditures	35

Productivity indicators include journal publications, conference presentations, artistic exhibits and performances, and authored or edited books. All departments included one or more indicators from this category. Fewer departments listed indicators in the other three categories. Departmental Commitment focused on the level of departmental resources devoted to research. These indicators included the level of faculty release time for research, the level of financial resources devoted to research (e.g., equipment expenditures, space allocation, computer time), number of graduate students in the program, and level of faculty involvement in supervising graduate research. These indicators are clearly more process than outcome oriented. Faculty Participation which was listed by more than a third of the departments included the number of proposals submitted by faculty, level of faculty involvement in professional organizations, and number of faculty on sabbatical or involved in an exchange program. The category of Awards and Expenditures included level of sponsored research from grants and contracts, level of funding for graduate students, and the number of faculty receiving professional awards.

While a number of these indicators are consistent with those cited in the literature on academic research, we sensed a frustration on the part of our faculty with the adequacy of these indicators to represent completely the research activities at Clemson. At the same time, there was a concern voiced by the faculty that the University might opt for the easiest method of reporting research activity by solely providing quantitative measures that do not necessarily reflect research quality. The listings of the number of research publications and dollar level of external funding were most often mentioned. In fact, the first report to the state focused on quantitative measures that were readily available. In the most recent report the University included a measure of student participation in research, both sponsored and unsponsored.

Given the uneasiness faculty were expressing with these action plans in research, the Office of Assessment and the University Assessment Committee endorsed this project which was designed to elicit faculty input at a broader level regarding assessment of research. Rather than developing and distributing a campus-wide questionnaire, we decided to bring groups of faculty together for discussion on assessment of research. Focus groups were conducted to answer questions faculty may have about the assessment program itself as well as to have the faculty brainstorm about additional indicators that might be developed and used to assess research at Clemson.

Method

Focus Groups

Four focus groups were conducted during the Spring and Fall of 1992. Groups consisted of 6 to 10 faculty members along with the two authors who served as facilitators. Faculty elected to the University Faculty Senate who served on the Senate's Research Committee participated in one focus group. Collegiate Deans nominated two individuals from their colleges, who were respected by their peers as researchers, to serve in the other focus groups. Eighteen of the 20 faculty nominated attended one of the groups. An additional faculty member who serves on the

University Assessment Committee also participated.

Procedure

Each focus group lasted approximately one hour. Following an introduction of all participants, the authors described the purpose of the focus groups which was to solicit their opinions regarding evaluation of research at a departmental level. The focus on departmental productivity rather than individual productivity was stressed. Then a series of four questions were presented, one at a time. The questions were:

1. Currently, how would your department head report the overall quality of research in your department?
2. Where do you feel faculty within your department would feel dissatisfied with that type of report?
3. What could be offered as indicators to improve that type of report?
4. What do you see as the distinguishing characteristics of quality research within your discipline?

Each question was shown on an overhead projector and comments were recorded on the overhead as the discussion proceeded. One of the authors also took notes during the sessions. The results are based on a compilation of both the comments on the overheads and the notes that were recorded.

Results

The first two questions asked the faculty to describe how quality of research would be reported in their department currently, and with what aspects of that report they feel faculty would express dissatisfaction. There was considerable consistency among the groups in terms of their responses. Table 2 lists the primary indicators of quality research that faculty feel their departments are currently using. As one would expect at a research university, publications and grantsmanship were the two main areas of focus. Within each area, however, the faculty made a number of distinctions and expressed reservations they held concerning the misinterpretation or over-reliance on various indicators.

Table 2

Frequently Mentioned Quality Indicators Currently Used by Departments for Reporting Research Activities

Research Publications:

Number of publications (in some cases, ratio per faculty member)
Types of publications (journal articles, monographs, chapters, books)
Quality of publication

- Reputation of publication in discipline
- Distribution of publication (e.g., regional, national, international)
- Refereed vs. non-refereed journals
- Invited chapters or papers

Citation statistics of research publications (number of citations as well as who is citing the work and the frequency of citation)

Research Grants & External Funding:

Number of grants submitted and funded
Competitiveness of grant process
Reputation of granting agency (e.g. NSF)
Total dollars generated
Granting agency response to grant reports (i.e., satisfaction with work)
Success rate of grant renewals

Other Indicators:

Papers presented at conferences and professional meetings

- Number of papers presented
- Quality of conference

External research awards, fellowships, and recognitions of faculty
External and peer reviews of research programs
Creative and scientific research "products" (e.g., art exhibitions, patents, new research applications and methods)
Amount and quality of interdisciplinary research including collaboration as well as consultative support
Proportion of graduate students who complete terminal degree as well as level of graduate funding for research
Number of completed research projects
Customer satisfaction with research product

A concern expressed with using research publications as an indicator of research quality was the temptation to overemphasize the number of publications generated. They perceive that the development of and striving to maintain (or exceed) a departmental publication:faculty ratio could lead to a reduction in the quality of research programs as emphasis shifts to increasing the number of manuscripts submitted. Measuring quality not quantity was a major recommendation from the faculty. They also felt that the ranking of the quality of journals could be somewhat subjective. Some faculty also felt there needed to be a place for scholarly research publications that are not in refereed journals. Lastly, they felt there could be difficulty in judging the quality of interdisciplinary and multidisciplinary research. Determining the contributions to one's discipline was perceived as more difficult when the research includes investigators and studies from multiple disciplines.

The highest level of concern was expressed regarding the use of funding indicators. While the faculty agreed funding of research was an appropriate indicator, the temptation to use funding as the primary

indicator of research quality needed to be avoided. The fact that funding is not only related to the quality of the research proposal and the investigators but also the topic, the existence of a graduate program, and dollars available from the agency makes the use of funding as a sole indicator suspect. Faculty were also concerned that research that generates indirect costs for the institution would be perceived as higher quality research when that is not necessarily the case.

The listing of other quality indicators is in response to the participants' opinions that judging research quality is more than counting the number of publications or amount of funding generated. Faculty expressed a desire to avoid using easily accessible quantitative indicators as the only measures of research quality. They sense that overuse of quantitative measures may be occurring now. They also felt additional indicators were needed as research becomes more of a collaborative effort with investigators from different disciplines.

When the third question was presented, faculty offered several new indicators of research quality. The more frequently mentioned indicators are shown in Table 3. A number of responses focused on graduate education. A close relationship between graduate education and research and scholarly activity is assumed in research universities offering terminal degrees. Within each focus group, faculty recommended quality indicators that are based on the progress of graduate students while they are at Clemson as well as where they go and what they do once they complete their graduate education. Graduate students coauthoring papers and making presentations are viewed as positive indicators of research quality. Placement of graduate students into appropriate career positions at prestigious institutions was also cited as an important indicator of research quality.

Table 3

Additional Quality Indicators of Research Productivity Recommended by the Focus Groups

Indicators Related to Graduate Education

Graduate student placement:

- Quality of institutions that hire graduate students
- Proportion of graduate students receiving graduate degrees
- Salary information and job titles of graduate students after completing program

Graduate student participation in research:

- Coauthorship on publications
- Paper presentations at conferences or professional meetings
- External graduate awards for research

External Reviews:

- External evaluations by professional organizations
- Granting agency editor's review of program
- External peer reviews of research program

Other Indicators:

- Evidence of research having a societal benefit or impact
- < Evidence of long-term peer use of research findings
- Undergraduate involvement in research
- Departmental faculty serving as peer reviewers or journal editors
- Election of departmental faculty to reputable positions due to recognition of scholarly activities
- Evidence of ongoing, sustained research programs by individual departmental faculty

Many of the faculty felt comfortable with some type of external review of the research program if it were conducted by peers or professional organizations within the discipline. The exact form of such a review varied from sending representative publications to peers for their evaluation to inviting a team of peers to campus for a review. Most faculty felt such reviews should be done regularly every several years.

Among the other indicators were several that could be viewed as long-term outcome measures. These include evidence that the research has had a benefit or application in society or that the research has had a long-term impact in the discipline. The activities of departmental faculty as reviewers of grants or editors of journals were considered a positive indicator of research quality as well as faculty being elected to positions within professional organizations. One faculty member suggested that the concept of renewable tenure (and faculty being able to secure a renewed term of tenure) would be evidence of a quality research program.

The fourth question asked faculty to identify the distinguishing characteristics of quality research programs within their discipline. Many of the responses included items listed in Table 2 that were given in response to Question 3. Quality research programs were associated with individuals within the programs. Reference was made to departments that have "stars," top faculty, well-rounded and well-respected individuals. These individuals were viewed as having established a reputation for consistently high quality research. Their publications are often found in the top journals within the discipline. These individuals are also sought by others for collaborative work, whether it be with other academic institutions or industry.

The quality of the graduate programs at these institutions was also viewed as an important component of high quality. They attract the best undergraduates into their programs (selective admission), involve graduate students in research, and produce graduate students who establish a reputation for themselves within the discipline. Some faculty felt that the top programs were associated with considerable support in terms of funded faculty chairs, lower teaching loads, and superior facilities and equipment. However, in at least one focus group, several faculty felt that in their discipline some of the top programs are not characterized by such levels of support.

Discussion

The process of conducting focus groups with faculty validated the use of many of the current quality indicators and also provided some additional indicators for departmental consideration. Faculty in the focus groups mentioned most of the indicators that have been listed in departmental assessment plans. A comparison of Table 1 which is based on the assessment plans with Table 2 which lists the frequently cited indicators by faculty reveals a high degree of similarity.

Faculty believe that two of the major areas of research quality include publication of research findings and grantsmanship. Within each, however, they were careful to note that multiple measures exist, some of which may not apply across all disciplines. This is a point noted by Moed, et al. (1989). The quality of the publication was an important consideration for faculty. Quality might be defined in a variety of ways including the reputation of the journal within the discipline as well as whether it is refereed or not. The faculty also emphasized the impact of the publications. Citations in other work and evidence that previous research has had a significant impact in the discipline were given as possible indicators. This finding is also consistent with the report by Moed, et al. Our faculty also noted some concerns about simply counting citations. They emphasized the value of research that is cited over an extended period of time.

The discussion on grantsmanship centered more on the grants themselves rather than the level of external funding. Faculty attached more significance to the competitiveness of the grant, the reputation and prestige of the granting agency and the outcome of the grant rather than the dollars required to fund the grant.

A major concern of the faculty was the temptation to emphasize the easily quantifiable measures possible associated within these two areas. This concern echoes comments in Snyder, et al. (1991). Relying on simple statistics such as the number of publications written per faculty member or the number of dollars

generated per faculty might distort the true research quality within the department. While the faculty recognized the importance of including measures involving dissemination of research findings and levels of external support, they felt other indicators were also appropriate.

The faculty suggested the inclusion of indicators based on graduate education as well as possible external peer reviews. The importance of success in the graduate program as a quality indicator of research surfaced twice. The faculty included measures of graduate student success when describing distinguishing characteristics of top research programs within their discipline. They also listed specific indicators involving graduate education that they felt should be part of their departmental plans. Most of the discussion centered on the accomplishments of their graduate students while in the program and after they receive their terminal degree. Prestigious institutions were likely to show graduate participation in research publications and presentations and would be more likely to acquire attractive academic and industry positions upon graduation.

The faculty seemed amenable to external reviews as long as they were conducted by peers within their discipline. Faculty felt the best evaluators would be individuals familiar with the research process within their particular disciplines. In some instances, they felt an external review process already exists when competing for external grants.

Faculty proposals for possible inclusion of indicators based on graduate education and external reviews are one of the major findings of this study. The recognition by faculty that education and research are closely related argues somewhat against the popular view that research activities detract from teaching. While the focus here has been on graduate education, several faculty did mention the importance of undergraduate participation in research when appropriate. Including measures of graduate education when describing research activities is one way institutions can educate the general public on the relationship of research and education. Students have noted that they value the contacts with faculty outside of the traditional classroom environment (Light, 1990). Including indicators of graduate (and undergraduate) student involvement when assessing the quality of the research program would be a statement of the importance the department places on education as part of the research process.

Faculty concern about external reviews as part of the assessment process is not new (e.g., Henkel, 1989). Within the research endeavor, however, external reviews are a common and expected component. Faculty submit their publications and grant proposals for external reviews. It appears that they would value external reviews of departmental programs also as long as they are conducted by knowledgeable individuals. In most instances, they feel comfortable with reviews by peers or professional organizations within their discipline.

We were pleased with this process for several reasons. First, the use of focus groups enabled the Office of Assessment to develop a list of indicators of research quality that will be provided to departments. The list is intended to aid departments as they revise their assessment plans. None of the indicators will be required. Instead, the faculty will be encouraged to review the list to identify those that they feel would best measure their progress toward the departmental research mission. The institution as well as faculty in the focus groups recognized the fact that departments vary in terms of their maturity as research units and research goals and that not all indicators were appropriate for all departments.

Second, the use of focus groups allowed for more detailed input on some indicators than would have been possible with the use of a questionnaire. Faculty were able to express their views and outline their concerns fairly easily. Consensus on many of the indicators was obvious. Being able to identify acceptance of some indicators would have been more difficult if a written questionnaire had been used.

Third, the discussion during the focus groups outlined areas where the institution needs to improve communication about the assessment process itself and also identified areas for further study. We found that faculty had some difficulty separating evaluation of an individual's research accomplishments from the assessment of a department's success in meeting its research goals. On several occasions, discussions shifted from reporting departmental progress to measuring the individual faculty member's ability to meet tenure and promotion requirements. The institution will need to continue to explain the purpose of program assessment to the faculty.

We also may have identified a potential problem in assessing research quality as multidisciplinary

research increases. Many of the current and proposed indicators rely on evaluation by knowledgeable peers. Consistent with Henkel's (1989) findings, faculty involved in multidisciplinary research recognized the difficulty in using some of these indicators when judging research that does not fit neatly into one discipline. Identifying "peers" may be difficult for some research projects. While faculty voiced these concerns, no solution was apparent. The short-term solution seems to involve identifying individuals with the breadth to evaluate particular multidisciplinary efforts. As multidisciplinary work increases, this solution may work in that faculty will be able to identify peers who possess the requisite knowledge and expertise for such evaluations.

Lastly, we were pleasantly surprised as the discussions within the focus groups developed. The participants appeared to enjoy the opportunity to interact with colleagues from different disciplines across the campus. The composition of the focus groups was intentionally heterogeneous. One group, for instance, included faculty from engineering, visual arts, accounting, nursing, chemistry and the library. The faculty were very accepting of the variety of research and scholarly endeavors represented by various disciplines. Faculty recognized that the wide variety of such activities precluded the adoption of a standard set of indicators across the institution.

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