also interested in the $60 billion market in corporate education that has burgeoned in recent years. Models developed at the undergraduate level can readily be adapted to tap this vast potential revenue source by helping to create efficient and effective continuous learning environments.

Studio Courses

One of the key innovations adopted at Rensselaer as part of its reform efforts has been the introduction of studio courses to replace large, introductory, lecture-based courses in science and engineering. Studio courses apply an integrated, multidisciplinary approach and incorporate technology to create a better learning environment for students and a better teaching environment for faculty. The courses are designed to bring the interaction often found in small-enrollment classes to large introductory classes. Lecture, recitation, and laboratory are combined into one facility, the studio—capable of accommodating all three teaching methods—where the faculty conducts hands-on interactive learning sessions. While the courses use advanced-function computing technology and tools, they actually are quite structured; their pace is determined by the faculty rather than by student participants.

To a certain extent, the studio format is designed to transfer some responsibility from the faculty to the student. The focus is on student problem solving and projects, not on presentation of materials. The emphasis is on learning rather than teaching.

Responsible stewardship of student and faculty time and resources is reflected in the reduction from six contact hours in the traditional course to four hours in the studio course. Evaluations demonstrate that students learn material better and faster despite the one-third reduction in contact hours. For large introductory courses, cost savings have been estimated as ranging from $12,000 for mathematics courses to over $100,000 for physics courses each time they are taught.

Going the Distance: The Virtual Studio

The challenge now is to progress beyond traditional modes of distance learning to providing the distance learner with as much of the studio experience as possible. In this model of interactive multimedia learning, one creates a virtual studio with students connected over a network that carries data, voice, and video to the students' computers. Each student has access to multimedia materials created for the course and delivered from CD-Rom or via the network. A careful balance must be struck between synchronous and asynchronous activity, adjusted to suit each course and audience.

Conclusion

In the future, universities will differentiate themselves based upon their audience and core expertise. Some will endeavor to become brand name institutions that will deliver outstanding educational experiences with high perceived value in particular areas of core expertise. Others will provide broad access to a commodity-style education at competitive costs.

A continuous learning system will evolve, in which the education of 18- to 21-year-olds in cloistered surroundings will be one small part—real growth will come in providing educational opportunities in the workplace and home. All institutions will be affected by the profound changes in teaching and learning being wrought by advances in information technology. ■

Quality Assurance Management

Grant Harman

Grant Harman is professor of educational management at the University of New England. Address: School of Administration and Training, University of New England, Armidale NSW 2351 Australia. Fax: 61 02 6773363. Email: <gharman@metz.une.edu.au>.

A review of recent international practice in the management of quality assurance shows tremendous variety in approaches and methodologies, providing a wide range of possible models for both systems and institutions.

Administrative Responsibility

The most common patterns at the national level are for responsibility to lie with specialized units or agencies set up by the government or for responsibility to be given to the central agency responsible for higher education coordination, whether it be a ministry of higher education or a university grants commission. One of the major issues concerning government agencies responsible for quality assurance relates to the degree of independence they should have from both ministers and major ministries and departments.

In a small number of countries, responsibility at the national level is under the control of an agency set up by higher education institutions. Similarly, within higher education systems, arrangements differ widely. Sometimes presidents or rectors take responsibility, while in other cases responsibility lies with an academic council or board.

Participation in the Program

An important variation between quality-assurance systems is whether participation is voluntary or compulsory. Many countries began with institutional audits, on a voluntary basis. Thus, in Britain, the institutional audits run by the Academic Audit Unit (AAU) were voluntary, and the Research Assessment Exercise run by the Higher Education

Funding Council of England for the funding councils continues to be based on the principle of voluntary participation. Generally, however, with national reviews of disciplines, participation is compulsory. Even when participation in such reviews is voluntary, strong moral and professional pressures often operate on institutions.

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Methodologies

Most quality-assurance mechanisms depend on one or a combination of a limited number of key methodologies, the most important of which are: self-studies or self-evaluation; peer review by panels of experts, usually involving at least some "external" members; the use of relevant statistical information and performance indicators; and surveys of key groups, such as students, graduates, and employers.

Self-studies have proved both effective and cost-efficient, achieving a high degree of ownership since key staff are heavily involved and such involvement increases the chances of improvement being achieved. On the other hand, experience points to the value of combining self-study with some element of external peer review to ensure that the self-study is taken seriously and to bring in outside perspectives.

Peer review by outside experts is a well-established academic process and generally works well, as long as panel members show respect for the values of those being evaluated and accept that often a panel's main contribution is in assisting with self-learning. At the same time, peer review can easily introduce outside values and constructs.

External reporting often is thought necessary not only to ensure accountability requirements but also to ensure that a review process is taken seriously. A crucial question, however, is to whom reports should go, and how widely and publicly they should be distributed.

Focus

At the national level, the most common forms of assessment are "horizontal" reviews of disciplines and "vertical" evaluations of institutions. Reviews of disciplines are usually carried out by panels of experts using site visits and analysis of documentary information, much of which is usually produced by the academic units being reviewed.

Institutional reviews include academic audits of quality-assurance processes and outcomes, and more extensive comprehensive reviews. The international practice of institutional academic audits has been considerably influenced by the methodology developed a decade ago by the AAU in the United Kingdom. At the institutional level, the main evaluation mechanisms are regular reviews of departments and faculties; reviews of academic courses and programs; reviews of administrative and services units; and reviews of functional areas such as information technology.

Purposes

Quality-assurance programs often can serve a variety of purposes, but generally their primary purpose is a combination of public accountability, improvement, and renewal. In some cases, there is a gap between stated and actual purposes, and as a number of writers have pointed out, there is often tension between accountability and improvement purposes.

Reporting and Follow-up

Reporting and follow-up activities are vital parts of any worthwhile quality-assurance program, either at the national or institutional level. But a major challenge is to devise fair and effective methods that are likely to lead to improvements but at the same time will not be unduly damaging to the unit or units being reviewed.

A variety of approaches are widely used with regard to the distribution of reports. In some cases, reports are provided solely to the institution or the unit concerned, but increasingly the practice is to make the results more widely available. What happens to a report can be a most contentious issue.

In some cases, a system of rankings based on performance in relation to established criteria is used. In the United Kingdom, for example, participating university departments are ranked in separate reviews of performance in both teaching and research, and these results are publicly announced.

In a minority of cases, some element of performance funding is used as part of a quality-assurance program. In the United Kingdom, performance in research, as measured by the Research Assessment Exercise, is used as the basis for allocating substantial research funding, while in Australia from 1993 to 1995 a sum of between $50 million and $80 million was allocated annually on the basis of assessments.

In a limited number of cases, the final result is accreditation or validation of the program or institution, using predefined standards to assess whether or not the institution or the program is given formal recognition. ■

Internet Resource

For more information on issues related to international and comparative higher education, visit the Center's website, located at:

http://www.bc.edu/cihe