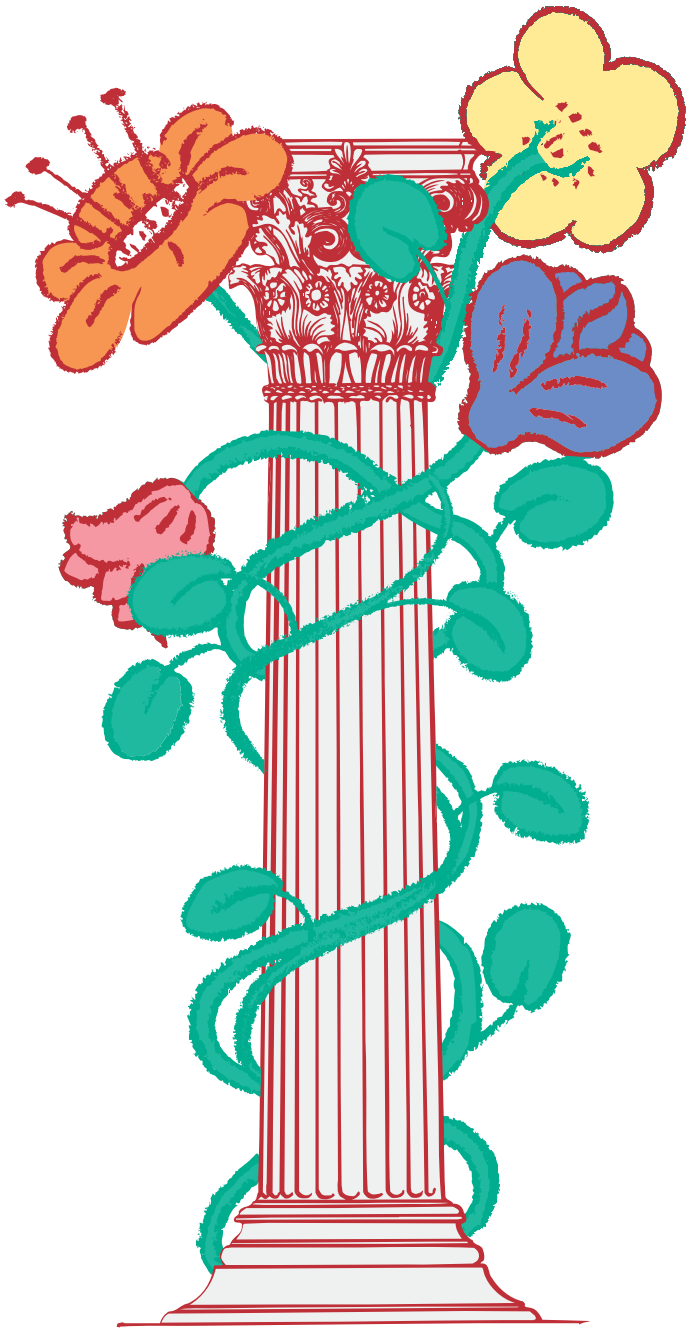
The Boyer Commission on Educating Undergraduates in the Research University

REINVENTING UNDERGRADUATE EDUCATION:

Three Years After the Boyer Report



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PREFATORY NOTE

This survey was initiated for the Boyer Commission to examine the development of undergraduate programs in the years since *Reinventing Undergraduate Education: A Blueprint for America's Research Universities* was published in 1998. Because the Commission felt the information would be of value to other educators, we decided to share the results.

The Boyer Report turned out to be of interest and use beyond research universities to all categories of American institutions and to large numbers of institutions worldwide. However, the current study surveyed only the American research universities that were the focus of the original report.

We would like to thank Emily Thomas, who designed and analyzed the survey; Wendy Katkin and Mary Leming, who collected the data and conducted the interviews; and Priscilla Smith who copyedited; their long and dedicated hours of work brought this project to fruition. Thanks too to Milton Glaser, member of the Boyer Commission, who designed the publication, and Wendy Gross, who executed it.

SHIRLEY STRUM KENNY

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REINVENTING UNDERGRADUATE EDUCATION:
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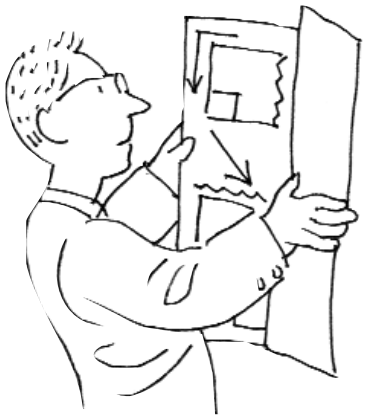
The Boyer Commission on Educating Undergraduates in the Research University issued recommendations in 1998 for *Reinventing Undergraduate Education: A Blueprint for America's Research Universities*. This follow-up report describes the extent to which research universities are dealing with some specifics recommended in that report, based on a survey of administrators responsible for undergraduate programs.

As the Boyer Report noted, various universities had initiated innovative experiments in undergraduate education before 1998, a number of which were described in the original report. The Report was a call to action, not a survey of current practice; nor was there any other survey of programs in place. Therefore, the current survey is not comparative. Instead, it records the current state of affairs, as reported by those running the programs.

The blueprint for undergraduate education proposed by the Boyer Commission covered many aspects of undergraduate education. Ten were selected for this survey because of their importance and specificity.

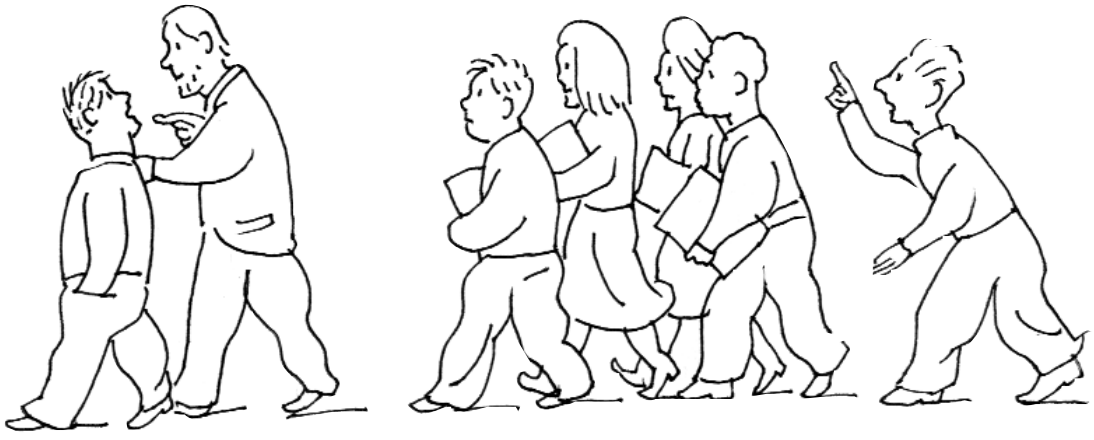


The blueprint for undergraduate education proposed by the Boyer Commission covered many aspects of undergraduate education.

THE SITUATION AT PRESENT

Undergraduate education is a topic clearly on the agenda at all research universities surveyed. Responses showed that the topics considered, such as undergraduate research, have become embedded in the practice and the rhetoric of undergraduate education. The conversion to a new model, however, is by no means complete. Discussions with campus officials who administer the programs indicated that they believe supportive leadership, administrative structures, and financial means are all necessary for substantial change.

The survey reflects the considerable headway that research universities have been making in recent years, but it also suggests that most efforts have been directed at the best students; the challenge for almost all is to reach a broader spectrum of students. The problem is particularly acute at institutions, usually public, that have tightly limited resources. Only fundamental campus acceptance of the value of these principles and pedagogical innovations, strongly reinforced by the national and professional associations and funding agencies, will propel campuses toward broad expansion of these initiatives to reach large numbers of students.



Surveys suggest that most efforts have been directed at the best students; the challenge for almost all is to reach a broader spectrum of students.

SURVEY METHODS

This report is based on a survey distributed in 2001 to representatives of the 123 Research I and II Universities nationwide that offer baccalaureate degrees, using the former Carnegie Classification system to include the institutions that the Boyer Commission considered in 1998. Representatives from 91 institutions, 74% of all research universities, responded. A list of these universities is appended. The survey respondents were deans or associate deans of undergraduate education or arts and sciences, vice provosts or vice presidents for undergraduate education, or other senior administrators with responsibility for undergraduate programs.

The survey included multiple-response questions on ten components of the Boyer agenda. There were also open-ended questions to identify the most important one or two things these institutions had done in the previous three years to improve undergraduate education and to name the single most important additional action they could take. To develop a deeper understanding of campus activities, follow-up telephone interviews were conducted with academic administrators from 40 institutions. Common themes that emerged in these interviews are noted to provide context for the specific survey findings.

The survey data summarize respondents' understanding of undergraduate education on their campuses. In many cases, that understanding was not derived from detailed quantitative data on undergraduate activities because those data do not exist. However, the respondents who contributed data on each component of undergraduate education felt sufficiently knowledgeable to report their institution's activities. Those who did not could respond "don't know." Further research collecting faculty perceptions and extensive data on specific components of the undergraduate education agenda will clarify and refine the understanding of undergraduate education at research universities, but this survey offers a national overview.

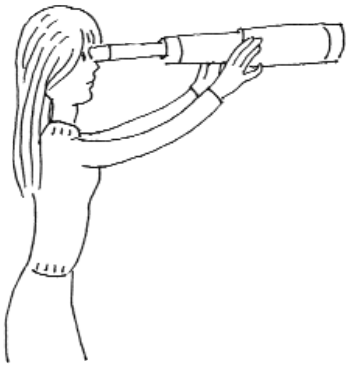
RESEARCH-BASED LEARNING

The Boyer Commission called for making research-based learning the standard in research universities, and university programs reflect this goal. Opportunities to participate in research and creative activities are now an established component of undergraduate programs.

Undergraduate Research and Creative Activities

All research universities offer undergraduates opportunities for supervised research or creative activities, but as with many elements of the Boyer agenda, the number of undergraduates engaged in research and creative activities varies among campuses. About 16% of research universities are in the forefront, with all or "most" (approximately 75%) of their undergraduates participating (Exhibit 1). Another 26% engage about half their undergraduates in these activities, or all their undergraduates in some majors. Most of the remainder, 48% of the total, have less extensive programs, involving only "some" (about 25%) or "a few" of their undergraduates. Nine percent of the survey respondents could not answer this question, reflecting the lack of quantitative information about undergraduate programs on some campuses.

To continue to develop opportunities for research-based learning, universities need to focus greater attention on the social sciences and humanities. Undergraduate research programs are much better developed in the laboratory sciences and engineering than in other disciplines. Sixty-two percent of the survey respondents reported participation by half or more of their laboratory science students (Exhibit 2). In engineering, 44% of the survey respondents reported participation by half or more of all undergraduates.



The Boyer Commission called for making research-based learning the standard in research universities, and university programs reflect this goal. Opportunities to participate in research and creative activities are now an established component of undergraduate programs.

EXHIBIT 1

How many undergraduates participate in supervised research or creative activities?

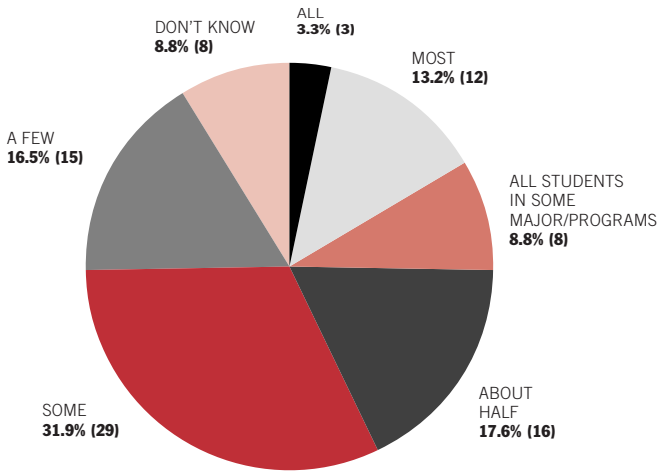
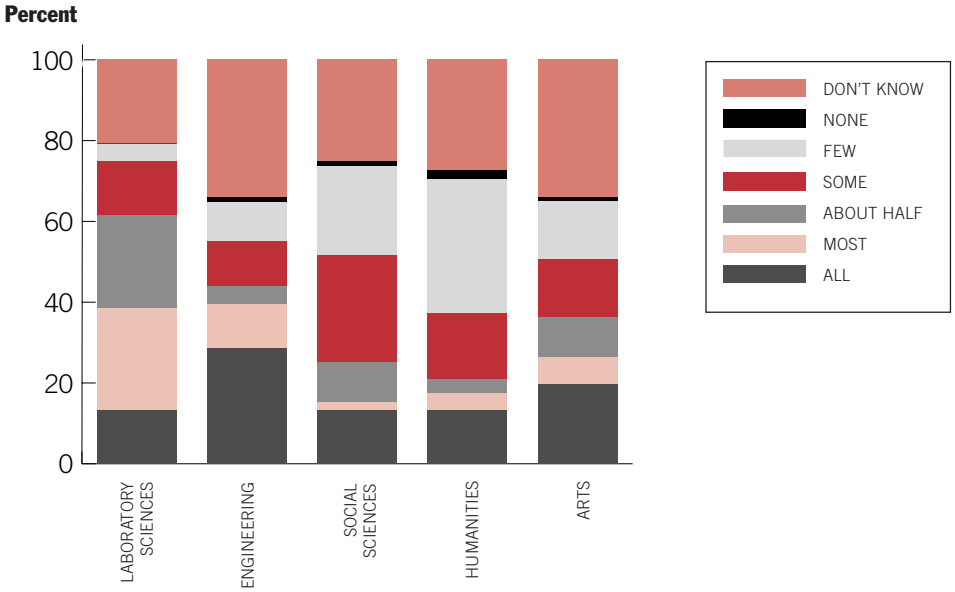


EXHIBIT 2

How many undergraduates participate in supervised research or creative activities?



In contrast to these opportunities for science and engineering students, only 25% of the survey respondents reported participation by half or more of all social science students, 49% reported lower participation, and 25% did not answer the question. Opportunities for humanities students appear to be similar: 21% reported participation by half or more of humanities students, 52% reported lower participation, and 27% did not answer the question. Arts students more often engage in creative activities with faculty. Thirty-six percent of all universities reported that half or more participate; 34% of the survey respondents did not know.

Offering research opportunities to a significant number of students in engineering and the laboratory sciences enhances the education of approximately a fifth of the students in research universities: 18% of all 2000 baccalaureate degree recipients from these institutions were in engineering, the physical sciences, or the biological sciences. Social sciences and humanities students, with more limited access to these opportunities, account for almost twice as large a group, 31% of all baccalaureate degrees. Most of the other undergraduates are in business (17%) and other career-oriented programs, such as communications, healthcare and education (24%) (Exhibit 3).

Survey respondents view the development of undergraduate research opportunities as an important recent achievement; 21% of the survey respondents cite this as one of the most important actions their campuses have taken to improve undergraduate education in the last three years (Appendix Table 1). They did not emphasize the need for further expansion of these opportunities as an important future step (Appendix Table 2), which suggests they view the development of these programs as well-launched. But much remains to be done if the opportunities available to some students are to be made available to most or all undergraduates.

Inquiry-Based Learning

Research-based learning is not limited to the completion of specific projects; it can take place whenever faculty and students share the act of discovery.

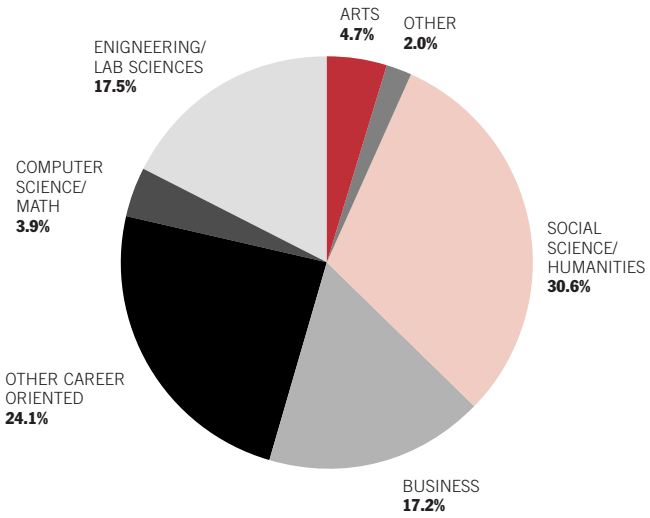
The survey findings and interviews indicate that faculty and administrators are developing inquiry-based techniques and thinking and talking about inquiry-based learning. However, sometimes the discussion includes questions about what actually constitutes inquiry-based pedagogy; there does not always seem to be a clear consensus.

Research universities are promoting their versions of inquiry-based learning with considerable success. Sixty-five percent of the survey respondents indicated that their campus encourages and helps faculty develop techniques for this mode of learning (Exhibit 4). Of those promoting change, 17% reported significant curricular change as a result, 56% reported some instances of change, and only 19% reported a limited effect or no effect (Exhibit 5).

Despite this attention, the use of inquiry-based teaching is limited. For example, only 20% of the survey respondents reported its use in many introductory courses (Exhibit 6); 21% reported inquiry-based learning in “several key introductory courses” and 38% in “a few” introductory courses.

EXHIBIT 3

Baccalaureate degrees granted in research universities, 2000-01



Source: IPEDS Completion Survey 414,013 degrees granted

EXHIBIT 4

Does the campus encourage and help faculty with inquiry-based teaching?

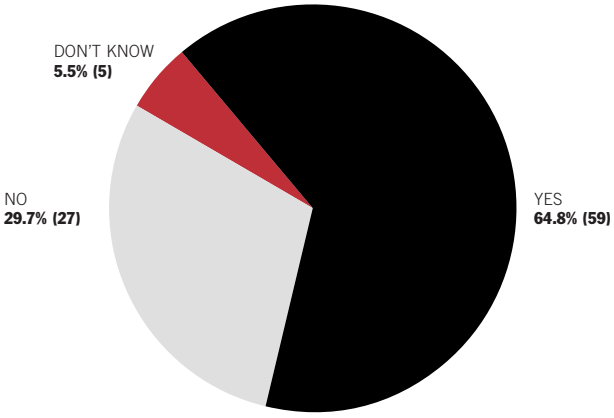


EXHIBIT 5

What is the impact of efforts to promote inquiry-based teaching? (on campuses with programs promoting inquiry-based teaching)

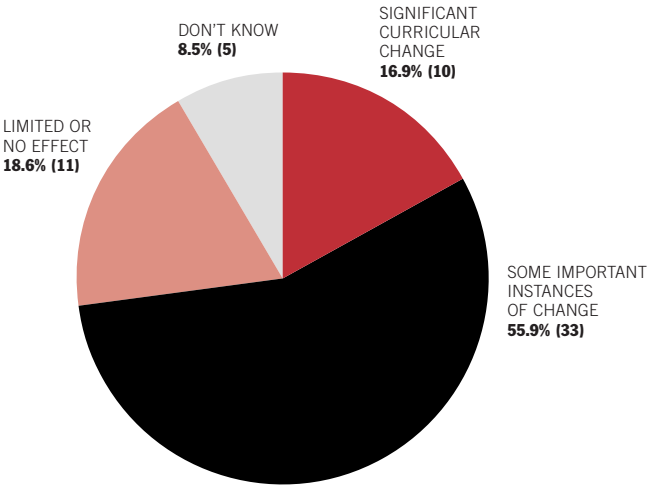
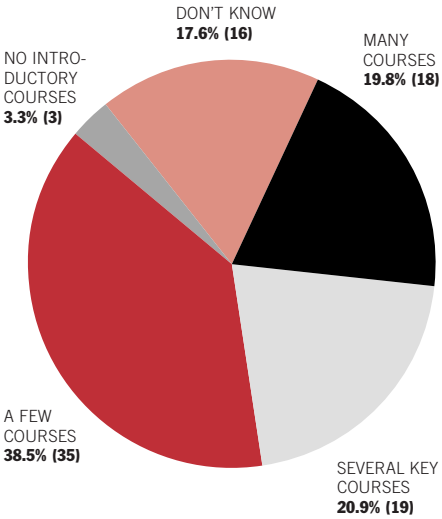


EXHIBIT 6

How prevalent is inquiry-based teaching in introductory courses?



Expanding Opportunities for Research-Based Learning

To further develop undergraduate research and creative activities, universities can use existing structures, activities, and incentives, or develop new ones. A full implementation of research-based learning will require expanding throughout the undergraduate student body opportunities currently focused on special groups such as honors students.

Establishing requirements for undergraduate research and creative activities institutionalizes the commitment to make them essential components of the undergraduate curriculum. Many research universities have made this commitment, but only to selected students. Just seven survey respondents reported requirements for *all* undergraduates: two reported course requirements and five project requirements (Exhibit 7). But only 13 reported the complete absence of requirements for research and creative activities. Many research universities have requirements for research or creative activities for honors students and/or other groups.

Within a context of flexibility and innovation, research universities are using a variety of techniques to promote undergraduate research activities. More than half focus attention by offering public events or symposia for the presentation of projects, and a third offer opportunities for undergraduates to publish research papers or abstracts (Exhibit 8). Emphasizing research-based learning in student recruitment also promotes its importance. Special programs for high-achieving students are fairly common. About 30% of the survey respondents reported that faculty are given incentives to develop opportunities for undergraduate research and creative activities.

Centralized structures are developing to extend research-based learning to more students; approximately 60% of all research universities have established these structures to promote and organize undergraduate research opportunities (Exhibit 9). Twenty-one percent reported a strong centralized organization, such as an office that controls funds, sets campus-wide policies, and has broad responsibility for promoting undergraduate research and creative opportunities. Another 38% reported that departments control funding and policies, but a loosely structured administrative organization provides coordination, for example, by maintaining information about research opportunities, and sponsoring events to celebrate undergraduate achievements. On 33% of the campuses, opportunities for undergraduate research and creative activities are organized at the departmental level. Seven percent reported no formal structure.

EXHIBIT 7

Are there requirements for undergraduate research/creative activities? (Check all that apply.)

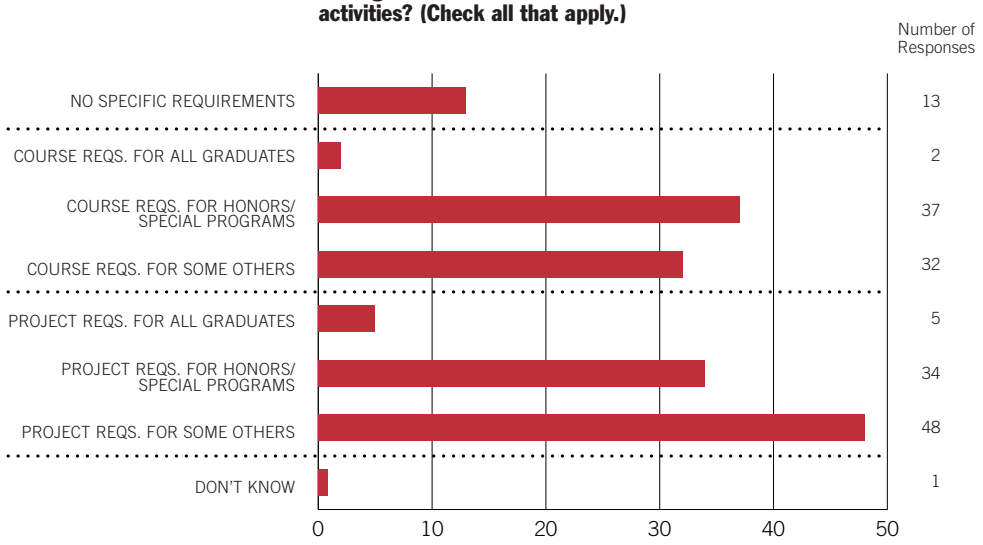


EXHIBIT 8

How do you promote undergraduate research and creative activities? (Check all that apply.)

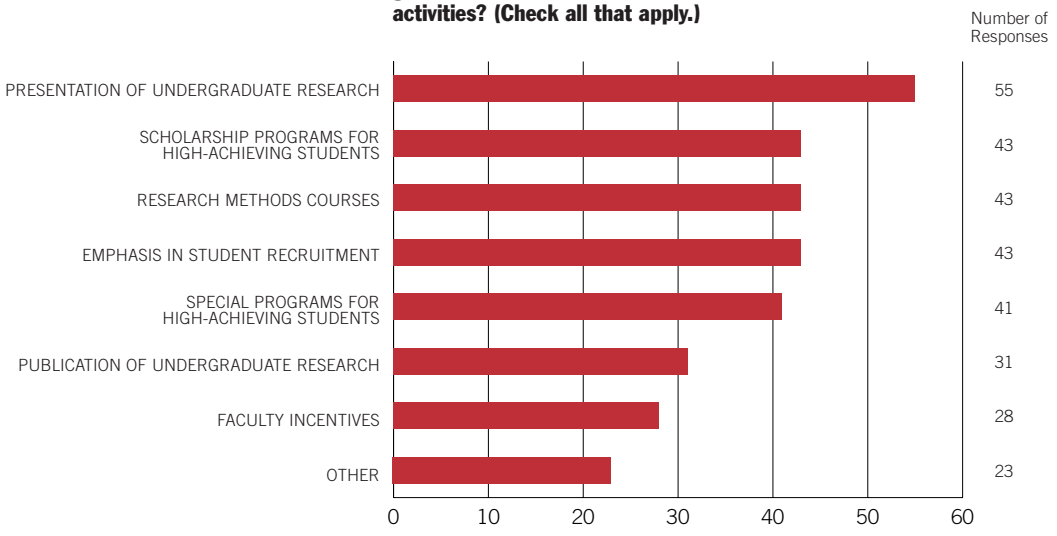
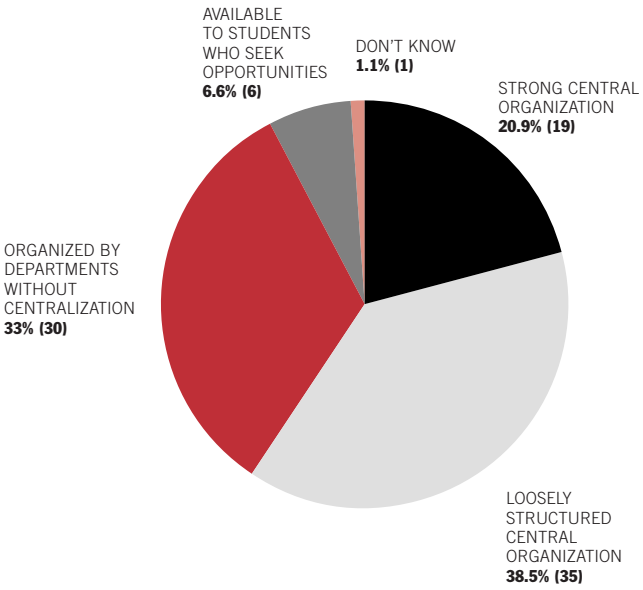


EXHIBIT 9

How are undergraduate research activities organized?



THE FRESHMAN EXPERIENCE

AN INQUIRY-BASED FRESHMAN YEAR

The Boyer Commission called for a first-year experience providing stimulation for "intellectual growth and a firm grounding in inquiry-based learning," with seminar learning to open new intellectual horizons and block scheduling to provide a supportive atmosphere. Research universities generally offer freshman seminars; a few provide freshmen limited opportunities to work on research and creative projects; and many use block scheduling. Developing or expanding freshman seminars and developing or expanding learning communities or block scheduling programs are two of the most frequently cited actions research universities have taken in the last three years to improve undergraduate education (Appendix Table 1).

Freshman Seminars

More than 80% of the universities included in the survey sample offer academically oriented seminars to their first-year students (Exhibit 10). Almost half (42%) of the 76 survey respondents offering freshman seminars enroll half or more of their freshman class in these seminars (Exhibit 11).

The Boyer Commission called for freshman seminars taught by experienced faculty to introduce freshmen to the intellectual life of a research university. About half the institutions included in the survey sample implement this vision insofar as all their freshman seminars are taught by regular full-time faculty (Exhibit 12). In most of the others, regular faculty teach most of these seminars, with some contribution by staff, graduate students, and undergraduate students. Only 5% report assigning mostly adjunct and part-time faculty to teach these seminars. Several interview respondents noted the valuable contribution of emeritus faculty.

EXHIBIT 10

Does the campus offer academically-oriented freshman seminars?

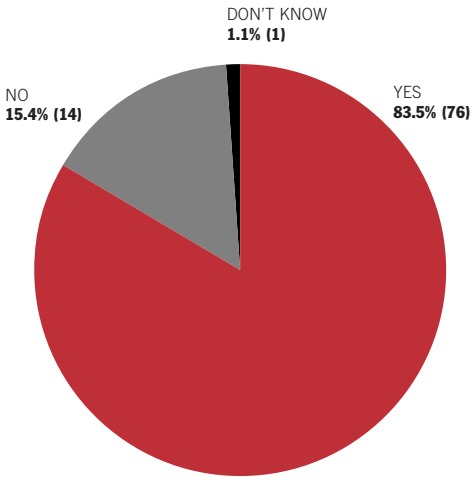


EXHIBIT 11

What percentage of freshmen enroll in academic seminars? (on campuses that offer freshman seminars)

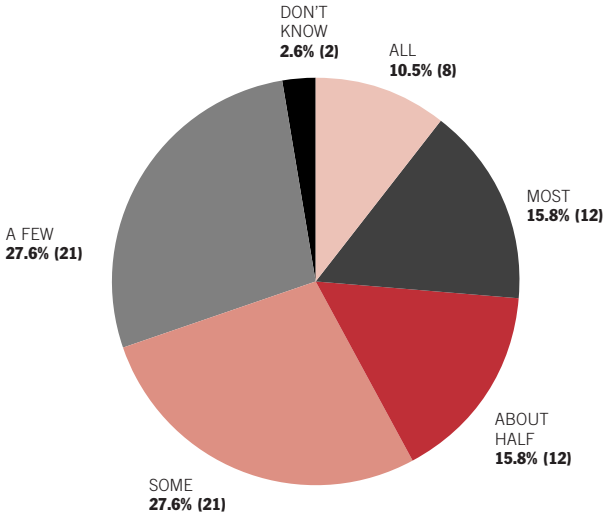
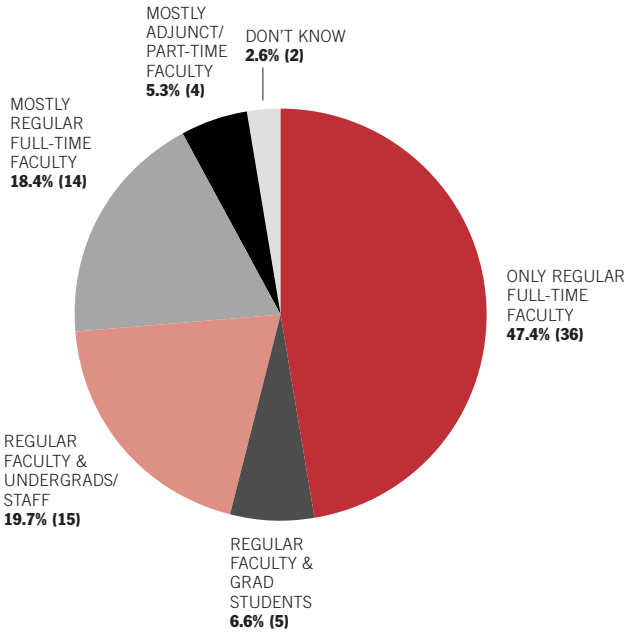


EXHIBIT 12

Who teaches freshman seminars?



Block Scheduling

To provide a supportive environment for adjustment to university life, two-thirds of all research universities have a program that schedules freshmen so that each student has two or three courses with the same cohort (Exhibit 13). The scope of these programs varies. Half or more of the freshman class participate at 20% of the universities that reported block scheduling. However, at 32% of these institutions, participation is limited to "some" students (about 25%), and 47% report participation by only a few students (Exhibit 14). The interviews conducted in connection with the survey indicate that some of these initiatives are limited to very specific groups. For example, two respondents mentioned "minority engineers" as the participating group.

Some research universities use their block-scheduling initiatives to offer an integrated freshman curriculum. About 30% report extensive on-going coordination among the faculty teaching these courses, and 30% report some coordination (Exhibit 15). Half the block-scheduling initiatives reported by survey respondents include an integrating seminar (Exhibit 16), generally taught by regular full-time faculty (Exhibit 17).

EXHIBIT 13

Does the campus schedule freshmen in blocks?

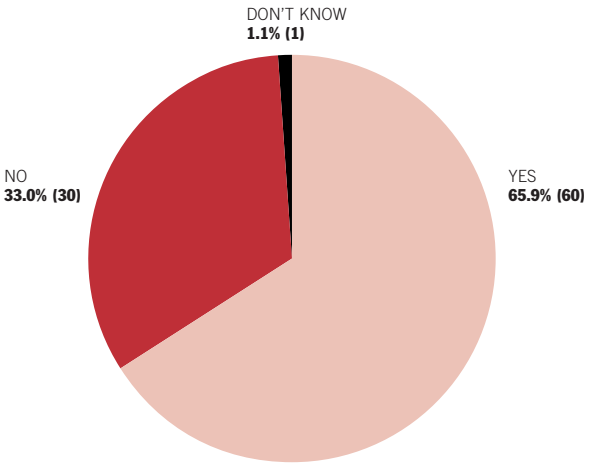


EXHIBIT 14

How many freshmen participate in the block-scheduling program? (on campuses that offer block scheduling)

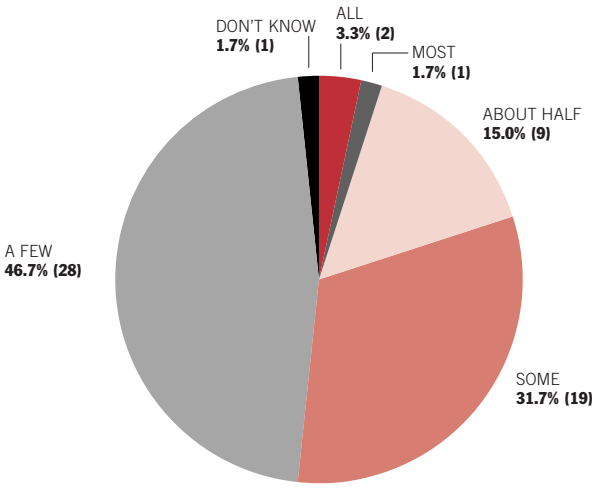


EXHIBIT 15

How much on-going coordination is there among faculty teaching block-scheduled courses?

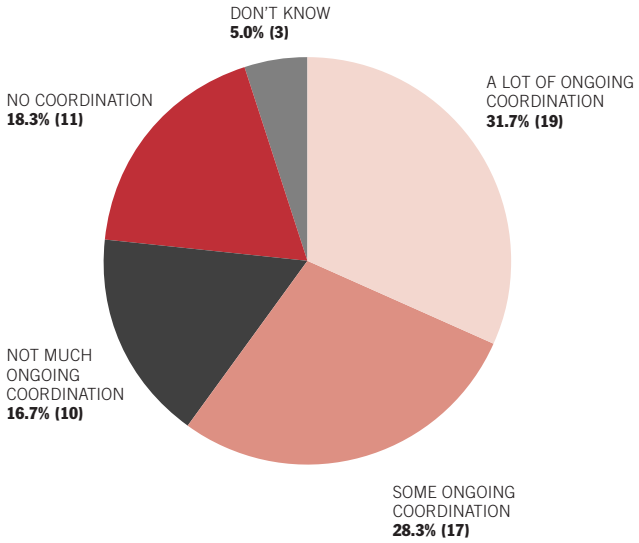


EXHIBIT 16

Does the block-scheduling program include an integrating seminar?

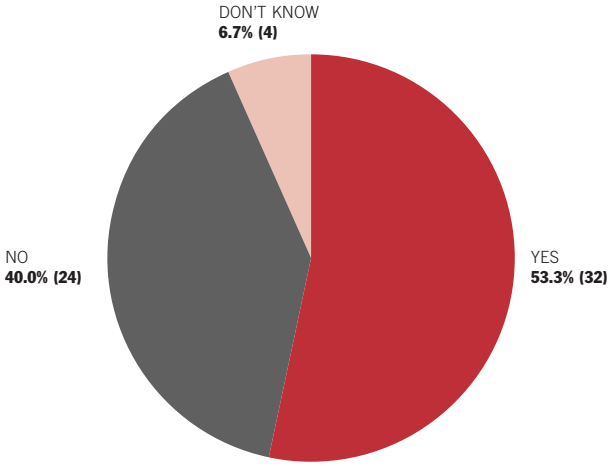
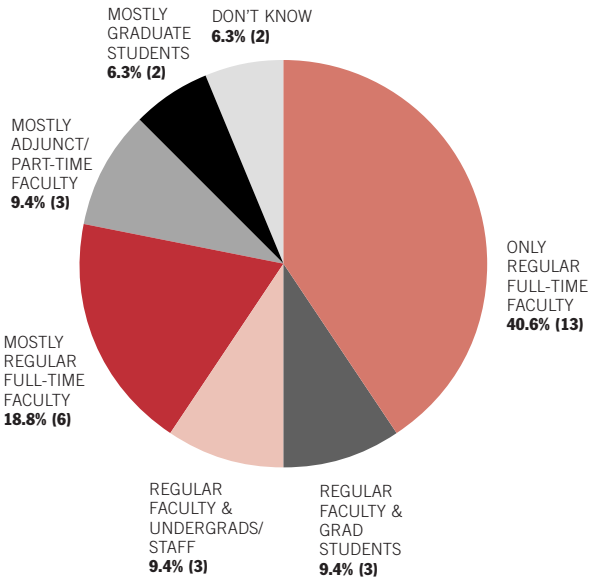


EXHIBIT 17

Who teaches integrating seminars in the block-scheduling program?



BUILDING ON THE FRESHMAN FOUNDATION

According to the Boyer Report recommendations, the freshman year is the introduction to an education that should be replete with opportunities for research, inquiry-based learning, opportunities to work collaboratively with other students, writing and speaking experiences, and a capstone experience embodying all of these aspects. Undergraduate education should be designed as a continuum that prepares students for continued learning and professional work through developing their individual talents to formulate questions and seek answers.

Collaborative Learning

Collaborative learning can engage students in the process of discovery, and it appears to be another element of undergraduate programs that is common but not equally developed across all fields. Collaborative learning experiences are being developed through departments, not as a university-wide initiative.

Asked if collaborative learning is a significant curricular issue at their institutions, 43% of respondents answered that it is promoted in some departments or programs. Only 13% identified collaborative learning as a significant curricular issue, and 11% reported that it is frequently discussed (Exhibit 18). Although many faculty do collaborative research, ironically most do not incorporate collaborative student work into their pedagogy.

Consistent with the departmental location of collaborative-learning initiatives, majors courses were cited as a locus of collaborative learning by 70% of the survey respondents (Exhibit 19). However, a significant number of research universities also use collaborative learning to engage entering students: more than half the survey respondents cited its use in introductory courses.

Collaborative learning experiences are being developed through departments, not as a university-wide initiative.

EXHIBIT 18

Is collaborative learning a significant curricular issue?

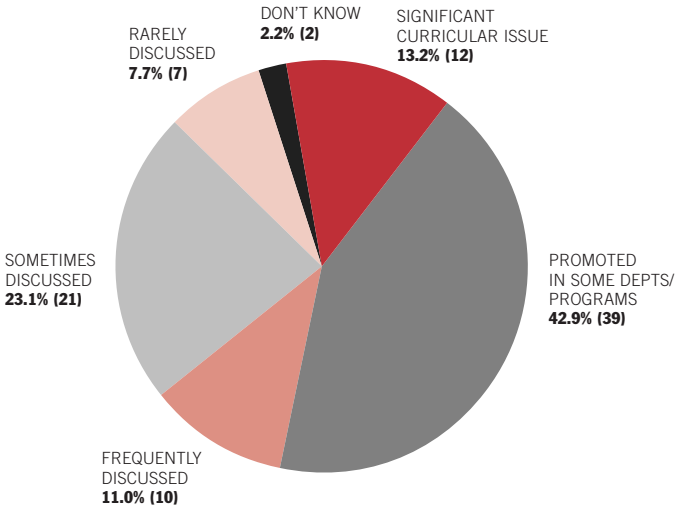
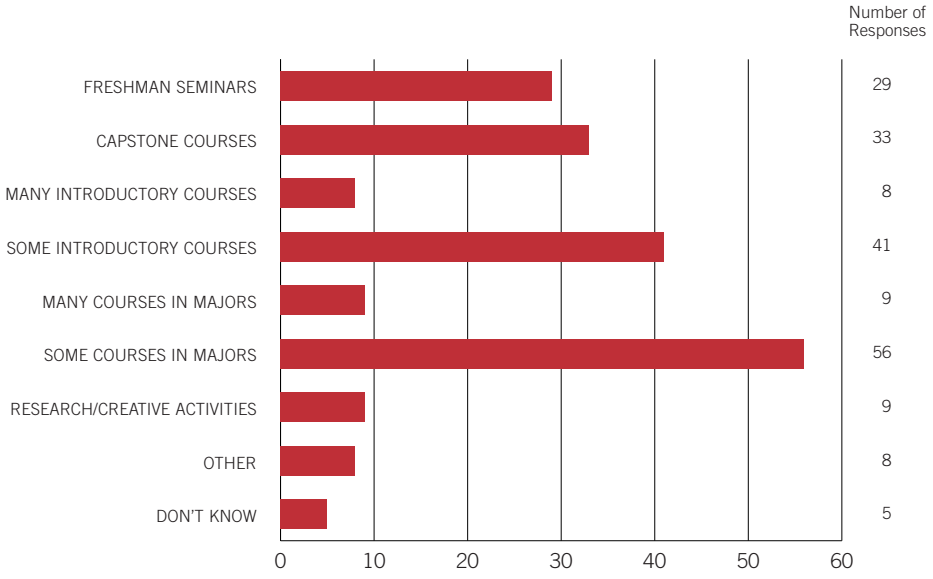


EXHIBIT 19

What types of courses incorporate collaborative learning? (Check all types that include collaborative projects.)



COMMUNICATION SKILLS

Faculty and administrators as well as potential employers express concern about students' lack of good oral communication skills.

The Boyer Commission called for undergraduate programs that provide graduates with strong written and oral communication skills. Research universities devote considerable attention to writing, but much less to oral communications.

Teaching Writing

Almost all the research universities included in the survey sample have freshman writing courses. About half (52%) offer a two-semester sequence, while 43% offer a one-semester course (Exhibit 20). In addition to freshman writing requirements, 38% offer other lower-division writing courses, 51% offer upper-division writing courses, 32% have other upper-division writing requirements, and 22% have some other way of infusing extended writing projects into the undergraduate curriculum. Developing writing programs was mentioned as a major recent improvement by 10% of all survey respondents (Appendix Table 1) and also appears on the agenda for the future (Appendix Table 2).

Teaching Oral Communication

Although faculty and administrators as well as potential employers express concern about students' lack of good oral communication skills, few universities have implemented campus-wide requirements to develop these skills. Only 19% of the survey respondents reported that oral communication skills are taught in their university's introductory courses, and about 30% reported that they do not offer any courses or activities to promote development of these skills (Exhibit 21).

Interview respondents identified the teaching of oral communication skills in specific programs, particularly in professional programs such as engineering, business, education, and agriculture. Forty-six percent reported opportunities for students to make oral presentations in special settings, such as reporting on their undergraduate research initiatives. Thirty-seven percent noted course requirements for communication majors, and 38% reported course requirements in other majors or programs. Some interview respondents observed that rhetoric and public speaking courses are increasingly popular electives.

EXHIBIT 20

How is teaching writing infused in the undergraduate curriculum?

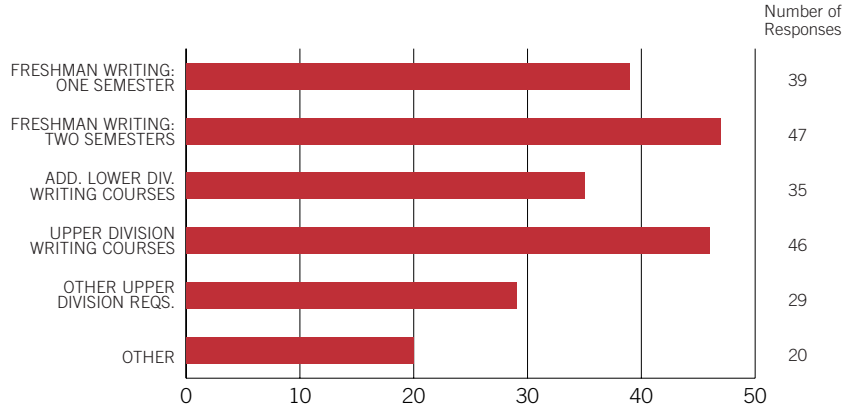
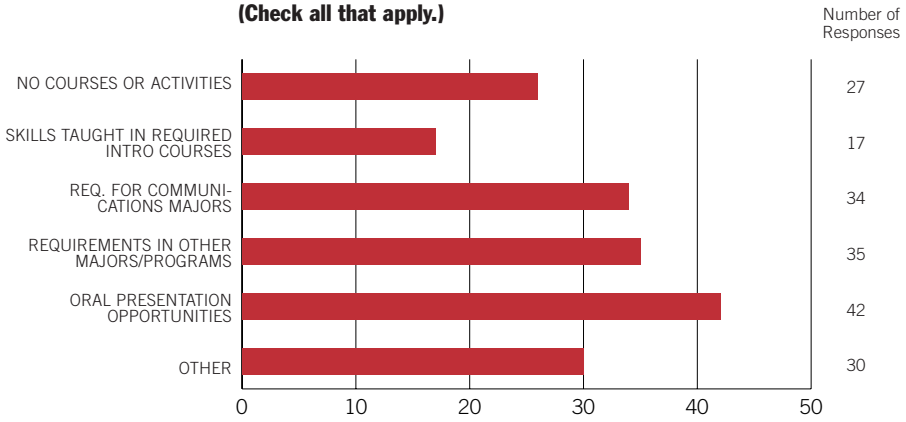


EXHIBIT 21

Are there specific courses or activities to develop oral communication skills? (Check all that apply.)



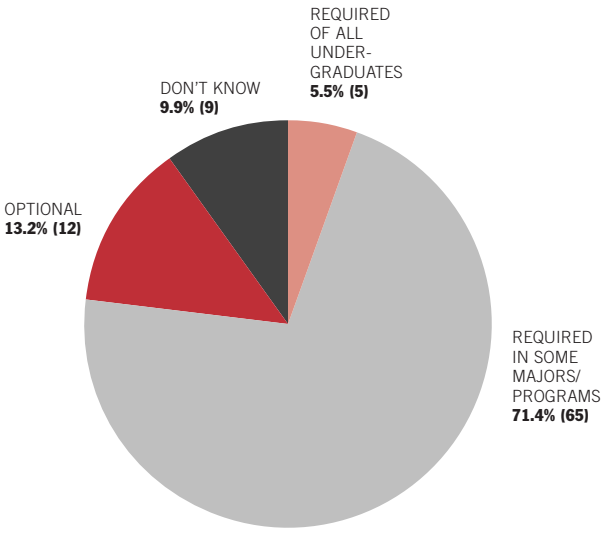
CAPSTONE EXPERIENCE

The Boyer Commission called for completing students' undergraduate education with a major project to utilize and further develop the research and communications skills students have learned throughout their university careers. Current offerings for selected students in research universities offer a model for the more widespread implementation of the Boyer vision.

Like collaborative learning initiatives, capstone courses are generally established as departmental, rather than university-wide initiatives. Almost three quarters of the research universities represented in the survey require a senior seminar or capstone course in some majors or programs (Exhibit 22). Interview respondents cited honors programs and engineering departments as common locations for these courses.

EXHIBIT 22

How many students take a senior seminar or other capstone course?

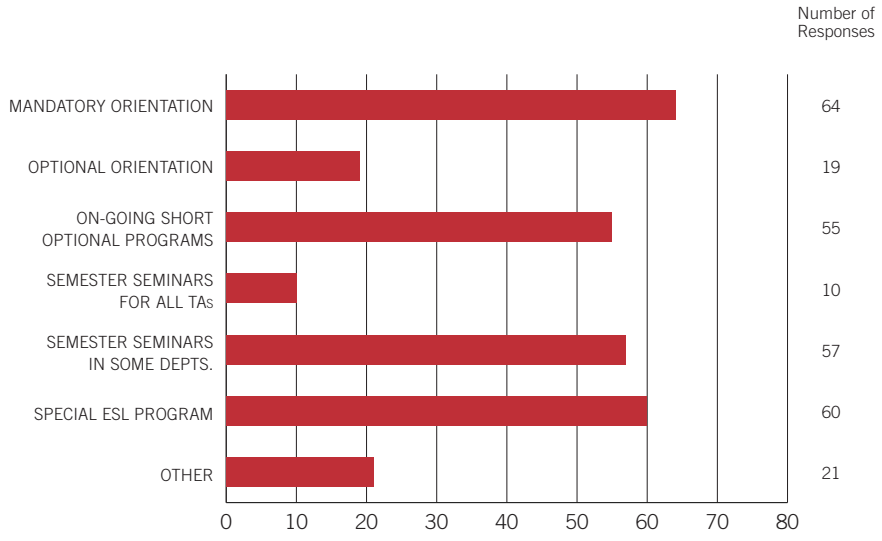


EDUCATING GRADUATE STUDENTS AS APPRENTICE TEACHERS

The Boyer Commission emphasized the importance of preparing students to teach undergraduates as part of their graduate education, and research universities have a variety of programs to achieve this goal. Most research universities (70%) provide mandatory orientation programs to train teaching assistants, and 66% provide special programs for teaching assistants whose native language is not English (Exhibit 23). Most of those that do not offer mandatory orientation provide optional orientation. To extend teaching-assistant training throughout the academic year, research universities frequently offer an on-going series of optional programs and short courses (60% of the respondents) and/or semester-long programs in some departments (63%). A few (11%) offer semester-long seminars for all teaching assistants.

EXHIBIT 23

What kinds of TA training are offered?



CHANGING FACULTY REWARD SYSTEMS

The Boyer Commission called for faculty reward systems that promote excellent undergraduate education, including an emphasis on teaching in promotion and tenure criteria and other rewards for teaching excellence. According to the survey respondents, there is a significant and increasing emphasis on teaching, although faculty incentives remain a complex issue in research universities.

About a third (35%) of the survey respondents characterized undergraduate teaching as a major consideration in promotion and tenure decisions (Exhibit 24). At other campuses it is a limited consideration (30%) or varies by department (23%). Almost half (45%) the survey respondents reported changes in the last three years to encourage excellence in undergraduate teaching (Exhibit 25).

Teaching excellence can be encouraged by rewards beyond the tenure system. Almost all the survey respondents report teaching awards for classroom instruction, and also about half (47%) offer rewards for undergraduate activities other than classroom teaching (Exhibit 26). Curriculum development grants are also common, and some universities offer salary supplements for teaching key courses.

Faculty perceptions of reward structures may differ from the administrative perspective reported in this survey, and several interviewees commented that many faculty do not yet give teaching a high priority despite administrative efforts. They cited several reasons: insufficient time, greater interest in research (some faculty members point out that interest in research is the reason they chose to work at a research university), the perception that the promotion and tenure process does not really value undergraduate teaching, and, quite simply, not knowing what to do.

About a third of the survey respondents characterized undergraduate teaching as a major consideration in promotion and tenure decisions

EXHIBIT 24

How important is undergraduate teaching in promotion and tenure decisions?

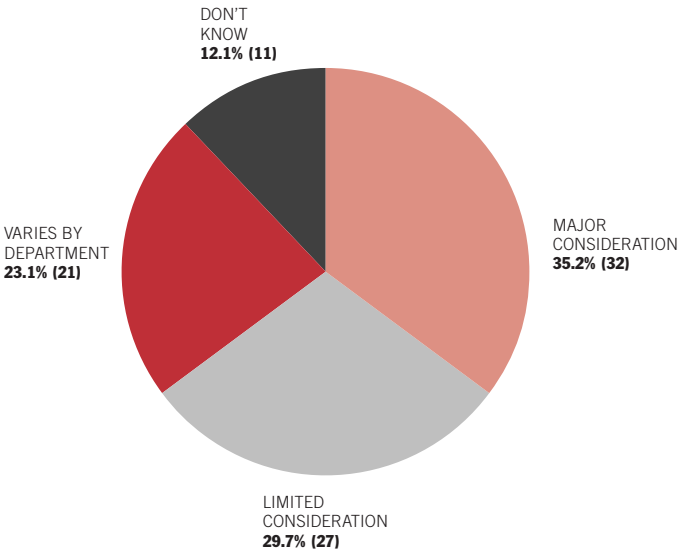


EXHIBIT 25

Has there been a change in faculty rewards in the last three years?

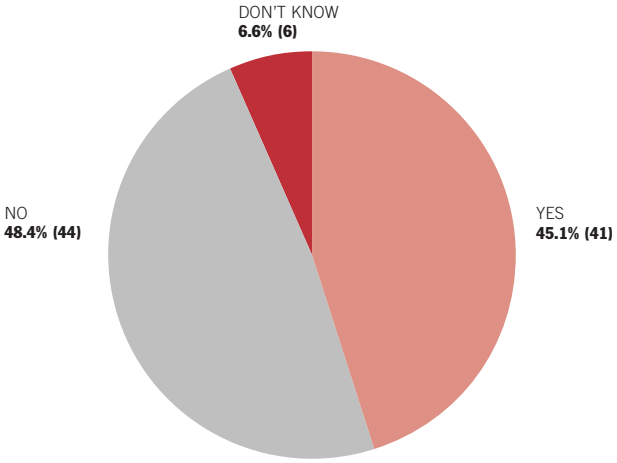
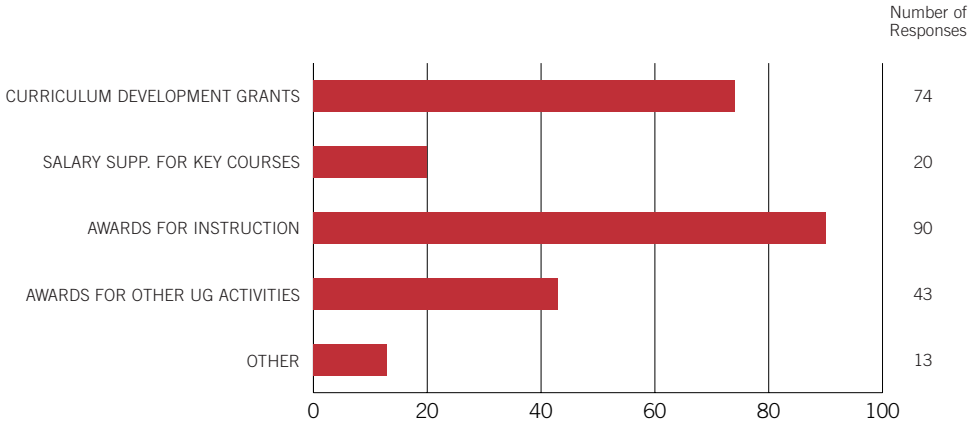


EXHIBIT 26

What faculty rewards are offered to encourage excellence in undergraduate teaching?



RECENT DEVELOPMENTS AND NEXT STEPS

In addition to answering specific questions, survey respondents offered their perspectives on the development of undergraduate education in research universities by identifying the one or two most important recent actions their institutions had taken in the previous three years to improve undergraduate education, and the single most important action they could take to make further improvements. Appendix Table 1 summarizes the 183 actions they reported and shows the percentage of the 91 university responses that identify actions in each category. Appendix Table 2 summarizes 80 actions identified by survey respondents as their highest priority for future action.

Undergraduate education is prominently on the agenda of research universities. Faculty and administrators are talking and thinking about the way undergraduate education is conceived and delivered to an extent they had not previously done. They are working on academic initiatives, pedagogy, improving students' social experiences, administrative support, and facilities. Some universities have long-established programs, but many have made significant headway in the last few years.

Research universities are revising their core, or general education, curricula. Thirty-seven percent of the survey respondents reported these revisions as an important effort to improve undergraduate education, including 10% who reported improved writing programs. Obtaining detailed information on the range or focus of curriculum revisions was beyond the scope of this survey, but many were reported as comprehensive efforts, several focused on improved communication and mathematical skills programs, and two on increased emphasis on diversity. Along with curriculum revisions, research universities have focused considerable attention on improving advising and academic support services, with 13% of the survey respondents highlighting key actions in these areas.

The first-year curriculum has received particular attention. Fifteen percent of the survey respondents reported the creation or expansion of freshman-seminar programs, and 12% described new or expanded, living-learning community programs.

The development of undergraduate research programs is a third important initiative in research universities, with 21% of the survey respondents reporting these efforts. Specific actions include the creation of a central office to administer these programs and increased funding.

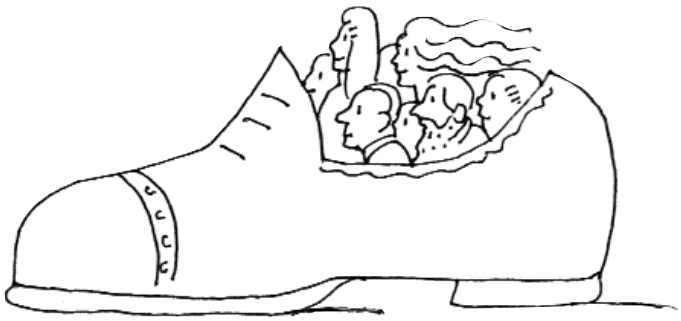
The other focus of recent developments has been encouraging and supporting faculty efforts to improve undergraduate education. Eleven percent of the survey respondents cited the creation or

expansion of a teaching support center as a recent accomplishment; 9% reported faculty development initiatives, and 7% noted new faculty incentives.

Next Steps

When asked to identify the "single most important thing your university could do to improve undergraduate education," survey respondents indicated the need to increase efforts in the areas that have been identified. Unsurprisingly, they focused on the need for more faculty to decrease class size and faculty incentives that support undergraduate teaching. Eleven percent of the survey respondents identified hiring more faculty as the most important action; 15% highlighted changes in faculty incentives ranging from changes in promotion and tenure policies to teaching requirements to efforts to engage research faculty in the undergraduate enterprise. Other administrative changes were mentioned by 8% of the respondents, addressing issues such as the creation of an undergraduate college, better integration between academics and student affairs, and institutional commitment to undergraduate education.

Curricular development was the other focus for future action identified by survey respondents. The priorities included revising the general education curriculum and writing programs, expanding inquiry-based and experiential learning, improving pedagogy, improving the first-year experiences, and developing capstone experiences.



Respondents felt that the next step in improving undergraduate education was to have more faculty and faculty incentives that support undergraduate teaching.

OBSERVATIONS

Reinventing Undergraduate Education pointed out that in 1998 there was probably no research university in the country that was not trying to address the problem of undergraduate education through the efforts of faculty committees, study groups, or outside consultants. These efforts resulted in new courses and revised curricula. In the last several years, however, universities have dramatically increased the attention paid to undergraduate education, and disciplinary associations and funding agencies have shown growing interest.

The data accumulated in this survey give a perspective on what is currently happening nationwide. They point to several conclusions:

- First, every research university is approaching the issues of undergraduate education seriously. The pace of action has accelerated, and the rhetoric has changed: "undergraduate research," for example, is a staple of most universities' curricular vocabulary.
- Second, institutions have not yet fulfilled their ambitions for undergraduate programs although many offer special opportunities such as research and freshman seminars to the best students.
- Third, the sciences and engineering curricula are well ahead of the social sciences, humanities, and arts in adapting to undergraduate research as a teaching method. Further, professional programs, such as business and engineering, are outstripping the arts and sciences departments in important areas such as written and oral communications.
- Fourth, oral communication experiences are not yet a priority. Oral communications courses are not deemed important across the university; students' grades in other courses are not affected by oral skills. There is little incentive for students to hone those skills unless the courses are required for their majors or oral presentations demanded by their professors.
- Fifth, writing skills are a priority; course requirements are increasing. But writing is often taught in ways that diminish its importance in the eyes of students. The courses are often taught by teaching assistants and adjuncts, not professors. Furthermore, if professors do not require extensive written work in their majors, students will not think writing skills matter for their professional life. Students too often feel that passing the writing course is the goal; they do not always understand that the ability to write well is a survival skill.

- Sixth, many administrators cite financial reasons for not expanding innovative undergraduate programs faster. Budgets are a matter of priorities. Unless improving undergraduate education is considered a top priority by both faculty and administrators, undergraduate education at research universities will evolve slowly at best. The will to improve undergraduates' experience, supported by the commitment of disciplinary associations and funding agencies, must continue strong if students are to receive the best possible undergraduate education.

APPENDIX TABLE 1

Most Important Actions University has Taken in the Last Three Years to Improve Undergraduate Education

(Respondents were asked to report one or two. A few reported three.)

	Number of Responses	Percent of Respondents
Revising the general education curriculum, including increasing the emphasis on teaching writing, communication, and math skills	25	27%
Expanding undergraduate research opportunities or programs	19	21%
Creating or expanding freshman seminars	14	15%
Improving advising and academic support services	13	13%
Establishing or expanding learning communities	11	12%
Creating or strengthening a teaching and learning center	10	11%
Expanding writing programs	9	10%
Initiating planning projects and discussions	8	9%
Creating or expanding faculty development initiatives	8	9%
Creating new positions or administrative structures to support undergraduate education	8	9%
Expanding the use of information technology	7	8%
Offering faculty awards and incentives	6	7%
Expanding experiential learning initiatives	5	5%
Focusing more attention on undergraduate education	5	5%
Improving the first-year experience, including initiating a common reading requirement	5	5%
Expanding honors programs	4	4%
Developing study abroad programs	4	4%
Enhancing residential life	4	4%
Placing more emphasis on undergraduate education in promotion and tenure guidelines	3	3%
Developing interdisciplinary initiatives	3	3%
Implementing recruitment and retention initiatives	3	3%
Implementing collaborative learning initiatives	2	2%
Establishing or expanding block scheduling	2	2%
Other	5	5%
Total	183	

APPENDIX TABLE 2

Single Most Important Action Your University Could Take to Improve Undergraduate Education

	Number of Responses	Percent of Respondents
Changing faculty incentives and increasing the integration of research and teaching	14	15%
Hiring more faculty/decreasing class size	10	11%
Increasing integration within the undergraduate program	7	8%
Implementing administrative changes	7	8%
Revising the general education curriculum	6	7%
Improving curriculum and expanding inquiry-based and experiential learning	5	5%
Improving pedagogy	5	5%
Improving the first-year experience	5	5%
Improving programs that teach writing and other skills	5	5%
Preserving quality while accommodating enrollment growth	4	4%
Focusing attention on student learning and learning assessment	3	3%
Increasing student/faculty interaction, in- and outside the classroom	3	3%
Developing a capstone experience	2	2%
Improving advising	2	2%
Other	2	2%
Total	80	

SURVEY RESPONDENTS

Arizona State University
Boston University
Brigham Young University
California Institute of Technology
Carnegie Mellon University
Case Western Reserve University
Clemson University
Cornell University
Duke University
Emory University
Florida State University
George Washington University
Georgetown University
Georgia Institute of Technology
Harvard University
Indiana University
Johns Hopkins University
Kansas State University
Kent State University
Louisiana State University
Massachusetts Institute of Technology
Michigan State University
New Mexico State University
New York University
North Carolina State University
Northeastern University
Northwestern University
Ohio University
Oklahoma State University
Oregon State University
Pennsylvania State University
Princeton University
Rice University
Rutgers University
Southern Illinois University
Stanford University
Stony Brook University-SUNY
Syracuse University
Temple University
Texas A&M University
Tufts University
University at Albany-SUNY
University of Arizona
University of Arkansas
University of Buffalo-SUNY
University of California-Berkeley
University of California-Davis
University of California-Irvine
University of California-Los Angeles
University of California-San Diego
University of California-Santa Barbara
University of California-Santa Cruz
University of Chicago
University of Colorado at Boulder
University of Connecticut
University of Delaware
University of Florida
University of Georgia
University of Houston-University Park
University of Idaho
University of Illinois at Chicago
University of Illinois at Urbana-Champaign
University of Iowa
University of Kentucky
University of Maryland College Park
University of Massachusetts-Amherst
University of Miami
University of Michigan-Ann Arbor
University of Minnesota Twin Cities
University of Mississippi Main Campus
University of Missouri-Columbia
University of New Mexico-Main Campus
University of North Carolina Chapel Hill
University of Notre Dame
University of Pennsylvania
University of Rochester
University of South Carolina-Columbia
University of South Florida
University of Southern California
University of Texas
University of Utah
University of Vermont
University of Virginia-Main Campus
University of Washington
University of Wisconsin-Milwaukee
University of Wyoming
Utah State University
Virginia Commonwealth University
Virginia Polytechnic Inst. and State U.
Washington State University
West Virginia University