

Assessing costs and benefits in NSF educational grants

Frank Quinn, January 2000

Summary:

It may be time for the educational research enterprise to mature into an investigation of what is practical, rather than just what is possible. In particular, educational grants from the NSF require extensive assessment of educational outcomes but little or no assessment of costs, particularly in faculty time. This omission makes it difficult to determine cost/benefit effectiveness, or to assess feasibility of incorporating techniques into the regular curriculum. Are these wonderful new techniques too expensive to be sustainable in real life? The most urgent current needs are in high-volume low-level courses with tight and inflexible budgets, where the cost issue is crucial.

Resource Limits:

- The clear message from parents, deans, and taxpayers is that resources provided for education will be flat or decline.
- Expensive programs with better outcomes do not attract more support, but rhetoric about “doing more with less.”
- This does not mean that we cannot investigate resource-intensive educational methods. It does mean that we must be realistically aware of their costs, since they must be paid for by shifting resources from other programs or through other tradeoffs, eg. lower-salaried instructors.

Faculty Time:

- The most important costs in educational programs are faculty time.
- Hardware, software, facilities, etc. can usually be counted as startup costs; amortized over several courses; or paid for from other budgets.
- Personnel costs are ongoing, cannot be hidden or shifted to other budgets, and account for nearly all the marginal cost of an additional student.
- Faculty time should be measured in faculty hours per student credit hour (hr/sc).
- In the end the units visible to parents, deans, and taxpayers, are dollars per student credit hour. This translates to faculty time through salary budgets. It is therefore important to distinguish between faculty levels with different expertise and salaries: we distinguish
 - research faculty (half-time teaching assignments);
 - instructional faculty (full-time teachers);
 - adjunct faculty (graduate students or others paid by the course); and
 - “helpers”, others, often undergraduates, used for grading, tutoring, or other non-instructional assistance.
- Dollars are not directly useful measures of cost. The fact that one research-faculty hour has the same dollar cost as 10 to 20 helper hours is important in balancing budgets and making tradeoffs. However they are not interchangeable in terms of what they do, so the distinction is important.

Time Budgets:

- Low-level math courses typically have a time budget of 1 research-faculty hour per student credit hour (hr/sc).
- This includes everything: preparing lectures, materials and tests; lecturing; grading; course administration; and office hours. It is nearly impossible to do all this within the budget, even with large classes and minimal preparation.
- This figure is obtained by dividing faculty size by number of students, weighted somewhat to reflect greater time requirements for advanced courses.
- Some institutions have substantially lower budgets for their lowest-level courses, sometimes in the range of 1/4 research-faculty hr/sc.
- This time budget assumes a 40 hour work week, spent half time on instruction (a research assignment). A more attractive figure can be obtained by assuming a longer work week, or what amounts to the same thing, less time spent on research. The research mission of the NSF will be best served by not inflating this number.

Tradeoffs:

- The standard time budget was developed years ago when routine lecturing, less testing, and higher failure rates were the norm. Expectations have risen but resources have not. This has required various tradeoffs.
- Some departments stick with research faculty but run their teaching over-budget in terms of time required. In many instances it is clear that this extra time has come from the research effort.
- Some departments leverage research-faculty time by having huge lecture sections with helpers grading papers. Most agree this is unsatisfactory in terms of educational outcomes, but there are almost no alternatives with the same time budgets.
- Many departments use instructional or adjunct faculty, or graduate students, for low-level courses. 1 research-faculty hour costs about the same as 4 instructional faculty hours, or 8 adjunct hours. A tight 1 research-faculty hr/sc budget translates to a comfortable 4 instructional hr/sc, or more frequently a ridiculous 1/4 research hr/sc budget translates to a tight 1 instructional hr/sc, or a workable 2 adjunct hr/sc.
- Time-intensive teaching methods drive the transition to instructional and adjunct faculty.

Conclusions:

- Costs, as well as educational benefits, should be assessed in new programs.
- The primary measures of cost should be faculty hours per student credit hour, separated by level of expertise (and salary).
- Assessment itself is expensive, and its cost should be assessed separately.
- Inherently expensive teaching methods do have a place and should continue to be developed. Thus while costs should be tracked, high costs should not automatically discredit a program.
- The greatest need for new methods is in low-budget situations: something that works better than lectures with 500 students, and can actually be used because it does not cost more. Such methods will always compare unfavorably with expensive methods in terms of educational outcomes. As a result, lack of cost accounting will make it impossible to address this need.