

Yale College

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April 3, 2003

To Members of the Yale Community:

On behalf of the Committee on Yale College Education, I am pleased to enclose the fruits of our year-long study, the Report on Yale College Education 2003. The Committee will welcome comments on the Report through Friday, May 2. At that point, it may choose to add remarks to the final version of the Report, which will be published in Summer 2003.

Faculty and students can share their thoughts on the recommendations by visiting the CYCE web site, <http://www.yale.edu/cyce/>. In addition, the Committee will hold a special faculty meeting at 4:00 p.m. on Thursday, April 24 for discussion of the report, and a public meeting for undergraduates will be arranged as well.

My thanks to the Committee for its hard and productive work.

Sincerely,

Richard H. Brodhead
Dean of Yale College

Yale University

REPORT ON YALE COLLEGE EDUCATION

April 2003

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REPORT ON YALE COLLEGE EDUCATION

PREFACE

In the fall of 2001, on the occasion of the tercentennial of the University, President Richard Levin called for a study of education in Yale's oldest component, the undergraduate college. No full-scale study of Yale College education has been undertaken since 1972. Since that time, changes that were new in the early 1970s—notably the opening of the college to women and to all sectors of American society—have been fully incorporated into the life of this school. Changes scarcely foreseen thirty years ago have transformed Yale in other ways. The computer revolution has made intellectual problems soluble in ways unimaginable a short while ago while also changing the way we teach, write and (arguably) think. Thanks to technology and a host of other forces, the points of the globe are in touch with each other to a degree that no citizen of 1972 could have envisioned.

Closer to home, in the last decade Yale has rebuilt its campus and renewed its intellectual resources on a scale that once seemed inconceivable, and the University is making further investments with major consequences for education and research: the \$1 billion rebuilding of the sciences, the renovation of the arts schools, the founding of the Globalization Center, and many more.

In this season of renewal and with the arrival of a new century, the time seemed right to take the measure of Yale College education anew.

For the past sixteen months, a Committee involving thirty faculty members (four from the junior faculty), four recent graduates and eight current undergraduates has examined the character of education in Yale College. Few committees have put in so many hours or consulted so widely. As part of our self-education, committee members interviewed chairs of departments and programs, directors of undergraduate studies, deans of professional schools, and directors of galleries, libraries and centers; conducted surveys and held focus groups; hosted six town meetings in the residential colleges attended by nearly three hundred students; and visited other universities to see how they approach shared problems. In addition, the Committee met with the Yale Corporation and solicited the

wisdom of Yale College graduates at a special assembly of the Association of Yale Alumni.

Though their number far exceeds our ability to name them, we are grateful to everyone who shared thoughts with us. The chair is grateful as well for his extraordinary committee. It is a lucky University that can call on intelligence and devotion of such an order.

On the whole, the Committee on Yale College Education found much to celebrate in its review. We admired the richness of the college's offerings, extraordinary by any measure. The Committee was also impressed by the energy and commitment that Yale faculty and students bring to the work of education: it is these qualities, in the end, that determine the value of the education we provide. But we also saw things that have long needed fixing, and we saw new areas of opportunity as well.

The Committee does not propose radical innovations in the Yale College program of study. But it does recommend a variety of important changes, some sweeping, some more narrowly targeted. The Committee believes that these changes, taken together, would dramatically improve the quality of Yale undergraduate education. Many recommendations address problems that have emerged over the past several decades, some uniquely at Yale, some in American higher education at large. Others look forward, attempting to anticipate the intellectual resources students will need in the complex future world.

Though we recognize their great value, our report does not spend much time addressing things that are in good health at Yale. Nor have we commented on changes to which the University is already committed and that are already underway, changes the Committee warmly endorses as complements to its proposals. These include especially the recruitment of an intellectually distinguished and socially diverse faculty and the provision of full technological support for teaching and research. This report outlines further good things that should be done at Yale, not every good thing Yale already has in hand.

We have tried to make our proposals ambitious enough to make a real difference and practical enough to permit them to be enacted. We have worked to adapt general ambitions to the particular facts of this University, and for this reason we present our recommendations in a fair bit of detail. We hope to have imagined them specifically enough to show what they can achieve and how they can be accomplished.

Some of the recommended changes will require new resources; many could begin right away. Some of the recommendations may gain easy approval; others may be quite controversial. That is as it should be, and a sign that serious issues are being addressed. As the Yale community reflects on these issues, we will need to keep in mind the complex mission we are trying to serve: to make Yale at once a center of knowledge and discovery, a place of powerful academic instruction, and a place that prepares engaged and responsible citizens for the nation and the world.

In furtherance of these goals, the Committee submits its report.

Richard Brodhead, Chair

Charles Ahn	Amy Hungerford
Rachel Alpert	Douglas Kankel
Dudley Andrew	Daniel Kevles
Chirag Badlani	Maxwell Laurans
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INTRODUCTION

Yale College education has changed dramatically throughout its history, and this report seeks to make further changes. Nevertheless, as the context for these innovations, we begin by affirming the philosophy of education Yale that has long embraced. The notion is familiar but is worth a brief review.

Liberal arts education aims to train a broadly based, highly disciplined intelligence without specifying in advance what that intelligence will be used for. In many parts of the world, a student's entry into higher education coincides with the choice of a field or profession, and the function of education is to provide training for this profession. A liberal arts approach differs from that model in at least three ways. First, it regards college as a phase of exploration, a place for the exercise of curiosity and the discovery of new interests and abilities, not the development of interests fully determined in advance. Second, though it permits (even requires) a measure of focus, liberal arts education aims at a significant breadth of preparation, storing the mind with various knowledge and training it in various modes of inquiry rather than building strength in one form alone.

Third and most fundamentally, liberal arts education does not aim to train a student in the particulars of a given career. Instead its goal is to develop deep skills that people can bring to bear in whatever work they eventually choose. These skills include but are not confined to:

the ability to subject the world to active and continuing curiosity and to ask interesting questions;

the ability to set a newly-noticed fact in a larger field of information, to amass relevant knowledge from a variety of sources and bring it to bear in thoughtful, discerning ways;

the ability to subject an object of inquiry to sustained and disciplined analysis, and where needed, to more than one mode of analysis;

the ability to link and integrate frames of reference, creating perceptions that were not available through a single lens;

the ability to express one's thoughts precisely and persuasively;

the ability to take the initiative and mobilize one's intelligence without waiting for instructions from others;

the ability to work with others in such a way as to construct the larger vision no one could produce on his own;

the sense of oneself as a member of a larger community, local and global, and the sense that one's powers are to be used for the larger good.

Liberal arts education is an old idea and may even seem an old-fashioned one. But a year's reflection has led to the conclusion that this education is not only not passé but may bear even greater value in the future than it has in the past.

We cannot be confident what the coming world will contain, but we can be sure that it will be characterized by increasing complexity, increasing interaction of once-distant cultures and once-distinct forces, increasingly rapid transformations of knowledge, and the continual emergence of new, unforeseen challenges and opportunities. What we must want for our students is that, in the unforeseeable succession of worlds they will live to inhabit, they will be able to summon the powers of mind to understand (and help others understand) this continually emerging reality and to see how to act in it in creative, thoughtful ways. In our judgment, the student best equipped for this future will be a person fitted with multiple skills that can be brought to bear in versatile ways on changing situations: a person who keeps finding new uses for things already learned and keeps gaining new learning from the new facts he or she encounters.

A school of Yale's character is particularly well suited for training of this sort. We note in passing that the formal academic program, the focus of this report, is only one aspect of the schooling Yale provides. Yale College's richly elaborated world of extracurricular activity—in community service and public affairs, in the arts, in sports, journalism, and so on—is another scene of education, an exercise-ground where habits of initiative, service, discipline, and working together in groups receive vital elaboration. Beyond that, the very texture of daily life in the undergraduate community is an agent of education. The free-flowing interaction with contemporaries similar to oneself in talent and energy but different in background and outlook has a powerful capacity to open, enliven and stretch the mind. The spirited, inclusive community grounded in the residential colleges is Yale's great training-ground in living and working together in a heterogeneous society, an ethical education grounded in the realities of daily life. Everything Yale does to strengthen this community serves to improve the learning we afford.

Turning back to formal study, a school of Yale's institutional character—a research university where the college is surrounded by a constellation of graduate and professional schools—offers special benefits as a site for liberal arts education. By virtue of its scale, a research university can offer a far larger number of intellectual opportunities than would be available in a liberal arts college. The teachers at a school like Yale are not only active in research but typically preeminent in their fields, and this has further benefits for undergraduates. At such a school, intellectual discovery is not a distant activity or spectator sport. Students study in an environment where knowledge is being not just transmitted but created, and where they can be partners in the unfolding of new understanding.

But along with such benefits, a research university will always have potential downsides as a scene of liberal arts education. In many schools of this character, research agendas can be so compelling as to minimize the attention faculty are willing to pay to undergraduate teaching. The tight specializations fostered by graduate training and research careers can also lead faculty to focus on their parts of the intellectual landscape, with the larger educational whole receiving scant attention. At their best, the research and the liberal arts agendas of a university can be wonderfully complementary, with research creating an excitement that animates the teacher in the classroom, and teaching requiring clarity of communication and a sense of larger bearings with clear benefit to research. But these agendas are not inevitably harmonious, and care is required to make these goals mutually supportive.

Yale has kept undergraduate education much closer to the center of its enterprise than is the case at most comparable universities. This is a place where virtually no faculty member is exempted from the teaching of undergraduates. More positively (and more impressively), it is a place where faculty, including many of the most distinguished scholars, take considerable trouble with the intellectual development of their students. But to say this is not to say that our success is uniform or guaranteed. The competing priorities of the university require constant balancing, and mindfulness of all the ends to be served.

The central recommendation of this report is that Yale work to maintain and, where needed, to strengthen its commitment to undergraduate education as an inseparable part of its mission as a research university. It would be an impoverishment for undergraduates if Yale were to weaken its commitment to research, the source of so much intellectual vitality and opportunity. It is a value, not a limit, of this school that undergraduates

can advance to the frontiers of discovery in virtually every field of study by the end of their undergraduate years. But for the expertise of the faculty to bear its full advantage, the University needs to emphasize that sharing knowledge is a crucial complement to creating and refining it.

To this end, **the Committee on Yale College Education reaffirms the central place of teaching in the Faculty of Arts and Sciences.** If superiority of scholarly accomplishment is necessary for faculty appointments at Yale, excellence in teaching must also be given substantial weight in all hiring and promotion decisions. The University's high expectations about both teaching and scholarship should be made clear when new members join the faculty. We urge that Yale take as great pains to support the teaching aspirations of its faculty as it does their research activities, and that Yale celebrate outstanding teaching and scholarship in every possible way.

Given the strength of department-based research and teaching at Yale, this report will have relatively little to say about departmental programs. This does not mean that we value them lightly. On the contrary: we regard them as foundational to the health of the College, and we consider it of the first importance that their strength be maintained. At the same time, there are critical aspects of the training of undergraduates that no department can address alone and that may not register as priorities in departmentally-conceived programs. The goal of this report is to identify aspects of education that are less well served by current structures and to propose ways to support them, in complement to existing programs.

After consulting with faculty, students, administrators, and alumni, we have converged on a list of places where, in our judgment, undergraduate education could be most significantly improved. While maintaining and nourishing existing strengths, we propose that Yale adopt as goals to:

assure that the educational ambitions of Yale College are clearly articulated, reflected in a curriculum that fully serves these ambitions, and consciously embraced by students as they put their academic programs together;

sustain and strengthen a culture of close intellectual contact between faculty and students;

foster the existing disciplines as means to knowledge while supporting forms of inquiry that lie outside or between these disciplines, requiring knowledge to be combined in new ways;

strengthen education in the sciences;

- enhance the international dimension of Yale College education;
- increase opportunities for the study of the arts including through creative practice;
- improve academic advising, especially in the years before the choice of a major.

Our report elaborates on these goals and proposes a variety of means to achieve them.

DISTRIBUTIONAL REQUIREMENTS

The Committee did not set out with the principal purpose of reforming Yale College distributional requirements. Nevertheless, our inquiries revealed that current requirements inadvertently contribute to major problems in Yale College education. We therefore think it necessary to make changes—and we believe that if the whole of our recommendation is enacted, undergraduate education will be strikingly improved.

After the elective system was introduced into American colleges and universities, virtually all schools recognized the need to guard against two dangers that it created: education by incoherent, dilettantish smatterings and excessive narrowness of concentration. Early in the 20th century, virtually all colleges wrote two new sets of rules to govern the elective system, one to guarantee depth of education, the other breadth. The first of these, the idea that students should become deeply initiated into the rigors of some intellectual discipline, found expression in the idea of a major concentration; the second led to a mandated distribution of study outside the major area. It is a striking fact that, while the idea of a major has been almost universally adopted and changed little over many decades, breadth requirements have enjoyed no such consensus. Excellent schools have given very different answers to the question how breadth should be assured. Brown has no formal requirements; Columbia, a required great books core; Harvard, a core that mandates certain kinds of intellectual encounters with a fixed array of classes that fulfill the requirements. Duke has just inaugurated ambitious general studies requirements combining specified areas of knowledge, modes of inquiry, focused inquiries, and competencies.

Through the 1960s, Yale College identified eight areas in which study had to be pursued up to a certain level, which advanced placement work

in high school was allowed to satisfy. Yale did away with all breadth requirements in the late 1960s and replaced them with the “Guidelines for the Distribution of Studies” reprinted in the Yale College Programs of Study since that date. In the late 1970s, the faculty adopted the current system of distributional requirements, the demands of which were further fortified in the 1980s. The current requirements are that a student must complete no fewer than twelve courses from outside the distribution group of his or her major; that at least three credits must be earned within each of the four distribution groups; and that for a student whose major lies in Group I (languages and literatures), II (other humanities), or III (social sciences), at least two of the three course credits in group IV must be earned in the natural sciences (not, that is, “in mathematical, applied mathematical, or computational courses”). Students are also required to demonstrate competence in a foreign language at the intermediate level.

The peculiar logic of the Yale distributional requirements is that while they mandate breadth, they allow great freedom as to how this breadth is to be achieved. Unlike core curricula, the Yale system dictates what kind of thing students must study while leaving them free to find the particular course by which to satisfy this obligation. A generation later, the Committee on Yale College Education remains firmly committed to this philosophy. In our view, however desirable it is in theory to say that students should know certain things, whenever something is mandated, there is a cost to the learning obtained. Students end up taking a course in order to meet the requirement rather than from authentic personal interest, with sometimes deadly results for involvement and class atmosphere. We believe that when students have chosen their courses, they are almost inevitably more engaged in them—a first precondition for serious learning. We believe the Yale system gives adequate structure while allowing for the play of exploration and individual curiosity: another prime educational value.

Nevertheless, the Yale distribution system has flaws whose consequences are not trivial. Except for foreign languages, the current system remains almost spectacularly vague about the skills it expects students to build strength in, freeing them to avoid their weaknesses in ways that can prove seriously self-impoverishing. The failure to be specific about skills as distinct from subject fields also means that the requirements can be fulfilled in ways that make little sense: a student can currently fulfill the Group I requirement by taking two terms of introductory language classes and one term of first-level expository writing, but that hardly

seems the exposure to the Humanities the requirement intended. (The odd wrinkle about computational courses suggests another unarticulated distinction between skills and substantive fields.) Further, in the most blatant failure of the current system, whether a course counts for satisfying a distributional requirement is now a function of the instructor's departmental appointment, not its particular intellectual content. When this is coupled with the relative scarcity of science classes available to non-scientists and the competition non-scientists fear from students who might have a leg up on them, it creates a perverse incentive to satisfy the science requirement by seeking the courses designated Group IV with the least scientific content. The problem of Yale science education cannot be solved while the rule remains in effect.

The Committee weighed many alternatives in approaching these problems. We noted with interest the effort of other schools to frame requirements that articulate all the things they want students to learn: research skills, ethical reasoning, cross-cultural inquiry, and many more. We chose against such a course, not because we think these goals are unimportant (far from it), but because we are not persuaded that the multiplication of mandated categories is the way to produce a deeply engaged, broadly informed mind. Education is not like a recipe, where the desired outcome is produced by adding fixed quantities of discrete ingredients to the mix; nor do students make the most interesting use of educational opportunities when they are preoccupied with checking off the boxes.

Balancing our desire to promote exploration and intellectual engagement with the need for trained competence and broad exposure, we propose the following revisions:

In place of the current requirements, students will be required to take no fewer than two courses in the Humanities and Arts, two courses in the Social Sciences, and two courses in the Natural Sciences. In addition, they will also be required to take two courses in any field that give attention to the development of writing skills; two courses in any field that strengthen skills in quantitative reasoning and analysis; and such work as will allow them to attain competence in a foreign language at the intermediate level, or, if they have already reached it, to build their skills further. In doubtful cases, courses will be designated as meeting these requirements by the

relevant curricular review bodies based on their content and educational ambitions, not the affiliation of the instructor.¹

We hasten to add several comments.

First and most obviously, the proposed requirements constitute our idea of a minimal education, not an adequate one. They are a rough, schematic representation of the least that an educated person should seek to know. They are to be embraced as starting points, not goals.

Second, though we do not view education as the acquisition of some finite set of competences, we regard certain skills as sufficiently foundational that Yale should single them out for conscious attention. These powers hold the key to many things students will want to be able to know and do in later study and later life. People who fail to develop them at an early stage are limiting their futures without knowing what opportunities they are shutting down. As a result, we believe that students should not only develop these powers but should make this development an intentional goal of their college education. This is the aim of the requirements.

We also think it important that undergraduates travel some further distance in these skills however accomplished they may have become in high school. These competences mature and deepen: the best high school writer still has a way to go to become the writer he or she could be. Further, when the development of these powers stops with high school, the result can be a going backward, not a standing still. Students who do not use their math or foreign language skills in college commonly lose abilities they once had and can graduate knowing less than when they arrived.

We would require further work, then, both of those who obviously need it and those who seemingly don't. But we want to be clear about the form of work we have in mind. It is emphatically not our wish to require students to take any particular course as the way to satisfy these requirements. We believe that this sort of instruction should be widely disseminated throughout the Yale College curriculum, such that a student could choose a course in any number of subjects for its independent interest, and still receive training in the skill in question. Though we applaud the

¹ It should be noted that under this scheme, courses that focus primarily on a fundamental skill would satisfy a requirement in a competence rather than a domain of knowledge. English 114 would count toward the writing requirement and Spanish or Chinese 115 would toward the language requirement; they would not count for the Humanities and Arts. Similarly, Math 112 and Statistics 101 would satisfy the requirement in quantitative reasoning, not the Natural or Social Sciences.

English Department for teaching expository writing, it is not our intent to require each Yale College student to take a course in expository writing. Rather than isolating this study from the rest of education, we envision serious writing training as being available in scores of courses in many disciplines, in the Humanities, in the Social Sciences, and ideally in the Sciences as well, such that it could be integral to and receive reinforcement from a student's whole program of study.

The quantitative reasoning requirement aims to increase student appreciation and command of numerical representation and its cognates. The mental rigor that results from this study has been celebrated for as long as formal education has existed. In addition, in modern times, applications of quantitative methods have proved critical to an astonishingly wide range of disciplines. Here again, however, it is not our idea to require any particular class in any particular department. The Math, Statistics, and Computer Science Departments would make obvious contributions to such teaching, but students would also be able to fulfill this goal in appropriate courses in Physics, Chemistry, Geology, Astronomy, and the various Biology and Engineering departments, and in Psychology, Economics, Political Science, and Sociology as well.

We recommend that a course be marked as satisfying these requirements by a superscript of W (for writing) or Q (for quantitative reasoning) on its course number. Clearly, not all courses in which writing is required or numbers used should count for this purpose. To meet these requirements, a course must make significant use of the ability in question and offer students a clear occasion to bring their command of this power to a higher level. On the other hand, the threshold must not be so high as to restrict appropriate classes to courses "in" the given subject. Though many courses would satisfy both a domain and a skills requirement, a single course could only be used to meet a single requirement. A class might well qualify as both a Humanities and a writing course or as a Social or Natural Science and a quantitative course, for instance, but a student could only count it one way. In staging these requirements, the faculty should emphasize the importance of addressing each skill early and building on this start in a purposeful way. When the new plan is adopted, explicit expectations should be laid out for the freshman and sophomore years to assure an early start while avoiding a trainwreck of colliding requirements. Detailed criteria for courses to meet the quantitative and sciences requirements—the two areas where a change in current practice is most needed—are proposed in Appendix 1.

Further, to satisfy the aims we have in mind, these changes in the distributional requirements have to be made in tandem with other changes. Satisfying a set of requirements never produced a good education, however enlightened the requirements. An academic obligation is only as good as the intellectual opportunities available for fulfilling it; and even then, its value will depend on whether a student is meeting the spirit or the letter of the law. For the new requirements to work, Yale must consciously strengthen the instruction it gives in the skills in question across wide areas of the curriculum. Quite as important, for these requirements to be successful, they must be implemented together with advising that can make these competences into actively pursued educational goals.

In thinking about this matter, the Committee was struck by something recently built in our midst. Some years ago, Yale College addressed the question of how to strengthen foreign language instruction. Yale had traditionally left such programs to the many separate departments of language and literature. But this arrangement left language instructors in different programs severely isolated from one another, and it left program quality at the mercy of each department's degree of interest in language pedagogy. Taking elementary language instruction out of the departments and locating it in its own administrative center, as some universities have done, held out the possibility of helping with these problems but created problems of its own: in particular, it broke the vital link between introductory teaching and higher-level language uses.

With help from the Mellon Foundation, Yale pioneered a different model. We kept these programs as integral components of their departments but gave them supplementary support through a newly-created Center for Language Study. In complement to the departments, this Center has created a community among language teachers; supplied a place where shared issues of language pedagogy can be addressed; offered incentives for curricular experiment and support (including technological support) for new teaching practices; and provided a way to keep in touch with enlightened developments outside of Yale.

We urge that similar centers be created in support of the other areas highlighted in the new requirements. It is essential that they be equipped with adequate resources to fulfill these teaching missions. To be more particular:

The Committee recommends the establishment of an expanded version of the current Bass Writing Program to support writing instruction across the curriculum. We recommend that this program be strengthened

along the lines proposed in the Report of the Committee on Writing Instruction, which was warmly received by the Yale College faculty in November 2002. (The Report is available on the web at <http://www.yale.edu/yalecollege/faculty/>) The Center would help faculty rethink the writing components of their courses whatever the discipline, supporting this task through workshops, grants, and consulting services. The Center would also administer an amplified version of the current writing tutor program tailored to student needs and to needs in specific courses or clusters of courses. The Committee is eager for undergraduates to improve their abilities in speaking as well as writing. This Center would be the base from which to strengthen skills in oral communication as well.

We also call for the creation of a center to support the teaching of quantitative reasoning. Like the Center for Foreign Language Study and the Bass Writing program, the QR Center would not supplant the role of departments but would supply what no department can realistically manage on its own. Many existing courses would already meet the new Q requirement, and many more could meet it if they made this aspect of instruction a more conscious goal. At present, however, there is no way to highlight this goal or to give teachers support in meeting it. In addition, beyond already-adequate courses and revisions of existing courses, we will almost certainly need further curricular developments if we are to boost the quantitative skills of all undergraduates. But as of now, there is no place for seeing this area of instruction whole and spotting what further might be needed.

Supported by a faculty council and staffed with appropriate pedagogical and technological expertise, the QR Center would draw faculty from disparate disciplines together around shared pedagogical concerns, providing a place for the exchange of good ideas, offering incentives for curricular innovation, and supporting course improvement and new course creation with appropriate dedicated resources. Given its perspective on larger instructional needs, the Center would also be in a position to second departmental requests for incremental faculty resources to meet this educational aim. The Center would also administer an extensive tutoring program to help students of all abilities meet the challenges of this form of learning and would advocate for classroom needs in quantitative areas. The outfitting of classrooms with appropriate computer support and projection equipment will be an important part of this initiative. The Center would work in close alliance with other forces promoting the teaching of quantitative reasoning: the faculty cooperating on unified Statistics train-

ing for social and natural science majors, the staff of the Statistics Lab, the Director of Math Instruction in the Math Department, and so on.

We do not believe that the Course of Study Committee is the proper body to decide which courses should count for Q credit. In our view, the Faculty Advisory Committee of the QR Center, which would include faculty from the core departments of Mathematics, Statistics and Computer Science and representatives of other relevant disciplines, would be the group to certify courses for this purpose. This would have the advantage that the committee that would "vet" courses would also be in the position to provide resources for course development and improvement: judging that courses meet the aims in question and helping them to meet those aims would become parts of a single process. In the same manner, the advisory committee of the Writing Center would designate courses for W credit, and the faculty on the advisory committee to the Science Teaching Center proposed later in this report would decide which courses meet the new science requirement.

We regard such teaching support to be integral to the success of the new distributional system. It is not our thought to send students to meet new requirements solely from existing courses: this Committee has the profound conviction that academic requirements only work when they are accompanied by an ample array of well-conceived, compellingly taught courses in which to satisfy these goals. The new requirements and the means to meet the requirements must come into existence at the same time. As soon as the faculty endorses the new system, appropriate committees should be convened to designate courses for the new distributional requirements and to advise on areas of needed development. Once the new requirements are passed and courses begin to be designated in the needed ways, students should be permitted to meet either the requirements they entered with or the new requirements if they so choose. We urge that the new requirements be made mandatory by the time the Class of 2009 enters in the fall of 2005. This will give the faculty two years to take the necessary curricular steps.

Finally, some further remarks on the foreign language requirement. The study of languages has long been understood to be one of the rudiments of a liberal arts education. The benefits of language study include (but are not limited to) increased understanding of how languages work, often resulting in heightened sophistication in the use of one's own language; unmediated access to texts otherwise available only in translation, or not at all; and the ability to cross cultural barriers by being able to

communicate across linguistic bounds. In the internationalized world of the 21st century, this form of education will become yet more important. To participate fully in a global society, students will need to be able to enter into profoundly different cultural settings and communicate across cultural lines.

With these thoughts in mind, the Committee reaffirms the centrality of foreign language study to undergraduate education but proposes certain modifications to the requirement. We continue to believe that serious command of a foreign language takes more than a single year of study. At present, a student is able to satisfy the foreign language requirement by achieving an appropriate advanced placement score, or by passing an examination at Yale, or by passing intermediate-level courses in a foreign language at Yale. In order to promote first-hand experience in foreign cultures and the learning of language in real-world settings, **the Committee recommends that students be allowed to satisfy the foreign language requirement by completing the introductory level of language instruction in the classroom and then completing an approved summer study or internship in a foreign-language-speaking setting abroad.**

When an academic program is used to satisfy this requirement, the College will assess the program and certify it for distributional and/or course credit by the usual standards and methods. The Committee believes that certain kinds of non-classroom experience should also meet the requirement if they can be shown to provide real and accelerated language acquisition along with a valuable cultural immersion. The faculty advisory committee of the Center for Language Study would set the criteria for approval and supervise the process by which the eligibility of proposals is determined. For this recommendation to work, the University must significantly expand its ability to help undergraduates locate suitable international opportunities. More detailed remarks on this issue follow later in the report. As we promote international experience as a way to fulfill the language requirement, it will also be important that students plan these parts of their program in a thoughtful, foresightful way. In our ideal scenario, students electing a foreign language class in the freshman year would already be thinking how they might follow it up with an experience abroad the following summer, and how they could build on that learning in later coursework.

Finally, we have noted our belief that, whatever their attainments before coming here, students should travel some further distance in developing foundational skills in the course of their college years. We believe

that it makes better educational sense to set Yale's language requirement in these terms than in terms of a fixed point to be reached. **For students who arrive at Yale without demonstrable language skills, the Committee recommends that three terms of foreign language (rather than the current four) suffice to meet the foreign language requirement, or two terms followed by a suitable experience abroad.** This will require a considerable "distance traveled" for them while also recognizing the value of other educational opportunities and priorities: when students require four terms of coursework to meet the requirement, they must spend one sixth of the credits required for graduation in introductory or intermediate foreign language instruction. To solve the problem of the leftover credit fraction (three terms of language yields 4.5 credits), **we also propose that students be allowed to join half-credits from disparate subject areas, for instance a language class and a lab,** as they are at many comparable schools.

For students who arrive at Yale with the equivalent of one, two or three terms of language competence, the current requirements will continue to apply, with the new international option added. To serve these students, it is highly desirable that the most commonly taught languages be offered in staggered fashion such that (for instance) the current Spanish 115b or 130b could be taken in either fall or spring.

Many students have enough previous study to pass the current language requirement upon arrival, and some students with a native language other than English pass the requirement by that means. Because of the complex and continuing benefits of language study, however, **we recommend that all students be required to engage in some form of post-secondary language study regardless of the level achieved at the time of matriculation.** Students who can show intermediate-level competence in a foreign language upon arrival would have several options by which to meet this requirement. They could enroll in a one-semester course that further advances their linguistic training in the same language, for instance a course in literature or culture. (This may require innovative course development at the appropriate levels.) Or, by special arrangement with the instructor and the DUS of the relevant foreign language program, they could extend their competence by completing a significant portion of the work of a regular Yale course using their foreign language in place of English. Or they could undertake an approved experience abroad in a country where their language is spoken. Alternatively, they might begin the study of another language. All that would not be permitted would be to make no further use of language acquisitions during the

college years. A student for whom English is a second language could demonstrate the “distance traveled” by doing further work in English or studying another foreign language.

An afterword on CR/D/F. The current Credit/D/Fail policy aims to encourage students to experiment at courses that might prove very challenging for them, but the actual use of this option deviates widely from the intention. Students pointed out to us that it is often the easiest courses that are available to be taken CR/D/F while many advanced courses fail to offer this option. In addition, the Committee heard evidence that a primary use of the CR/D/F option in the sciences is to avoid serious work in satisfying the distributional requirements—indeed, some students base their course selections in the current Group IV on whether courses are offered CR/D/F.

We do not believe that it is appropriate for students to expect to satisfy Yale’s distributional requirements in ways that require significantly less effort than other academic goals. Therefore, **we recommend that students not be allowed to use the CR/D/F option in courses taken to fulfill the distributional requirements.** On the other hand, to encourage broad experimentation and to avoid the lumping of CR/D/F adopters in particular courses, a phenomenon encouraged by the current system, **we recommend that students be allowed to take any course *not* used to satisfy the distributional requirements CR/D/F up to the limit of four courses in a student’s career.** The only exception would be that departments and programs could, if they chose, restrict the number of courses that could be taken CR/D/F to satisfy the requirements of the major.

To be completely explicit, under our recommendation, faculty would no longer be free to close their courses to CR/D/F adoption. Though local option sounds sensible and harmless, in practice, this system has been severely distorted by the choices faculty have made. We recommend that these changes to the CR/D/F system be reviewed after three years to make sure they have produced the desired results.

SMALL CLASSES IN THE FRESHMAN AND SOPHOMORE YEARS

Though excellent and important instruction takes place in lecture settings, small classes have a special value in fostering active intellectual engagement, and they are the breeding ground for the sort of close relations with faculty that carry education beyond the bounds of the classroom. With nearly 2000 classes for 5200 students, Yale College provides a particular abundance of small courses. The Committee in general celebrates this fact. But we are concerned at the number of classes that are small because overspecialized in conception, and we note that for all their apparent abundance, Yale lacks certain kinds of small classes that are highly desirable. The availability of seminars for juniors and seniors in some oversubscribed majors is one issue deserving attention. We also believe the small group experiences should be more available than they currently are to students in their first years of study and that faculty, departments and programs should give higher priority to fulfilling this objective.

Yale already provides many chances for freshmen to learn in a smaller setting. Math, foreign languages, and the expository writing offerings in English are all taught in small sections, so that the typical freshman already has a number of small classes. In addition, there are many freshman classes that, while they also build foundational skills (for instance in writing), give introductions to broad fields of study in a true seminar environment. These would include the Directed Studies program in the Humanities, the Perspectives on Science program, and the introductory classes in close reading of literary texts that large numbers of students elect in the freshman year. Beyond this, freshmen have access to the whole array of seminars offered in the College (those that a freshman can get into, at least), and many find small-class opportunities not specifically designed for their benefit.

We also accept the notion that a good lecture course can make an excellent introduction to a field, and that there are certain subjects—particularly those in which knowledge is cumulative—in which the lecture format might make better sense at the introductory level than a seminar. In thinking of introductory offerings, we will want to keep a blend in mind. The best schedules combine lecture courses with smaller courses of varying kinds.

A question the Committee pondered was whether Yale should create a standardized freshman seminar program. The national literature stresses

the benefits such seminars can offer in generating intellectual excitement, nurturing relationships with faculty and peers, and aiding adjustment to life in a more sophisticated setting. In the end, however, we decided against such a recommendation. Given the number of small classes already available, we did not regard this issue as the problem at Yale that it may be elsewhere. Further, in researching peer colleges and universities with formal freshman seminar programs, we found a series of trade-offs that seemed to us to argue against such an approach. The deployment of ladder faculty to freshmen seminars can create gaps in offerings for more advanced students, so that what is gained in one place is lost in another. (Many students pointed out that current opportunities are much more problematic for sophomores than they are for freshmen.) In addition, freshmen seminar programs that start with a cadre of ladder faculty often find it difficult to sustain their participation, creating problems for future years.

But while the Committee does not favor creating a standardized freshman seminar program, **we recommend a major effort to increase opportunities for students to study with ladder faculty in small groups in both the freshman and sophomore years.** The appropriate opportunities would take different forms in different parts of the curriculum, and we believe that they will come out best if they are not centrally designed. Nevertheless, it is desirable that there be central coordination of these offerings to ensure that they are visible to students and that they include a good array of choices. To help with this aim, **we recommend that a member of the staff of the Yale College Dean's Office be designated to coordinate small-group learning before entry to the majors.**

Our study convinced us that, in addition to their current teaching at this level, ladder faculty in the Humanities could offer a modest but critical number of freshman and sophomore seminars that would provide broad humanistic instruction in the instructor's area of expertise. To make this possible, faculty members in the Humanities should normally be expected to teach one of these seminars every three years. Freshman and sophomore seminars should meet twice a week, not once, to promote the desired contact between students and faculty, and they should require research, analysis and writing at an appropriate level. Seminars already taught at this level—Directed Studies seminars or the introductory literature classes—would fulfill this faculty expectation.

In the Social Sciences, the issues are somewhat different. While some departments offer small-group options for freshmen—Economics for

instance, which teaches its introductory-level course in both a large lecture and seminar format—several prefer the lecture format for first-level instruction and think small-group opportunities more advantageous at a later point. For departments swamped with large numbers of majors—particularly Political Science, Economics and Psychology—the greatest perceived need is for small classes in the junior and senior years.

Different cases will need to be addressed in different ways, but social science departments need to think about student-faculty contact in the early years more systematically than they do now and to create appropriate opportunities where they are lacking. Some of these departments—Anthropology, Sociology, and Political Science come to mind—would be naturals to offer broad-based liberal arts seminars like those described for the Humanities and should make this a priority in their teaching programs. Some (not all) of these departments may require further resources to meet these goals. Supplying this need should be a priority for the University, but only after the teaching already available has been reallocated as effectively as possible. In this division as in the Humanities, if members of the faculty were to teach one such course every three or four years in lieu of a specialized advanced seminar, a good deal of teaching would be available.

Because of the number of things that must be mastered before one can fruitfully join the discussion, in the sciences, the freshman seminar is often not as useful a teaching vehicle as it is in other divisions. On the other hand, at Yale, science students are the ones who complain most loudly about large classes and lack of faculty contact in the early years. Here, other models should be pursued.

We have one success in the recently-created Perspectives on Science program, which allows sixty freshmen to discuss pathbreaking research with faculty in small groups while still taking the large classes they need as prerequisites for later study. We encourage the development of more courses on the "Perspectives" model, which could usefully be extended to more specialized areas. To cite one example, enrollment in the Engineering majors is kept down to some extent by the number of prerequisites students must take before making contact with the excitement of this field. There is no skipping these studies, but students could be given a taste of the eventual payoff through a program like Perspectives that focused on current discoveries in technology. Getting to know faculty in this intimate setting would be an excellent way for students to join the

community of inquiry in this field. Perspectives programs might be designed for other settings as well.

Another possibility would be a science analog to Directed Studies that might be called Foundations of Science and Technology. Several of the foundational courses in science (introductory physics, chemistry, mathematics and biology) are required or recommended for a wide variety of science majors. Coordinated classes could present this material with a stronger sense of the connections of underlying concepts than departmental offerings achieve, creating an appreciation of the relations among scientific disciplines. Like Perspectives, this program could help recruit outstanding science students to Yale. It would have the further benefit of creating for science students the sense of camaraderie and common purpose that Directed Studies creates for non-scientists.

An augmented Perspectives program and a Directed Studies in Science would serve students already committed to this area of study. But we are equally concerned to improve the science education of non-scientists, and small-group experiences would have particular benefit in this regard. Classes that permit significant direct contact—courses limited to 20-35 students—taught in areas of particular scientific excitement would provide a valuable alternative to the large introductory lectures. Even a relatively small number of such classes would provide a boost to the quality and perception of science education at Yale.

While the initiatives in all divisions will be best developed in a decentralized fashion, it will be important for some office to survey the whole body of offerings and identify areas that need development. A member of the Yale College Dean's staff working with the support of a broad-based faculty committee should be put in charge of this venture. This person will work with department and program faculty, chairs and DUSes to learn of existing options and to help shape new ones, and to advertise the whole universe of opportunities to students. It will be essential for individual faculty members and departments to work seriously at creating the right kind of courses for this level. This office must have resources to support faculty in the course development this effort will require.

We expect that much of the teaching for this venture can be obtained by making such instruction a more explicit priority for departments and by redirecting faculty from specialized courses with small enrollments. (The curricular review process proposed later in this report will make departments more mindful of this part of their obligation.) Where this is not possible, this office will work with other groups overseeing the

undergraduate program to instigate course development and supply the means to support it. As we envision things, for instance, a faculty committee on science teaching would take the lead in identifying needed new forms of science instruction and arguing for new resources to staff them. The central office would not direct this process, but it would stay in continual close touch with it, to make sure that science played an appropriate role in the program of small-group offerings.

Once an appropriate array of courses has been identified, an obvious option would be to mount these classes within the residential college seminar program. With valuable exceptions to be sure, there is a widespread perception that the College Seminar program is no longer the vital contributor to Yale College education that it was at its founding. Embracing the mission of creating close intellectual contact between newer students and ladder faculty could give the program a revivifying new function. Housing this teaching in the residential colleges would build on one of Yale's greatest assets and give such courses a natural home. A class taught in a college, by a fellow of a college, giving priority to freshmen and sophomores from that college, would create social and intellectual bonds of enduring value. If each college hosted two such seminars a term, not an onerous ambition, nearly 900 places would be created. An adapted version of the current application system for college seminars would help apportion access to these classes in a convenient way. The master and students of a college could still have a voice in shaping the offerings for their college, in supplement to coordination from a central office.

We note in passing that the teachers students meet through these classes would be natural advisers for their later education, so that this change would further several of our purposes. In turn, a strengthened advising system will be able to highlight the value of these opportunities and make students more purposeful in seeking them. We also note that courses of this sort provide an obvious place to give close attention to writing and quantitative skills and to train students in the use of resources for research and scholarship in Yale collections and on the Internet. Without encroaching on the curricular inventiveness of the faculty, the office overseeing these opportunities should work to link these courses to these overarching educational goals.

Finally, a discussion of close contact between teachers and students should include a word on graduate students as undergraduate teachers. Graduate students can supply an important supplement to instruction, especially in large lecture courses and certain introductory teaching. But

for the sake of undergraduates and graduate students alike, graduate student assistance should always have a carefully considered pedagogical justification. This committee heard much praise for individual teaching fellows and the value they provide in certain courses; we also heard many complaints from Yale College students that they have too many sections with too little educational purpose. This problem cannot be solved through a global policy: the essence of the challenge is to see what kind of help yields what value in the context of different courses. That said, we urge that individual faculty and departments regularly rethink the role of graduate student teaching fellows to ensure that it serves the educational needs of all parties. In any case, it is essential that such instruction should supplement, not replace, the direct engagement of students and faculty that is the core relationship of undergraduate study.

UNDERGRADUATE SCIENCE EDUCATION

The features of reality that science equips us to understand and shape—genetics and human health, the environment, information and communications technology, to list only the most obvious examples—have become more central by the decade and will be yet more important in future years. For this reason, scientific illiteracy will be an increasingly costly impairment to anyone aspiring to be an effective citizen of the future world. Yale is a major center of scientific research activity and a student coming here can get first-class training in a large variety of science fields. But for complex reasons, science education at Yale presents obstacles that students do not face in other divisions.

Social and cultural factors make the study of science a challenge in our society at large. The current system of secondary education in the United States leaves many students poorly prepared for college-level science, or not prepared at the level faculty expect to start from. In addition, the culture of scientific research provides faculty with few incentives for creative teaching at the undergraduate levels, in contrast to the strong incentives available for research. These difficulties are faced by all undergraduate institutions, but at Yale they are joined with problems peculiar to this institution that make the situation harder yet.

The first is the geography of the campus. At Yale, science has been segregated into two areas on the periphery of the University, Science Hill and the Medical Campus. While the distance between these zones and Central Campus is not large in physical terms, it looms large psychologically. For undergraduates, the geography of the campus reinforces the notion that science is an area of scholarship divorced from other areas of learning, to be visited only with massive inconvenience.

This problem is intensified by the makeup of the undergraduate body. Yale has a smaller fraction of non-premed science majors than many of our peer institutions (for instance Princeton or Stanford) and a larger fraction of students who decide at some point that they are “not science people.” The result is that non-premed science students can find themselves relatively isolated at Yale, and that undergraduate culture does not foster a high degree of interest in and respect for scientific inquiry.

Certain structural features of science instruction aggravate these difficulties. The vast majority of the biomedical science courses taken at Yale are chosen to satisfy medical school admission requirements. The outcome is a clustering of students in a small number of introductory lecture classes and their accompanying labs, and this affects the character of such courses. Many are large, impersonal, and highly competitive, providing relatively little emotional or academic support. In our focus groups and a survey we conducted, students identified this as a major source of unhappiness—and a sharp contrast to their experience in other areas of study. Meanwhile, outside of courses that science students take as prerequisites, Yale has a relatively thin curriculum for the general exploration of this field. The current system of offerings has a tendency to bifurcate into courses designed for science majors and courses implicitly marked as not for serious scientists.

Not surprisingly, our exploration of student attitudes toward science and mathematics made clear that a great deal rides on the first exposure to these subjects in college courses. Students frequently abandon science, not just as a possible major but even as a continuing interest, as a result of a single bad experience early on. In some cases they do not try again until very late in their college career, and then regret that they missed out on what might have been an important part of their education.

We recommend that Yale bend every effort to make teaching in the sciences as compelling and richly available as any other form of study on this campus, both for students intending to go on in the sciences and for those who are not. It would be important in any case for Yale to

address this issue. The disincentives currently attached to the study of science leave too many students weakly prepared in an essential domain of knowledge. But the fact that Yale is currently investing \$1 billion in science facilities makes it critical to face this challenge now. The rebuilding of science instruction must be an integral part of the rebuilding of science at Yale.

While a certain amount of the problem of science education arises from the nature of the subject, much could be done to improve the situation. Since the current situation arises from many causes, changes need to be made on many fronts. We offer seven major proposals.

1. The Committee recommends that Yale undertake major curricular initiatives in the sciences. Proposals made earlier in this report will reduce the temptation for students to seek the least “scientific” science course, one of the principal banes of Yale College education. In the future, courses will not satisfy the distributional requirement in science unless they are adequately rigorous and adequately rooted in scientific thought. But at the same time that Yale closes this loophole, we must make a sustained effort to generate the right kinds of learning opportunities in science and engineering. We have identified several areas where curricular innovation is particularly needed.

First, **Yale needs to encourage the development of courses similar in rigor to the introductory courses for science majors but different in approach.** Many students complained of the division between science courses designed to lead to continued study in the field and those designed for students whose interest and ability are minimal. What is lacking are courses that make serious intellectual demands but have a different ambition from laying the groundwork for advanced study. Broad introductions to fields of science organized around topics of general interest to educated citizens would be obvious examples of such a class. Chemistry 103, Chemistry, Energy, and the Environment, is a praiseworthy recent attempt to create such a course; there would be demand for equivalent classes in Biology, Computer Science and the various fields of Engineering and Applied Science.

Another useful category is courses that attempt a deep study of a focused aspect of a field to introduce scientific methods of thought. Full courses on such topics as the science of air or water pollution or the molecular origins of disease, which are usually only touched on in introductory surveys, might allow non-majors to achieve deeper understanding than they typically now obtain. Such courses should have content and

workloads similar to those in the introductory courses for majors. The focus, not the level, should be the difference.

Second, given the critical role that early experiences play in undergraduate science education, **Yale must develop more opportunities for freshmen to have close contact with science and engineering faculty.** A college-wide program that encourages intimate academic experiences must have a strong component addressing the sciences. This report has already spoken of the value of creating a Directed Studies for the sciences and of generalizing the current Perspectives on Science program. Another success we should try to replicate is that of STARS (Science, Teaching and Research Scholars). A meeting this committee held with students in STARS formed a striking contrast to our meetings with other pre-med students. This program has had major success at countering the discouragement students can experience in science by supplying strategic supplements to instruction (for instance by upper-class student mentors) and building strong communities of study support. Students spoke of STARS as like a family, where members pool their efforts to help each other through. STARS was created to address the needs of women and under-represented minority students, but if such support could be built more broadly, many students might persist in science who now give up in frustration.

This report also spoke of the need to develop small classes to accommodate some significant number of non-science majors. Courses of this kind are not recommended for students who already know they are likely to major in science, who should be encouraged to start with the mainstream introductory sequences. However, it is to be hoped that some fraction of students who enroll in these courses might decide to become science majors. To allow for this possibility, science departments should be encouraged to restructure their majors such that they can be chosen by students who do not start the major immediately upon their arrival at Yale.

Third, **we recommend a major review of the laboratory courses attached to the large introductory surveys.** We heard many complaints about the poor integration of labs with the courses they are nominally connected to. In some labs, the subjects covered have also become antiquated; in many, the pedagogy is needlessly divorced from the realities of current scientific inquiry. If the Committee's recommendation about curricular planning is adopted, in future, the reassessment of such foundational instruction will be a regular exercise; but we need not wait to begin

the work. The Committee was delighted to learn that the Physics Department is already overhauling its laboratory courses as part of a redesign of its whole undergraduate program.

These are not all the curricular initiatives that would be valuable, but they would make an ambitious start.

2. To lead the effort to improve science education at every level of engagement, we recommend that Yale build a Science Teaching Center. For any of these projects to succeed, faculty must be willing to develop new kinds of courses. This will be a far more formidable task than devising standard courses, for which curricula, textbooks, and other materials already exist. Since these initiatives transcend specific fields and require special resources and incentives, it is hard to see how they can be achieved within the departments, where curricular effort now takes place. The Committee believes that these ends could be most effectively served through the creation of a Science Teaching Center that would work in complement to the departments.

To fulfill its complex function, the Center must be ambitiously conceived and relatively lavishly resourced. In our vision, the Center would contain a variety of mutually supportive features. Since one of its aims will be to bring students and teachers together in a shared space of activity and inquiry, the Center would house many activities alluring to students. It would provide centrally located classroom space for science lecture courses and seminars, including some large introductory courses and courses for non-majors. It would supply a place for major lectures, visits by distinguished visitors from academia, government, and industry, and other activities aimed at inspiring greater interest in science. It would also provide a home for undergraduate programs like STARS, Perspectives on Science, and the science version of Directed Studies, and would give a home base to extra-curricular activities including science clubs and journals.

Students would be further drawn to the Center by various kinds of support for science study. At the Center, students would also be able to learn about research opportunities on the central and medical campuses. A richly elaborated tutoring program in the Center, combining the services of peer tutors, graduate students, faculty, and Center staff, would complement the Math and Science tutors in the residential colleges. Fully elaborated, this program could provide college-wide and nearly round-the-clock help geared toward specific courses and general areas of difficulty.

The Science Teaching Center would have something to interest students of every level of ability and promote appreciation of science and engineering among the whole student body. Appropriate amenities would help make this a place where students would enjoy spending time. Meanwhile, the Center would also supply a place for teachers to work on science teaching. It would be a place where instructors and teaching fellows could educate themselves about pedagogical innovations at Yale and elsewhere and incorporate new practices into their courses. In support of these efforts, the Center would supply resources and incentives for course development and course improvement, including both financial resources and technical and web support provided by Center staff. To improve computer aided teaching in science and quantitative reasoning, a number of classrooms would be equipped with advanced computers and electronic displays.

It is our thought that a group of faculty fellows would be appointed in the Center (somewhat on the model of the Whitney Humanities Center) as a visible cadre of faculty with particular concern for undergraduate teaching. Incentives for these fellows should be substantial, since a good deal would be asked of them. Fellows would be expected to teach through the Center and attend Center events, and they would serve as a transdepartmental advisory board on undergraduate science education. Like the committees proposed for the Quantitative Reasoning and the Writing Centers, the Science Center Fellows would administer the new science requirement, "vetting" courses for science distributional credit and supporting needed changes with course development resources. In addition to responding to individual proposals, the fellows would look at undergraduate science offerings in a comprehensive way to spot areas of deficiency or opportunity, and would proactively solicit proposals in needed areas. They would control the funds to commission new courses and would advise on incremental staffing that might be needed to teach such courses.

The fellows would make recommendations in this regard to the Yale College Pool, which is discussed below. Where it will yield the desired benefit, the advisory committee would seek to meet incremental teaching needs with ladder faculty. But certain kinds of non-ladder appointments would be appropriate and useful as well. These could include appointees hired for special skills in pedagogy, some of whom already make extremely valuable contributions to science instruction. It could also include distinguished visitors, scientists and science educators from outside Yale

who might be brought in for a single year or semester to satisfy specific educational needs.

It might also include a post-doctoral program, in which science and engineering faculty would be encouraged to apply for a post-doctoral position on a one-time-only basis, with the understanding that the postdoc would spend part of his or her time assisting or collaborating on the faculty member's research, and part time working with the faculty member to develop and teach a new course for non-scientists. The Center would support the salaries of this teaching staff and provide office space and a "home base" when this is not available in the relevant department.

The QR Center proposed earlier in this report cannot be fully subordinated to the Science Teaching Center, since it will provide support for teaching and course development in the Social as well as the Natural Sciences and Engineering. However, given the centrality of quantitative reasoning to science education, we believe that it makes sense to house the QR Center within the ST Center. Its advisory board will be augmented with social scientists and mathematicians but should include some overlap with the ST Center fellows. The relation of the centers should be envisioned such that their staffs will cooperate in all appropriate ways.

Finally we turn to the issue of location. If the Center were on Science Hill, it would be easier for faculty to make use of the resources. But the student-based purposes of this initiative would be far more difficult to achieve, since the distance issue would be left unaddressed. Therefore, the Committee came to the conclusion that the Center would best be located on Central Campus, possibly in the Lower Hillhouse or Lower Prospect area. We envision the ST Center as abuzz with activity at all hours of the day. Minimizing walking distances from the residential colleges is essential for realizing this goal.

3. We recommend that Yale enrich and expand opportunities for direct participation in research. Mentored research activities can be among the most important experiences in an undergraduate's education. Such opportunities are particularly critical in the sciences. This is where much of the most rewarding faculty-student contact takes place in these fields, and direct engagement in research gives students their best taste of the nature and the power of scientific inquiry. Participation in original research is an integral part of undergraduate science education at Yale, and more than 90% of science majors undertake summer or academic-year research with science and engineering faculty throughout the University.

Although most students report satisfaction with directed research experiences, it is our impression that these experiences are of varying quality. To assure the uniform excellence of this important element of education, we endorse recent efforts to spell out obligations and expectations for research conducted for credit. Undergraduates and their faculty mentors should share the expectation that the student workload is comparable to a typical course; that regular, face-to-face contact is required between the student and the mentor; and that the work the student will be engaged in will have proper educational goals. (It should not be clerical or custodial.) The College might sponsor an annual meeting for new mentors of undergraduates to review and discuss these expectations. This would also be a chance to make sure that mentors understood the way student work is to be evaluated in Yale College: the Committee notes that grades earned in directed research have a very high level of homogeneity.

To make students aware of the opportunities around them, an evolved version of the Office of the Dean's Adviser on Science Education should continue to track credit-bearing research experiences and to advertise their availability. (This is currently done on the Yale Science and Engineering Research website.) This office will provide the institutional memory to ensure that new students are directed to the most valuable situations; it can also provide feedback to mentors on ways to optimize the education students receive in their labs. As mentioned above, this function should be lodged in the Science Teaching Center.

We also suggest expanding the current Yale College Dean's Research Fellowship Program to provide summer stipends to students who have established research relationships with faculty and labs during the academic year.² In addition to the support faculty provide from research grants, eight programs currently fund approximately 100 summer research fellowships for undergraduate scientists. We would like to see these programs expanded to ensure that undergraduate access to high-quality research experiences is not limited by the availability of faculty grant funds. Assuring funding for such opportunities should be a serious priority.

Helping students find financial support for research activities would be another function for the office just mentioned. In addition, that office should work with departments to create opportunities for students to present their work to a broader audience. These "research day" programs

² Yale research fellowships support student work not just in the sciences but across the whole program of study. We encourage their development in all the academic fields.

or poster sessions would be natural events for the Science Teaching Center to host. **To recognize the important teaching done in this context, we also recommend that an award for outstanding research mentoring be awarded together with the teaching prizes at Commencement.**

4. We recommend that Yale strengthen the teaching of science and technology in social context. The Committee does not recommend that courses whose principal focus is on the social context of scientific developments be allowed to satisfy the distributional requirements in science or quantitative reasoning. When they can count in that way (as they often do now), such courses are often chosen to the end of avoiding the core aim of the requirement, and a serious educational goal is defeated.³ But separated from inappropriate uses, such courses provide enormous enrichment to the education of undergraduates, scientists and non-scientists alike.

For this reason, as a complement to science education proper, we urge that Yale provide a richer menu of courses examining the intersections of science and technology with ethics, medicine, law, economics, national security, business, politics, and government. Courses of this sort are currently offered in various disciplines and programs: Biology, Computer Science, Environmental Studies, History of Science and Medicine, and Political Science, among others. We propose that such courses be increased in number and coverage. To encourage this development, we recommend that resources and incentives be made available for the creation of these courses through the Science Teaching Center in the same way as they would for other science courses.

This is the first of many points at which this report will stress the need to build education in the space between disciplines in Yale College. But here as elsewhere, the Committee understands interdisciplinarity to mean the conjunction of plural forms or fields of knowledge, not a space of undisciplined speculation. It is important that these courses be taught by instructors with substantial knowledge of both the relevant science and technology and the elements of "society" that they address. Given the varieties of expertise that will be required, we note that team-teaching might be particularly appropriate for such courses and that the provision of an appropriate post-doc to complement a faculty member's range of knowledge might be especially helpful. This would also be an area in which faculty from relevant professional schools—particularly the

³ These restrictions do not apply to the teaching of relevant social issues in a course whose principal focus *is* scientific—a development we would encourage.

Schools of Medicine, Nursing, and Epidemiology and Public Health—might make important contributions. The cooperation of the School of Forestry in the undergraduate Environmental Studies major provides a useful model in this regard.

To cite one area in more detail, there is tremendous interest among Yale College undergraduates in the study of health and illness. Courses such as “Biology of Reproduction” and “AIDS and Society” are popular in part because they place biological processes in the context of larger issues. A recent residential college seminar on public health offered by an EPH faculty member generated 160 applications. The History of Science and Medicine course “Public Health in America” typically draws more than 100 students. For all that, there are few formal ways for Yale College students to gain an integrated exposure to theory, methods, and challenges in this area or to combine the study of biology, social and economic processes, and policy implications. In response to these needs, members of our Committee envisioned a possible future program in Health and Health Policy⁴. The Committee remains agnostic on the exact form this study might someday take, but **the Committee expresses strong support for building a base of excellent interdisciplinary courses in health and society**. The participation of appropriate faculty from the Schools of Medicine, Nursing, Epidemiology and Public Health, and Management would be a major asset to this effort; it would also benefit from the participation of Faculty of Arts and Sciences members from both the natural and social sciences. We recognize that departmental agendas may not naturally favor hiring people with this special interest or the requisite interdisciplinary range. For this reason, this would be an appropriate area in which the Yale College Pool (described below) could put up “challenge” slots as an incentive for appropriate appointments.

Health and health policy would be only one of several areas in which “science and society” strength could valuably be built. The study of the environment has been strengthened in Yale College in recent years, but this is another area for continuing curricular attention. It is also easy to imagine that recently-created Computer Science courses on e-commerce and computers and the law could form the core for larger offerings on the history, technology, economics, politics and ethics of modern information technology—another critical area for contemporary students to understand. Biotechnology and Society would be another field of obvious interest. Here one could imagine linked courses in biology, biotech and medi-

⁴ Further details are found in Appendix 2.

cine, biotech and agriculture in the US and the Third World, bioethics, and the history of the biotech industry, to name no more.

This is not the place to elaborate such ideas in detail. We only note that they too form another opportunity for Yale College education.

5. We recommend the creation of a secondary concentration in the sciences. A survey of non-science majors that the Committee conducted showed that few take Group IV courses beyond the minimum required. But interestingly, many of these students indicated that they had genuine interest in science, and a significant number had considered majoring in science. Nevertheless, despite this interest and ability, such students did not pursue this aspect of their study, electing to take the minimum number of courses allowed. This is regrettable from several points of view. Our system does not encourage non-majors to follow through on their scientific interests; this feeds a culture in which the study of science is undervalued; and non-scientists with strong appreciation of this field, a desirable group of future citizens, fail to emerge as a typical product of Yale College education.

Simply requiring more courses is no solution to this problem. But it would help if Yale gave an incentive to pursue science and quantitative studies beyond the minimum level.

To this end, we propose that Yale establish a secondary concentration in science and quantitative reasoning. To complete this concentration, students would take some specified number of courses (including some advanced courses) in the broad areas of science and quantitative reasoning beyond what was needed for distributional requirements.⁵ Students who completed this program would have the fact recorded on their transcript. In some career areas, such a credential might be of significant value.

⁵ More particularly, we propose that students be recognized as having completed a secondary concentration in science and quantitative reasoning if they have satisfied the standard S and Q requirements (necessary in any case for graduation); taken at least two "advanced" S and Q courses, that is, courses that require other college level courses or AP credits as a pre-requisite; and taken at least eight courses bearing S or Q credit or in science, technology and society, of which at least one, but not more than two, must be in the latter category. This combination would ensure that students pursue science or quantitative studies beyond the introductory level and have some acquaintance with the relationship between science and other areas of thought and society. We note that this program would be naturally satisfied by pre-medical students majoring in non-science fields provided they take a science, technology and society course along the way – a desirable thing in any case.

We note in passing that a secondary concentration would be a new feature for Yale College, one that would have useful applications apart from this example. We distinguish a secondary concentration from a minor, a concept we are not endorsing. A minor is a smaller version of a major and so compounds the forces of specialization in a student's program; a secondary concentration is a broad course of study encompassing many disciplines, and so supports large liberal arts ambitions. (International Studies and Ethnicity, Race and Migration take this form and might be more appropriate as secondary concentrations than fully constituted second majors.) In the context of the sciences, we see special value in this notion. In lieu of the current disincentives, it would give positive encouragement to continue the study of science.

6. We recommend that Yale join the call for a reassessment of requirements for medical school admission. As we have noted, much of the undesirable character of science education results from the numbers of students meeting premedical requirements. The course requirements for medical school admission have remained relatively stable since Abraham Flexner's 1910 report *Medical Education in the United States and Canada*. In consequence, while scientific developments have changed all the relevant disciplines, and while medical schools themselves have made curricular reforms to streamline learning and ensure its relevance, little thought has been given to what pre-medical students "should know."

While it is beyond the power of this report to say what changes should be made, we believe that, to remove one deforming pressure on undergraduate science education, the time is ripe for medical school admission requirements to be reevaluated. This process must include a wide representation of faculty from many institutions nationwide, including both colleges and medical schools. A recent report from the National Research Council has identified the curricular consequences of pre-med requirements as a major obstacle to the training of future research biologists.⁶ For the needed reassessment to begin, other prominent voices must bring the issue to public attention. We urge President Levin to call for the creation of a national panel to reevaluate the requirements for medical school admissions.

⁶ "BIO 2010: Transforming Undergraduate Education for Future Research Biologists" (Washington, D.C.: National Academies Press, 2003). The report was produced by the Committee on Undergraduate Biology Education to Prepare Research Scientists for the 21st Century, of which Yale Professor Joan Steitz was a member.

Certain special needs of current pre-medical students need attention in the meanwhile. The Committee was profoundly impressed by the support that the Health Professions Advisory Office in Undergraduate Career Services gives to the host of students who come to it for admissions and career counseling. Given the demands on the current position, **we suggest that staff be added or redeployed to strengthen premedical advising in UCS.** Undergraduates are in a better position to appreciate whether a career in the health sciences is appropriate to them if they have engaged in hands-on work in a medical facility. This expanded office could also help students learn of clinically-oriented volunteer opportunities in area medical facilities.

Another valuable advising supplement would be added if students in the Medical School, especially those who are Yale College alums, could be drafted into informal roles as pre-med advisers in the residential colleges. They could be supervised by the Health Professions Advisory Office and recompensed with appropriate meal privileges by the college.

7. Yale should work to make Science Hill an attractive destination. As previously mentioned, at Yale, the impression that science is only for scientists is bolstered by the separation of the science buildings from central campus. The location of these facilities will not change, but things could be done to overcome the perception their location fosters. **We recommend that the shuttle be improved** so as to run from one or two key destinations on central campus to Science Hill at regular short intervals.

Student services and amenities should also be available to undergraduates on Science Hill. In order to make Science Hill an area for student and faculty interaction, we recommend incorporating some kind of student center into the future building plans for the science facilities. This should include a readily accessible cafeteria and common space where students and faculty can gather. The Science Teaching Center should have similar amenities in a down-the-hill location but this will not remove the need for a home for undergraduates on Science Hill. Consideration has been given to converting portions of the Sterling Chemistry Lab into an undergraduate center with labs, lecture halls, and common spaces. This is the sort of plan we would endorse; but above all, we urge that university planners give serious priority to the needs of undergraduate education as they envision the renovation of Science Hill.

To break the correlation of science with distance, **we also recommend that more non-science courses, including several very popular ones, should be scheduled to meet on Science Hill.** The Science Teaching Cen-

ter would enable a complementary move: it would allow us to **schedule more science classes, including some very popular ones, closer to central campus**. Many of the lecture halls on Science Hill are in serious need of renovation and technical updating. It should be a high priority to redesign them to be fully functional settings for a diverse array of classes.

We propose that other Yale College activities should be integrated into the fabric of Science Hill as well. The segregation of the sciences and the tacit equation of science with distance and discomfort would be mitigated if space were created on Science Hill for a range of other activities, such as studio, rehearsal and performance space for theater and the arts. In addition to breaking down the wall between science and non-science, such facilities are badly needed, and would enhance other areas of undergraduate life.

INTERNATIONAL EDUCATION

If ignorance of science will be a greater and greater disability in the future, so will ignorance of the transnational world. In the time we live in, no country or culture lives on its own. Each is profoundly shaped by forces that originate from afar, whether health menaces or social migrations or environmental factors; each is being transformed by forces that have no real location, like market forces or information technology. Meanwhile, as cultures meet and interfuse in new ways, old-fashioned forms of religious, ethnic and political conflict show no signs of vanishing, and international security has become a greater, not a lesser, concern.

The academic study of the international world and first-hand experience of foreign cultures are crucial training for citizens of the global future. The Committee urges that both be strengthened at Yale. We urge that acquiring these forms of knowledge be a more conscious goal of undergraduate education and that students be helped to combine the two in purposeful and imaginative ways.

One charge to the Committee was to evaluate Yale's education of undergraduates in the international area. We took this to include the study of foreign languages; international relations and transnational institutions; the history, culture, literature, politics, and economics of particular countries and regions; comparative studies across countries and regions;

international trade and finance, politics, and law; global environment and public health; and the needs and challenges of developing countries.

Yale's strengths in many of these areas are prodigious, and we applaud the recent addition of resources in fields that had been weakly served. In the past few years, significant strength has been added to the study of Latin America; new positions focused on the Middle East have been added in History, Political Science, and Religious Studies; and overdue attention has been given to South Asia in complement to Yale's long-running strengths in East Asia. Meanwhile, the disciplinary interests of virtually every department in the Humanities and Social Sciences continue to evolve in ways that give greater prominence to international and comparative matters. To name but a few examples, our rebuilt Sociology Department has new strength in comparative Sociology. Political Science is actively building in the area of international relations and transnational order. Religious Studies is giving new attention to non-western religions and cross-cultural dimensions of religious experience. Anthropology has broadened its focus from tightly focused local ethnographies to the global flows of people and cultures evident in any cultural site. With its strong focus on world cinema, Yale's recently amplified Film Studies program allows students to study a major form of contemporary cultural expression and intercultural exchange.

Beyond the classroom, Yale faculty conduct research in virtually every part of the world. Their inclusion of students in research activities ranging from archaeology to astronomy to primatology to public health supplies a further dimension of international education. We should also not forget the learning that flows from an ever more cosmopolitan faculty, an ever more international student body, and the continual parade of international business and political leaders, health and human rights workers, architects, poets, film makers, and the like who visit this campus every week.

We admire and encourage the developments just named, but we draw attention to certain shortfalls as well. Courses with an international focus are among the most popular at Yale, but in certain areas, student demand far exceeds the supply. Some departments and programs are overwhelmed with student interest and find themselves scrambling to meet the needs of their majors, often with inordinate reliance on visiting faculty. Given this fact, their ability to serve non-majors is severely compromised—particularly regrettable since these fields are of crucial importance to a general education.

To mention some specifics, the International Studies major is currently limited to forty-five undergraduates. It turns away as many applicants as it can accept, and it offers a limited array of courses even for its majors. In its present form, the International Studies major cannot fulfill the mandate to deepen the international education of all Yale undergraduates. Nor is the problem confined to International Studies. The Grand Strategy seminar had ninety applicants for twenty-four places for the spring of 2003. The History of the Cold War regularly enrolls about 400 undergraduates but turns away almost that many. There are not nearly as many other courses in post-1945 international history or politics as legitimate student interest requires.

We also encountered demand for more classes with a cross-disciplinary international focus, especially broadly conceived courses suitable for non-majors. It is possible to take courses at Yale in both the history and the theory of international relations, for instance, but there are currently no courses that show how history and theory could complement one another in explaining such major developments as the spread of democracy or the emergence of a global economy. This report's comments on global health highlight another interdisciplinary field of massive interest where current offerings are meager.

We are encouraged by the movement of many departments to embrace the international side of their fields more fully. But departmental priorities tend to lie near the center of their disciplines: something further is needed to spur the sort of teaching we have identified as lacking. The incremental chairs for interdisciplinary international senior faculty sponsored by the Yale Center for International and Area Studies provide a further resource, but the contributions the appointees can make are necessarily finite. We have investigated—and are excited by—the possibility of drawing on the strengths of Yale's professional schools to help fill this gap. We encountered considerable enthusiasm among the faculties of the Law, Management, Public Health, and Forestry and Environmental Sciences schools when we raised the possibility of their teaching Yale undergraduates. The new Center for the Study of Globalization, which has been highly receptive to the interests of undergraduates, offers promising synergies as well. These faculty and programs too, however, can only help at the margin.

Everything we have learned suggests that, without an expansion in the number of ladder faculty who care passionately about research and teaching in international subjects, Yale will not be able to give its undergradu-

ates the full education their future requires. The departments with contributions to make in these areas must do their part by designing a curriculum that has the larger needs of undergraduate education firmly in mind; departments must also help by deploying faculty so as to meet the most important teaching needs. In conjunction with these developments, **we recommend that the strengthening of broad and (where appropriate) interdisciplinary teaching in international fields be a high priority for the use of incremental faculty resources.**

Understanding the dynamics of a globalizing world can be gained in part through formal classes. But experience abroad is an invaluable complement to academic training, especially if it is connected to formal study in thoughtful ways. With this in mind, **the Committee affirms that Yale undergraduates should be expected to gain experience of the larger world and to plan their time abroad as an integral part of their Yale education.** We recognize that there will be legitimate exceptions to this rule. We know, for instance, that students going on in some science careers cannot miss certain opportunities only available in this country. Nevertheless, we phrase this expectation to make clear that a high educational priority is involved.

The sort of activities that would yield the desired growth in understanding take many forms. They would include substantive courses taken in foreign universities, intensive language training, directed research, internships, lab work, and living and work experiences hard to categorize in formal ways. We recognize the potential value of each of these pursuits and affirm that students need to find the one best suited to their intellectual project.

But while recognizing a variety of alternatives, we believe that Yale must be more active in promoting the value of international experience and in helping students find the right opportunity. To this end, the Committee makes four recommendations.

First, **we recommend that Yale use all available means to underline the importance of experience abroad to undergraduate education.** Until very recently, Yale largely left the value of international learning to the imagination of individual students and their advisers, who gave it as much—or as little—weight as they chose. Since the creation of the International Education and Fellowship Office three years ago, this situation has in significant measure turned around. In the last years IEFPO has built a heavily used website, hosted international opportunity fairs, trained peer advisers for outreach to the colleges, and seen visits to advisers and

fellowship application numbers soar. Building on this success, Yale College should seek every occasion to proclaim the value of international education. Among other steps, materials for prospective students should emphasize the issue in a pronounced way. A section should be created in the Yale College Programs of Study to explain how experience abroad can reinforce (and be reinforced by) academic study at Yale. This section should offer detailed information on the resources available; DUSes should have such information readily at hand as well. Advisers should be trained in a way that will familiarize them with opportunities overseas and effective ways to conjoin such opportunities with study at Yale.

Second, we recommend that the IEFP and Undergraduate Career Services expand the number and variety of international opportunities that they guide students toward and facilitate efforts to find the right fit. As Yale College imposes a new expectation on its students, we create a new obligation for the school: to guide students to a range of international opportunities in all fields, on all continents. To this end, IEFP should be given greater resources and a wider brief. IEFP should boost its collaboration with departments to generate a broad and diverse list of approved academic programs at foreign universities. Understanding that many students will pursue learning abroad outside of term-time, IEFP should pay particular attention to summer study opportunities at foreign institutions.

UCS has already begun an aggressive effort to identify work and internship opportunities abroad. This is not always easy, since the idea of a summer internship is not a familiar one in many countries. Nevertheless, working with all available sources of information and cultivating Yale's many contacts in foreign lands, UCS should give continuing priority to helping students find work opportunities in international settings. Helping students find summer laboratory internships in other countries would be of particular service. Here UCS will need to work with the faculties of the science departments and the medically-focused professional schools.

We also urge the Yale Summer Term to expand its program of summer courses taught abroad. We applaud this office's recent experiment in offering Yale courses in places like Berlin, Paris, Mombasa, Cracow, Petersburg, and Oapan, Mexico. In the future, more courses should be offered in yet more diverse locations.

Third, to further encourage international experience, Yale College should award course credit for supervised research abroad. It has long been rumored that Yale students cannot be certain that they will receive

Yale credit for coursework abroad until they have completed the work and returned to school. In fact, IEPF already certifies programs such that students receive automatic credit for their coursework upon receipt of an appropriate grade. Further publicizing this fact will remove one obstacle to study abroad. As a signal of the importance we attach to such experience, the committee recommends that credit also be awarded for the completion of faculty-sponsored research abroad. Currently, students can sign up with professors to take independent reading courses for credit in the fall or spring and can satisfy the course's requirements with work done over the summer. We propose that Yale officially recognize summer research, lab work, and other types of endeavors done in other countries as credit-worthy provided the faculty adviser grants approval. This approval should be given in accordance with a set of guidelines designed by the Yale College Dean's Office in conjunction with IEPF and departments.

One model that appears to have worked well in some majors involves research between the junior and senior years on a topic related to a student's senior essay. In an evolved version of this scenario, students would be encouraged to identify an appropriate topic for senior essay research in spring of the preceding year, working up a proposal for research abroad with an adviser's guidance. If the adviser found the proposal feasible and sufficiently weighty, he would approve it for a provisional credit, to be actualized when the student submitted a research memo on returning to school. Travel stipends that students could apply for on a competitive basis would give further incentive to this development.

An earlier section of this report proposed that study or experience abroad should satisfy a Yale requirement that promotes the fundamental international skill: the foreign language requirement. Under our proposal, formal study in an accredited program abroad can be presented for Yale credit in the usual way; if a student pursues a non-academic experience abroad of an appropriate nature, this will fulfill the distributional requirement but will not count for course credit. Directors of Undergraduate Studies would retain the authority to grant credit toward the major for study and research abroad. That determination should be made department by department.

Fourth, we recommend that Yale work toward the goal of funding the financial need of any student pursuing a Yale-approved opportunity abroad, whether it involves study, research, or internship. As a first step, Yale College should accelerate its fund-raising for this goal and publicize all existing funding sources in a centralized database. As Yale Col-

lege promotes learning abroad more aggressively, we must recognize that financial constraints make such experiences less accessible to some students than to others. To open these opportunities to all undergraduates and to signal the importance Yale attaches to them, this institution should commit itself to raising the funds to make these experiences available without regard to family ability to pay. The financial aid changes announced in 2001 and implemented this year reduce the self-help expectation for all students on aid by nearly \$3500 in each of their four college years. This will go a considerable distance to making summer opportunities abroad more affordable. But in calculating the real cost of such experience, it is important to remember to add in foregone earnings and the cost of travel and living abroad. Of course it is not only students on financial aid who are constrained by financial considerations.

We recommend that the Undergraduate Financial Aid office cooperate with IEFPP to study the financial obstacles to international education and to propose ways to remove those obstacles. Needless to say, we also urge that the University be aggressive in raising funds for this good cause.

A last note: the Committee is aware that in the contemporary world, cultures that were once more distinct have come increasingly to interpenetrate one another, such that the foreignness once looked for at a distance can be found in some measure in one's own land. We are also aware that this country is a foreign land to international students, and, further, that many regions and cultures of this country are as foreign to the average American as certain situations abroad. In giving such emphasis to international education, we do not wish to dismiss the value of first-hand experience in other American cultures: that can be a powerful form of education and should be encouraged as well. But given the history of inward-turning in American culture and the potential cost of such provincialism in the future, we think it appropriate to give special emphasis to international experience at this time.

THE ARTS

Human expression in music, art, dance, theater, film, and literature offers an understanding of experience that cannot be realized in any other way. As experience abroad can give new reality to academic international

study and raise new questions for academic exploration, so the study of art is enriched by the actual making of art. In recognition of this fact, **the Committee affirms that the analysis of creative works and the actual practice of the arts are fundamental components of a liberal arts education.** We encourage students to study both and, ideally, to combine their study.

Yale has extraordinary resources to nurture an education in the arts. The presence of the Schools of Art, Architecture, Music, and Drama draws many of the world's great artists to campus, enriching the life of the University as a whole. These schools raise Yale's profile nationally and internationally and attract students of serious artistic talent to apply to Yale College. The co-presence on campus of performing arts organizations with long, distinguished histories and the dozens of smaller efforts that spring up every year makes Yale known as perhaps the premier college for academically strong students interested in the arts. For all that, the creative arts are currently somewhat at the margins of the formal academic program. **We recommend that the arts be brought into the mainstream of liberal arts education.**

In 1979, a committee was appointed to study the place of the arts in the College. In every unit surveyed, three issues emerged: space constraints; the problematic state of teaching facilities; and the inadequate number of faculty available for undergraduate teaching. Nearly a quarter century later, the quality of the facilities has improved quite markedly, but problems of space and faculty remain. The current Committee found that the four arts schools, the Music Department, the Film Studies and Theater Studies Programs, and the creative writing program in the English Department all have problems meeting demand for courses in creative expression.

In considering this problem, the Committee noted that the relation of each professional school to Yale College is unique: a matter of history, tradition, and complex interdependencies that have grown up over the years. While the Schools of Music and Drama feel the tension between the needs of their students and those of Yale College, the fact that a Music Department and Theater Studies Program exist in the college means that a rich experience is possible for undergraduates in these fields. The Department of Music, in addition to administering the Music major and acting as home for the study of music history and theory, also acts as a liaison between the College and the School of Music and coordinates many of the spectacular performance opportunities available at Yale. Its most

critical current need is for more practice rooms for undergraduates. Though its resources are more limited, in addition to offering courses for its majors, Theater Studies is able to direct students toward Yale's rich extracurricular opportunities in theater, making the practice of theater available to many more students than the program is formally equipped to serve. This program is most in need of rehearsal space, performance space not shared with extracurricular groups, and adjunct faculty to teach acting to majors.

But though they have remaining needs, since they are based in the Faculty of Arts and Sciences, these programs have Yale undergraduates as their first priority. This is also true of the English Department, which has augmented its creative writing offerings and established a writing track for majors. The undergraduate focus of these units, together with the flourishing extra-curriculum in these arts, mean that undergraduates have substantial opportunities in these areas.

Filmmaking too has a base in the College but here extracurricular support is much weaker. The Film Studies Program teaches a seminal art form of our time in a way that draws together film history, film theory, American and global cinema, and the making of film. Not surprisingly, this program experiences insatiable demand for filmmaking courses. While recognizing that the appetite is probably limitless, with film as with the other arts, **this Committee believes that it should be a University priority to offer both the training in artistic creation that majors require and some further instruction at the elementary level open to students in general.** If the creation of art is a primary form of education, such education should not be confined to specialists.

Where instruction in filmmaking should be located is an unresolved issue at this time. The School of Art sees video production as crucial for artists in various fields and believes that production courses and faculty should be based in the School. The Film Studies program believes that production courses are part of the undergraduate major's integrated mission and should be taught from within the program. Our Committee does not profess to know how the issue should be resolved and calls for advice from a group that can hear all parties. Here too, facilities are needed to support production courses: the Digital Media Center for the Arts is an excellent start but is inundated with student demand. Indeed, throughout the arts, there is increasing demand for computer laboratories to support different forms of creative expression.

By contrast with music, theater, creative writing, and film, there is no entity in Yale College linking the study and practice of the visual arts, and access to art courses is particularly problematic. The limited slots available in the introductory art courses offered through the School of Art are given to those who show a significant and well-developed interest in art. Freshmen are given priority over seniors since they may be beginning a sustained study of the art; opportunities for other students are severely constrained. The resources needed to address this situation are not limited to more faculty. There is not enough nearby studio and dark room space to support the number of undergraduate students who would like to take art or photography courses. The new School of Art building was full to capacity upon occupation.

Given the importance of visual art and the richness of Yale's resources, the Committee believes that it should be easier than it now is to include in a Yale College education. Here as with other arts, the Committee urges an increase in curricular offerings in artistic practice. The Committee also believes in the special value of bridging the gap between the practice and the academic study of the arts; and this too is more an issue in visual art than other fields. The History of Art Department provides excellent training in the history and criticism of art from many regions of the world, from the remote past to the present. The Program in Art, based in a professional school, provides excellent training in drawing, painting, graphic design, sculpture, and photography. But there is little educational contact between the two—and meanwhile, Yale's extraordinary art collections sit adjacent to but are not fully connected with the teaching of artistic practice. (There is more connection between History of Art and the Architecture major but this too could be strengthened.)

There may be a good reason for separate programs, but in the Committee's view, the current fragmentation of the study of art, the practice of art, and the experience of actual art objects weakens what could be an integrated education. With this in mind, **the Committee recommends the formation of a task force to study the role and organization of the visual arts in the Yale College curriculum.** The group's chief task will be to study how the parts of this education should be provided and how they could be interrelated in the education of students. It should include representatives from the History of Art Department, the Art and Architecture schools, and the art galleries as well as faculty from outside the affected fields, and a member of the Committee on Yale College Education should be involved as well. To be successful, this group must be able to consider adding additional facilities and additional faculty both through

existing avenues and incremental means. It should be a partner in any plan for the integration of arts space into science or other campus areas as proposed in other parts of this report.

The Committee also believes that the recruitment of artists and figures who bridge the gap between artistic theory and practice should be a priority for the use of incremental resources. Yale has some distinguished artistic practitioners on its faculty, but it would enrich the experience of undergraduates to have more regular exposure to talent and achievement of this order. It would be an excellent use of the Yale College Pool to hire a Tony-winning director, an exciting young artist, or a brilliant new author to teach in Yale College. Wherever possible, we urge the relevant FAS departments to hire faculty whose work integrates artistic practice with the theoretical approach of an academic discipline: for instance, a photographer who could train students in both the history and the making of photography, or a scholar/musician who could help students research the historical context of a classical or jazz composition and then integrate their research into a historically-informed performance. The YCP could be approached to support such appointments when other resources are unavailable.

Few colleges have facilities like the Yale Art Gallery and the British Art Center within a short walk of undergraduate residences. In addition to wishing to strengthen the links between the academic and the creative study of art, the Committee is eager to see Yale's collections brought more fully into the education of undergraduates. When faculty use the collections in their teaching, undergraduates benefit enormously and a world of knowledge is opened up. But outside of History of Art, faculty and curators rarely make the connections that would enable wider pedagogical use of the collections. **We therefore recommend that a full-time liaison position be established in the Yale Art Gallery to help faculty use Yale's art collections in the classroom.** The liaison, appointed at the curator level, would reach out to faculty in all relevant disciplines, helping them discover ways to use the collections in their courses and arranging the logistics of such use. It might be best to base this person in the Yale Art Gallery, since its new facilities are to include significant classroom space; but the liaison would represent both the Gallery and the Yale Center for British Art and should also be informed about special collections at the Sterling and Beinecke Libraries.

The Committee also urges the creation of year-long gallery internships for juniors and seniors that could earn course credit when sub-

stantial projects are undertaken, mounting an exhibition or writing an exhibition catalog, for example. Such an initiative would strengthen the relationship of undergraduates with the galleries, making the larger university's riches a fuller part of the college's life.

THE PROFESSIONAL SCHOOLS AND THE LIBERAL ARTS

To address an issue just touched on somewhat more largely, Yale College is enriched in many ways by the adjacent archipelago of professional schools. In some cases, professional school faculty teach courses within departmental curricula: in Political Science, the course on Constitutional Law has recently been taught by a professor from the Yale Law School. In other cases, the professional schools can be central participants in undergraduate programs: the Art and the Architecture majors draw faculty from the schools of those names; the Environmental Studies Program is co-taught by Arts and Sciences departments and the School of Forestry and Environmental Studies; Religious Studies has joint appointments with the Divinity School. Yale Medical School faculty contribute lectures to undergraduate classes in Biology and MB&B and give Yale College students opportunities to participate in advanced research. Medical school faculty will also be major contributors to the new program in Bio-medical Engineering.

Beyond these formal arrangements, the professional schools give daily richness and vitality to the milieu that all students enjoy.

In the Yale of the future, we are eager to see these benefits made more broadly and systematically available. Within the limits that their missions impose, we want to capture everything the larger university has to offer to the education of undergraduates. The recommendations of this report would draw on the intellectual resources of the professional schools to supplement the study of health science and health policy, interdisciplinary international issues, and the arts. Yale is a small enough (and congenial enough) place that such cooperations are relatively easy to imagine. In building such synergies, it will be essential to look for mutualities of interest without forgetting legitimate differences of aim. It is also essential

to remember that crossing the boundaries of different levels of education requires accommodation to a different audience and mission.⁷

To promote this sort of boundary-crossing and to enlarge the horizons of students from all majors, **we recommend the creation of a series of high-profile courses that would be taught by members of the professional schools but designed for and open to all undergraduates.** The professors chosen to teach these courses—we imagine they will include some of the most distinguished teachers in their schools—must be able to speak at a level appropriate to the undergraduate liberal arts experience. Ideally, the subjects chosen for the course would expose students to aspects of a profession’s way of thinking and special challenges while setting the work of the profession in its broader social context. The courses would have the benefit for teachers of making them consider their professional universe from a broader point of view. For students, they would add to a liberal arts core and supplement departmental curricula while giving a glimpse of life beyond the undergraduate world.

The courses in this series should be listed in their own section of the Blue Book to make them visible as a series. From the outset, they need to be perceived by faculty in the professional schools and students in the college as special and prestigious. Proposals for such courses would be vetted by a small committee appointed by the Dean. Professional schools could make nominations, but the committee should also be aggressive in soliciting such courses, suggesting individuals and topics that would seem like natural candidates. We envision that three or four of these courses would be offered every year. This might include a mix of recurring courses and those taught only once. While not every professional school would provide a course every year, and while some schools might offer courses with greater frequency than others, each professional school should provide at least one course every three or four years.

⁷ The possible use of health sciences faculty from the professional schools offers an instance of this point. Many courses in the Medical and Nursing schools involve a series of lectures by different faculty around a common theme. The “parade of stars” approach may work at the professional level, where the supporting context is assumed, but it rarely produces the sort of integrated, comprehensive course that undergraduates expect and need. When an exceptionally strong educator participates in all sessions and supplies an overarching framework, such a course can be a great success, as recent examples attest. But when faculty cross from school to school, the different kind of teaching required needs to be made explicit.

IMPLEMENTATION

This report has proposed many initiatives to improve undergraduate education at Yale. But it was never the Committee's wish to make proposals only. We have worked to make our recommendations idealistic enough to be worth doing yet practical enough that they could actually be put into effect. In addition to the various implementation mechanisms already mentioned, for the goals of this report to be realized, accompanying changes will need to be made in three key areas: the oversight of the curriculum; resources for faculty appointment; and advising.

Curricular Review

At Yale, students can pursue their study in virtually every field to the highest levels of sophistication, and the ability to witness and participate in the creation of new knowledge is one of the great benefits Yale College confers. At the same time, it is essential to remember that undergraduates are not small graduate students and that undergraduate education has a character of its own. Whether the level is introductory or advanced, the best undergraduate instruction clarifies and reflects on (rather than merely assuming) disciplinary methods and places the subjects studied in a larger human context. It aims to furnish a breadth of understanding that is more than the sum of many specialized parts.

To preserve the larger purposes of such instruction, Yale must reaffirm the partnership of the College and the departments in matters of undergraduate teaching. **We recommend that departments and programs be required to examine the curriculum on a regular basis, discussing their offerings in light of the larger aims of undergraduate instruction and the role their teaching plays in the curriculum overall.**

Some departments engage in curricular planning in a regular, thoughtful way, but in others there is little collective attention to this issue. In many units, the care of the curriculum is delegated to the Chair or Director of Undergraduate Studies, freeing others to ignore the larger issues such planning raises. In some units, the curriculum is made up of what individual faculty members think it interesting to teach. There is value in having faculty teach what excites them, and we have no wish to keep undergraduates from the frontiers of discovery. But the best curriculum is one in which these values are balanced with other, equally important values, and where the parts form a thoughtful whole.

In the current process of course review, departments forward batches of separate course proposals to the Course of Study Committee. This process can guarantee that courses have certain appropriate features, but it is not well designed to assess the whole these pieces compose.

In the view of the Committee, the University has an obligation to ensure the development of coherent curricula both within departments and across the university generally. To this end, the committee recommends the mandating of active curricular planning by all Yale programs and departments. Departments should be required to develop a comprehensive curricular plan and should review and revise this plan every four or five years. The principles and expectations articulated in this curricular plan should guide and inform the solicitation of course offerings from the department's faculty from year to year. The plan should be shared with the Course of Study Committee as a context for evaluating individual courses in any given year and should be subject to regular review by the Committee on Majors. When external reviews of departments are conducted, a practice we also favor, the University should explicitly request an evaluation of the undergraduate program.

This planning review should consider the department's or program's overall curriculum (as distinct from its actual offerings in any given year) on a variety of scales. At one level, it should assess the contribution this unit makes to a general liberal arts education, asking what this field can supply to a broadly-based foundation of knowledge and ensuring the availability of courses that meet these goals. Some of these will be gateway courses for the major, but where appropriate, departments should develop special courses that meet the learning needs of non-majors. Together with such concerns, the review should also consider how the unit's teaching meets the transdepartmental goals outlined in this report: needs for training in writing and quantitative reasoning, science instruction for non-scientists, international and arts education, and so on. Consideration of department offerings for freshmen and sophomores, including but not confined to its small course offerings, should also form part of the review.

At another level, the curricular plan should consider the curriculum of the major, articulating learning goals appropriate to majors at different stages of study and ensuring the availability of courses for majors as they progress from the introductory through the intermediate to advanced levels. In addition, since a liberal arts education focuses on how to learn as well as what is learned, making conscious provision for students to develop the research skills of this discipline will be an important task of

these reviews. Many entering students are not prepared to access the universe of information available to them at Yale. Yet the remarkable advances in information technology require new skills for accessing and organizing information.

The Committee believes that research skills are appropriately acquired in progressive ways between freshman and senior year and that this progression should be integrated into the course of study. During their curricular reviews, departments should make certain that research skills are steadily developed from introductory through upper-level courses, culminating with the senior project. The challenge is to help undergraduates develop research skills so they are prepared for independent investigation and learning when they graduate. The Sterling Memorial Library staff is already working with faculty to make information literacy a more conscious goal of curricular development and is eager to do more. In order to ensure this, a library liaison should work with faculty on the integration of research skills into the curriculum. A full report on this issue prepared for the Committee by the library staff is available online at <http://www.yale.edu/cyce/>.

As this report's repeated emphasis on interdisciplinarity makes clear, obtaining mastery of a field in a relatively isolated fashion is a less and less adequate preparation for undergraduates. Increasingly, students need to be able to coordinate a variety of disciplines and modes of inquiry in the study of complex issues. For this reason, in addition to courses that provide training in the core traditions of a discipline or field, departments should give students the means to push beyond traditional disciplinary divisions and integrate knowledge and methods from different sources. The curricular plan should make a point of addressing the department's contributions to interdisciplinary learning.

Many departments will find that these plural agendas ask a great deal of their limited resources. It will be easier to meet these needs, however, if teaching resources are not spent on projects of limited scope and value. As part of the curricular planning process, departments should consider how their teaching forces are allocated and take care to direct them to the most important functions. Many courses could better serve the larger purposes of liberal arts education if those purposes formed a more conscious part of their construction. The large number of very small classes in Yale College suggests that there are also economies to be made.

Increasing the Size of the Faculty

In the course of this report, the Committee has identified a number of steps Yale College should take to correct enduring deficiencies or seize new opportunities. We have proposed to improve education in the sciences on several fronts; to strengthen teaching in international studies, health studies, and other fields; and to enrich the training we afford in the study and practice of the arts. We have also identified the need to strengthen the teaching of core skills in writing and quantitative reasoning, to increase the availability of small classes in the first and second year of study, and to enlarge those offerings that contribute breadth (including cross-disciplinary breadth) to a liberal arts education. In addition, we are aware that certain programs are overrun with student demand, lacking the faculty to give majors the attention they deserve.

Many of these goals can be met in significant part by Yale's existing faculty, and that must always be the first recourse. Nevertheless, the Committee is convinced that to realize the ambitions this report has outlined, Yale will need to add to its teaching force in strategic ways. Accordingly, **we recommend that the University increase the Faculty of Arts and Sciences by at least ten percent over the next five years.** Needless to say, this increase in faculty numbers will require a proportional increase in other forms of faculty support.

We do not believe that simply enlarging the divisional pools, whose resources are allocated by the Steering Committee with advice from the divisional committees, will ensure the best allocation of the incremental resources. Rather, these resources should flow from, and return to, a separate Yale College Pool (YCP), to be allocated by the Steering Committee with advice from a new Committee on YCP Resources appointed by the Dean of Yale College. There should be no presumption that these resources should be divided equally among the divisions or among departments within divisions.

The Yale College Pool mechanism is designed to ensure that the needs that justified the creation of incremental faculty positions are given adequate weight in decisions on how to deploy them. A proposal to the YCP would need to make clear which of the goals identified in this report the proposed appointment would meet and why this could not be achieved through other channels. It is emphatically not our idea that the teaching needs of the college should be met from this source while the "regular" appointment process would be exempted from these considerations: the question of the contribution it would make to undergraduate education

should be part of every deliberation on faculty hiring and the allocation of positions. Similarly, it is not our intention that the YCP slots would be used to create a separate “teaching faculty.” Faculty appointed into these slots would be judged by the same standards of excellence that are used in other faculty appointments.

The purpose of the pool is not to create a different kind of faculty member but to bring a different kind of consideration into play in deciding how to apportion the university’s resources. In effect, the Yale College Pool will be a strategic supplement to the existing process of faculty deployment, giving us the means to address needs and seize opportunities that process leaves unmet. It goes without saying that there would need to be the closest coordination between the allocation processes centered on the YCP and the existing divisional pools. The two-pool system will work to the extent that the results are mutually supporting. Any decision about YCP resources would need to be made in full awareness of what was going on elsewhere.

We envision two ways by which a YCP slot would be awarded. In the first, departments would submit proposals for use of YCP resources. Under this procedure, departments would have to make a compelling case that, if granted the resources, they could meet an identifiable teaching need in Yale College with distinction, as well as enhance the scholarly goals of the appointing unit. In considering such proposals, the YCP advisory committee will need to learn in detail the use the department makes of existing faculty positions. It would be foolish to supply extra resources if existing ones are being used ineffectively. In the most compelling case, a department would indicate how the new YCP position would work together with its existing ones to serve deep educational goals. In any case, when a YCP position is made available, the expectation should be that it will translate directly into new teaching of undergraduates that would not otherwise occur. This might come from the newly appointed faculty member or from other ladder faculty within the appointing unit: the YCP resource might free up existing faculty to do the desired teaching.

In addition to responding to departmental requests, the Committee on YCP Resources should sometimes invite proposals for which there is a perceived Yale College need. This would allow the pool to address core teaching needs that are not the purview of a single department and to staff cross-disciplinary areas that traditional department offerings do not recognize. For the latter type of appointment, a scheme currently

employed by the Yale Center for International and Area Studies offers an instructive model. It deploys resources to encourage particular kinds of international, regional, and interdisciplinary appointments by offering incremental slots to departments willing to search in a designated area. In so doing, it gives departments the incentive to consider appointments that they otherwise might not, without requiring them to compromise their standards for appointment. In a like spirit, pairs of departments should be free to propose joint appointments to the Committee on YCP resources where opportunities to improve cross-disciplinary teaching and research arise.

Departments and programs receiving YCP resources should not acquire presumptive property rights to them. Here too the model should instead resemble that currently employed by the YCIAS for the junior faculty equivalents (JFEs) in its control.⁸ These JFEs are allocated to appointing units either for a fixed period or for the incumbency of an appointee, after which they revert to YCIAS for reallocation in the light of evolving needs and priorities. Should a unit that receives a YCP resource fail to deliver on the Yale College teaching commitments made in order to obtain that resource, then the YCP pool should be reimbursed from that unit's other vacant resources.

It will be essential to enlist the enthusiasm of departments in this venture if it is to be successful. To this end, they should remain the principal guarantors of faculty quality in the Faculty of Arts and Sciences. In general we oppose any change in the system of appointments that would dilute the authority of departments (operating within the ambit of existing university appointments committees) to recommend, or decline to recommend, appointments and promotions in their disciplines. For the same reason, Yale should continue the strong presumption that all faculty who teach courses in Yale College will be appointed in a department, whatever additional appointments they might have in professional schools or interdisciplinary programs. The best way to ensure that this system does not create a two-tier faculty is to ensure that the new positions meet the criteria of scholarly excellence that merit appointment at Yale.

In certain cases, however, there might be an appointment that would be of conspicuous value to the University that does not register as a priority for any department. Here it might be advisable for the University

⁸ In the Faculty of Arts and sciences, all ladder appointments are supported by the appointment resource called the JFE, with one JFE necessary to support a junior position and two JFEs needed for a senior position.

to envision appointment mechanisms that would supplement the departmental ones. The Committee felt that in the Humanities in particular, there are kinds of appointments that would expand the intellectual range of the University that do not match the priorities of departments or their discipline-based norms. With this in mind, **the Committee recommends that a task force be established to consider how interdisciplinary teaching in the Humanities can be best supported and how appointments mechanisms could be altered to meet these ends**, while continuing to ensure that candidates for appointment are preeminent scholars of national and international renown. As is currently the case, the FAS Steering Committee and the Corporation would have to approve any proposed changes in appointment mechanisms.

We expect the bulk of the YCP resources to support JFEs to facilitate ladder rank appointments but they need not all take this form. One of their uses would be to bring artists, poets, filmmakers, and other distinguished practitioners into the Yale College teaching force; figures of high accomplishment from such fields as government, business, journalism and law might be welcome additions as well. The pool would supply funds for such appointments rather than JFEs or slots, since they would not be ladder appointments. In such cases the appointment might well be joint with a professional school and might conceivably be made wholly in such a school (as for instance with the Music or Art School). In this case the YCP would supply the school with the appropriate resource. Similarly, the Pool might “buy” teaching from professional schools. The Forestry School was recently given an incremental faculty position in exchange for a continuing commitment to offer a certain number of courses in the College. To imagine a parallel example, an arrangement of this sort with the School of Epidemiology and Public Health might be a useful way to obtain interdisciplinary teaching in the field of health and society. In some contexts, it would make the most sense to appoint non-ladder faculty for some particular aspects of instruction. Yale currently hires teachers chosen for their special pedagogical qualifications to teach in certain specialized situations, for instance science laboratories and foreign languages, and such appointees make valuable contributions in these contexts. In a case where it is judged that this is the most appropriate form of appointment, YCP resources should be available for the hiring of Lecturers and Senior Lectors. But while flexibility will be needed to seize the right opportunity, wherever possible, the appointments the YCP enables should be ladder faculty appointments. It would not be a proper use

of the Yale College Pool to hire lecturers, adjuncts, or graduate students to teach courses that should be taught by the ladder faculty.

YCP resources should be available to appoint senior faculty, junior faculty, or to promote junior faculty to tenure. Indeed, we believe that a priority for Yale should be to increase the size of the junior faculty (the numbers in these ranks have declined notably in the last ten years) and to ensure that junior faculty are nurtured to enhance their prospects of promotion to tenure. No proposal for YCP resources should be accepted if it places new junior faculty at a disadvantage for promotion vis-à-vis other Yale junior faculty. Particular care is warranted in this regard for junior faculty who are appointed in more than one department or program.

It is not our expectation that junior faculty appointed into YCP slots would always require a further JFE from the YCP pool to enable their promotion to tenure. Wherever possible, the promotion of a qualified junior should be worked out in the usual way, through reallocation of slots within the department or appeal to the ordinary divisional pool. However, as the YCP Committee succeeds in enabling junior appointments, it would be wise for it to reserve some fraction of its slots for eventual use in promotions to tenure.

We recognize that the creation of incremental positions will require considerable new financial support but we regard it as essential to carrying out the vision of this report. The goal of this proposal is less to increase the size of the faculty than to improve the quality of Yale College education. This end must be kept firmly in mind as the new resources are put to use.

Advising

To assure that every Yale College student receives a suitably rich and coherent education, the right courses must be taught in the right ways, but something more is needed as well. As students choose their program of study, they need to reflect on the goals of their education so that their choices can build toward these goals. This process will always involve large measures of individuality but it is wrong to think that students should perform it on their own. Good advising helps students become purposeful seekers of an education, not just skilled pickers of discrete courses or efficient meeters of requirements.

The Committee heard louder complaints about advising than about any other issue in Yale College, and this should not be surprising. The issues surrounding undergraduate advising have grown increasingly complex, and it is worth remembering some of the reasons why. In recent years the undergraduate population has grown in both numbers and diversity. The Yale of 1950 included around 3000 students from fairly homogeneous backgrounds who had followed much the same high school course of study. Today, Yale College has 5200 students from every cultural origin in this country and the world. Given these new demographics and the history of schooling in modern times, this student body is diverse in more than social terms. Students come with neither the shared preparation nor the shared understanding of education itself that prevailed in an earlier generation.

In the same years that saw Yale become more democratic and inclusive for students, Yale also turned into a full-scale research university, and this produced corresponding changes in the faculty. Itself newly diverse in origins, in many cases the product of an education very different from the kind that Yale College offers, the modern faculty is less acculturated in the role of undergraduate schoolmaster and more intensely committed to research. The modern research career means that faculty lead demanding lives with many other obligations than undergraduate teaching. These lives are focused in new measure away from the college toward a national and international research community, and away from broad liberal arts education toward the world of expertise.

Put together a student body with more variegated ambitions and needs and a faculty at once busier and more specialized than it used to be and the result could be predicted: the need for good advising has grown at just the moment when it has become more difficult to provide. Yale students have more curricular choices than ever but less guidance about the meaning of these choices. This problem is in no sense a Yale monopoly. The Committee's inquiries made it seem to be virtually the rule that the more highly a university is ranked, the more its advising system will be thought to be in crisis.

Excellent advising is already available at Yale from a variety of sources, but for students to get the good of Yale's extraordinary offerings, this Committee believes that **Yale must make a major commitment to strengthening undergraduate advising.** Given the multifaceted nature of advising, there is no one solution to this problem. Rather, what we need is a constellation of solutions functioning in a concerted way. Our rec-

ommendations focus on academic advising in the freshman and sophomore years since that is the most problematic part of the current system. (We recognize that advice on the social and personal sides of undergraduate experience is already available from a multitude of sources.) Our proposals aim to make several forms of help available at strategic moments in student careers and to give a clearer sense of what each source can provide.

At Yale, the residential colleges shape the student body into manageably-sized, continuous communities with many kinds of ongoing support. Among their other virtues, the residential colleges supply a natural base for advising. College deans are in a position to know each undergraduate and to look out for his or her academic welfare; they also know Yale's academic requirements and can interpret them effectively to students. **The Committee affirms that the residential college deans should bear the principal responsibility for freshman advising.**

To orchestrate college-wide advising operations, the Committee also recommends appointing a Coordinator of Advising within the Yale College Dean's Office. Working closely with the college deans, the Coordinator would develop an advising website for incoming freshmen; answer questions from parents and prospective students in the summer before they come to college; help recruit and educate faculty advisers; and work with faculty to support best advising practices in departments.

Once students arrive at Yale there are a million things to understand and arrange. At present, time is so short that academic issues tend to take a back seat. To ensure a chance for a deep, thoughtful orientation before classes begin, **the Committee recommends that the current freshman orientation be lengthened by two days and that academic orientation be given a higher priority in the program.** We recognize that complexities of the calendar, cost, facilities and housing issues, and the schedules of summer and pre-orientation programs make this a difficult change to put into effect. Nevertheless, the Committee believes that the introduction to Yale College is of such importance that it must take priority over all of these.

As soon as possible after students arrive on campus, residential college deans should meet with freshmen on academic matters in a group session. At this meeting the deans should explain all the academic resources that Yale makes available, where they are found, what they are good for, and the ways students can access them in the coming days. Many of the current complaints about advising arise either because students are igno-

rant of easily available resources or misunderstand what different resources can provide: a student who thinks a faculty adviser from English worthless because he does not know the timing of the Chemistry placement test was looking for the wrong kind of help. Full information delivered at the earliest moment will solve many problems.

Freshman counselors, another valuable source of advice, should be present at this meeting so that they are on the same page when they begin seeing the freshmen on their own. Freshman counselors too need to be thoroughly versed in advising matters so they can direct students to appropriate sources of information. Others who can offer specific forms of help to students—the college's writing tutor, the math-science tutor, and representatives of the International Education and Fellowship Program, for instance—should be present as well. Students will be better able to meet Yale's ambitions for their writing, quantitative, and international education if they have these in mind from the first.

Each residential college should also organize a gathering focused on the Blue Book (as many already do) where the dean, freshman counselors, and seniors can offer their combined wisdom to freshmen. The more chance students have to become accustomed to Yale's requirements and resources and the more sources of help they learn they can turn to, the likelier it is that they will make good use of the choices before them. To further help with this goal, the day before classes start should be designated more or less formally as "advising day." In the morning and afternoon, an advising fair should be held with departmental representatives available to answer questions about courses, course sequences, and the roads to different majors. Pre-medical advising should be available on this day as well. Nearly one-third of the students who matriculate at Yale either are pre-med or are intent on keeping the pre-med option open. Advising on short-term choices and long-term strategies is of crucial importance to pre-medical students but is sufficiently specialized to deserve special support. The Health Professions Advisory Office in Undergraduate Career Services can supply good help in this regard, especially if its staff is augmented as suggested above.⁹

⁹ The Committee is aware of the special help that could be provided to undergraduates of all years through increased contact with the many recent graduates who return to Yale to medical school, law school, and graduate school. The colleges would be wise to incorporate such students into the life of the college through the graduate affiliate program or other means. They could provide informal but very valuable advice both about getting the good of Yale College and about paths from college to professional schools and careers.

In complement to these other forms of assistance, **the Committee recommends that each freshman be assigned a teaching member of the Yale College faculty as a faculty adviser.** Not every faculty member understands every requirement of Yale College or can advise on every course of study. In the modern multiversity, it is would be unreasonable to expect this. But as the members of the community with the deepest involvement in the intellectual mission of the University, the faculty have a special value to arriving students and must be included among their advisers. Useful advice is now given by a host of people in the Yale community, and we would be the poorer without the contributions adults in every position in the University make on behalf of undergraduates. To be eligible to be a formal academic adviser for Yale College freshmen, however, a person should teach (or have taught) on this campus. Retired faculty would be suitable advisers and might be actively sought for this role.

In the past a number of things have conspired to make the ideal of a freshman faculty adviser difficult to achieve. As currently composed, many college fellowships do not contain an even “mix” of faculty and cannot give students an adviser who shares their interests. Students who have never had a college class can be intimidated by their first meeting with a college professor; faculty can be embarrassed in this contact as well. In addition, faculty are not always present on Labor Day, and the start of school is a particularly demanding time for faculty. The Committee recognizes these problems but still believes that arriving students need a connection with someone with a deep relationship to the intellectual life of the institution—even when this connection is artificially made and even when it does not produce perfect results.

Freshmen should meet with their faculty advisers on the day before classes begin. It is our thought that advisers and advisees might have lunch in the college on this “advising day” in place of the current evening gathering, but this will be worked out by the Advising Coordinator and the college masters and deans. By this point it should be amply clear to students that these are not necessarily “requirement” or “placement” advisers. Their role is not to help students deal with the nuts and bolts of their program but to help them envision education in a large-minded, longer-term way.

To make this advising relationship more productive, to the fullest extent possible, the faculty adviser should share interests with the students he or she is assigned. To facilitate this arrangement, **we recommend that each college fellowship include good representation from all academic**

divisions. The college deans and advising coordinator should actively solicit faculty advisers from underrepresented disciplines. Faculty advisers should meet with their freshmen at least twice more: at midterm, to assess the fall term's choices and begin to think about the spring; and in the first week of classes in the spring semester.

The most productive student/adviser bonds grow out of shared intellectual experience. Augmenting the small classes available in the freshman and sophomore year will give students the chance to form relations with teachers that can develop beyond the bounds of the class. As the freshman year progresses, many will find a more natural adviser in a teacher of one of their classes. This person will know the student's interests, gifts and challenges from experience and will be able to provide a better grounded, more personalized sort of counsel. It is essential that students be urged to be looking for such potential advisers and not to be shy in approaching them. By the end of the freshman year, they should have secured a faculty member of their choice to be their sophomore adviser. If they would prefer to substitute a faculty member they have gotten to know for their assigned adviser at an earlier date, they should be allowed, even encouraged, to do so.

Current undergraduates advised the Committee that the second semester of the freshman year and the sophomore year are also crucial times for advising, but the kinds of advice needed are somewhat different. By their second and third terms at Yale, students are better informed, less distracted by college's manifold novelties, have a better sense of where they are going, and are more open to mentoring than when they first arrive. To speak to this new situation, **the Committee recommends that residential college deans hold a January meeting for all freshmen to discuss their remaining terms in college.** This would be a time to raise the subject of Yale's formal expectations and to urge students to think of these as ambitions for themselves, not just requirements they must meet. It would also be a chance to talk about the importance of building a coherent program of study, not just a random set of agreeable classes, and to shed light on how this is done. If students have not already found a faculty adviser of their own choosing, this would be a chance to emphasize the need to take the initiative and to be on the lookout for a sophomore adviser. Representatives of IEFP and UCS should be available to remind students of opportunities outside Yale.

Sophomore year is an important transitional year during which students are deepening their commitment to their tentative course of study,

re-considering and adjusting their ambitions, or choosing new paths. It is important that students have good advice as they renegotiate their relation to Yale's intellectual offerings. The Committee strongly supports the practice of requiring freshmen to select a sophomore adviser from the faculty and to submit the adviser's name to the college dean. This adviser should meet with the student three or four times throughout the year to help the student think through the choice of plans. In addition, students should be encouraged to make the acquaintance of more of their teachers, and to seek advice from all sources. The college deans should also have a special meeting for sophomores in October to address the special challenges of this phase of their education. Among other things, this will be a chance to prepare students to reorient themselves from general advising to advising within a major. Representatives from the IEFP and UCS should be available to discuss summer and study abroad options and the relation between academic choices and career options.

In support of the exploration and commitment that takes place in this year, the Committee recommends that each department host a well-advertised program particularly for sophomores. These meetings, which are already held in several departments, should illuminate the nature of the discipline so that students will understand the areas it explores and the kinds of questions it asks. The meetings should also allow students to meet faculty members in an informal context and to meet other students who share their interests.

The Committee also recommends that, as now, at the end of their sophomore year, students should review a prospective course schedule for the next two years with their departmental adviser or with the DUS of the department of their prospective major. The point is not that the plan will be unaltered: this is an excellent chance for students to think in advance about a coherent course of study. Model schedules from many different students, collected by the Coordinator of Advising, should be on record to illustrate the many different paths toward a coherent schedule that it is possible to take.

* * *

At the end of the day, no advice can do much good unless it is coupled with an active interest in expanding the mind. Fortunately, this sort of engagement is not rare in Yale College. The ingenuity of students, who regularly get things out of Yale that Yale itself was unaware that it of-

ferred, reminds us that the University should not, and need not, try to determine the whole content of undergraduate education. But while respecting their freedom and applauding their initiative, Yale owes it to students to give more guidance about goals they should set and to offer a program of study that clearly speaks to those goals.

The development of the curriculum, the building of the faculty, and the improvement of undergraduate advising could be undertaken as separate projects, but the best result will be reached if they form mutually supportive parts of a single effort. That effort is to offer Yale undergraduates the broad, rich, challenging training that will let them become thoughtful contributors to the life of their times. Taken together, the Committee on Yale College Education believes that its recommendations will move an already excellent school closer to this goal.

APPENDIX 1

CRITERIA FOR COURSES TO MEET THE QUANTITATIVE
AND SCIENCE REQUIREMENTS**A . Quantitative Reasoning**

The new quantitative reasoning requirement will consist of two courses. At least one of those courses must be a class in core QR skills. The other can be a course that uses QR in an applied context. The primary purpose of a course in the first category must be to develop and advance the student's quantitative reasoning skills. A course in the second category would involve practicing quantitative reasoning methods and techniques in the context of another discipline.

Core QR. The new requirement ensures that, regardless of the level at which they enter the college, all students will strengthen and extend their core quantitative reasoning skills while at Yale. These core skills are statistics, mathematics, logic, mathematical modeling, and the study of algorithms. At least *one* of the two required QR courses will be a course whose primary purpose is to develop these skills directly. The level of this course will depend on the background of the particular student. A relatively introductory course such as Math 112 or Statistics 101 may be the appropriate level for some students; students with more previous training would take a higher level course. As with the language and writing requirement (and in accord with the current placement systems in freshman Chemistry and English), the appropriate level will have to be determined by careful pre-screening. Choosing the course that will build an individual student's quantitative skills to maximum advantage will become an important aspect of student advising.

Courses that meet the core skills part of the QR requirement can, but need not, be taught in the Departments of Mathematics, Statistics, and Computer Science. Courses in other departments that would count for core QR include those that train students in detailed statistical techniques

(e.g. econometrics or biostatistics); courses whose primary focus is on developing the mathematics required for Physics, Engineering, and other disciplines; and courses in logic offered in the Philosophy Department. Conversely, not all courses in Math, Statistics or Computer Science are core-skills classes. Some, particularly computer science courses that focus on applications or on societal impact of computers, may be more appropriate for the QR in context category discussed below.

QR in context. Students will be allowed to meet their QR requirement with two core skills courses if they wish. We believe, however, that many students would develop their QR abilities to best effect by applying their skills to "real world" problems in other disciplines. For this reason, for one of their two required courses, students may elect a course that uses quantitative reasoning in context. To satisfy the requirement, a course need not be primarily focused on quantitative methods, but it must give significant exercise to quantitative reasoning skills. Course assignments should provide rigorous training and practice in applying quantitative reasoning techniques such as model building and problem solving. Typically these assignments would include problem sets or equivalent exercises.

Quantitative reasoning in context will result in a wider range of courses being eligible to meet Yale's QR requirement than would meet the equivalent requirement at other schools. We need to be careful, therefore, not to create soft routes through which students could avoid advancing their quantitative skills. There are many existing or potential courses that, while excellent in other ways, should not be eligible as QR courses. For example, it is not enough for a course to have some readings or some class discussion of data: the students should have to analyze and manipulate data and solve statistical problems themselves. Just as a writing class must involve the students' actually writing, so a QR class must involve the students' practicing quantitative techniques. A course whose primary goal is to provide a broad introduction to a potentially quantitative major but which does not itself emphasize quantitative techniques would usually not be appropriate to meet the requirement. If the development of quantitative skills were made a more conscious purpose of such a course, however, it might well be judged to meet the requirement.

The eligibility of courses to meet the QR core and QR context requirements would be judged by the faculty advisory committee of the QR Center, which would also have the means and the mission to strengthen the QR teaching aspect of relevant courses.

Although the requirement is for two separate courses, students will get the greatest benefit from this requirement if they choose their QR courses in a thoughtful sequence, such that the powers addressed in the first are continued and further developed in the second. The QR Center and the academic advising program at large should help advise students on intelligent sequences of QR courses.

B. Science

As indicated in the report, two courses in the Natural Sciences will be required in the new distributional requirements. Our recommendations aim to develop a rich array of courses that will supply suitably rigorous science education at appropriate levels. They will also ensure that courses bearing science titles that for one reason or another do not meet this goal do not count for the science requirement. Courses will be eligible for science distributional credit in two ways:

- a) Any course that is ordinarily used to satisfy the requirements of the following majors will count for science credit except those whose primary goals are the development of mathematical, statistical, or computational techniques, or those whose content is primarily focused on the societal context of the discipline (e.g. history, philosophy, ethics, and the like). Applied Physics, Astronomy, Biology, Biomedical Engineering, Chemical Engineering, Chemistry, EEB, Electrical Engineering, Geology & Geophysics, Mechanical Engineering, MB&B, MCDB, Physics.
- b) Other courses may also be used to satisfy the science requirement if they meet the following criteria:
 - i. The primary subject matter of the course is the systematic study of some manifestation of matter or life. Courses whose primary focus is on human behavior; mathematics, statistics or computation; design issues in engineering; or the societal context of the discipline (e.g. history, philosophy, ethics and the like) are not in general appropriate.
 - ii. The course should not exclusively emphasize rote learning of facts and procedures, although these will necessarily form some part of the course content. Science courses should help students to understand, appreciate, and apply the methods of science through which these facts and procedures are developed.
 - iii. The exercises and grading procedures assigned in the course should reflect criteria i and ii, through problem sets, laboratory work, field

work, or other exercises appropriate to the particular discipline, at a level at comparable to that of introductory courses for science majors.

Eligibility for distributional credit through this second route will be determined by the faculty fellows of the Science Teaching Center as described in the report. Courses that treat the content of science historically or that focus on science and a related topic may satisfy the science requirement provided that criteria ii and iii are clearly met.

APPENDIX 2

INTERDISCIPLINARY HEALTH STUDIES
IN THE COLLEGE

In recent reports, the Institute of Medicine of the National Academy of Sciences has embraced the theme of “healthy people in healthy communities” as a way of articulating the importance of educating students in public health for the 21st century. Issues as diverse as the AIDS epidemic, bioterrorism, and successful aging can be addressed from perspectives rooted in the biological sciences, social sciences, or policy analysis. The IOM notes the importance of educating students interested in health and illness such that they gain an understanding of the connections and relationships among the forces that influence health, including but not limited to genomics, physiology, individual behavior, societal and economic structures and systems, culture, policy and law, and ethics (see *Who Will Keep the Public Healthy*, Report of the IOM, 2002). The necessity of encouraging a deep understanding of and expertise in these matters is put into greater relief when one considers that about 13% of our Gross Domestic Product (\$1.3 trillion in a recent year) is allocated for health-related expenditures, more than any other industrialized nation.

In response to these needs, the Committee envisioned a new program of study that might be called, provisionally, Health and Health Policy. The Committee agrees that the reality of a rich curriculum must be in place in this field before it makes sense to think about creating a major; the exact institutional structure this study might eventually take on remains an issue for the future. Nevertheless, when Yale has sufficiently filled in its teaching offerings, a program of study in this field could be attractive to students in both the biological and the social sciences. It might appeal to students contemplating majors in History, History of Science and Medicine, and International Studies as well. We offer the following thoughts as guidance for future efforts.

First, though it can draw on a number of existing offerings, to develop its own center of gravity, this area will need faculty with a special com-

mitment to the venture. Relevant faculty might come from both the FAS and the professional schools, but FAS leadership will be crucial to keeping the undergraduate focus in sight.

Second, while the offerings developed in this area should emphasize multidisciplinary approaches to problems in health and illness, they should ensure that students are grounded in strong disciplinary training on both the scientific and the non-scientific side. If a major or secondary concentration is created in this area, it would make sense to require a multidisciplinary set of prerequisites—for instance, introductory courses in at least three of the fields represented by the program (e.g., biology, psychology, economics). To ensure that students develop a specific disciplinary expertise as well as a multidisciplinary perspective, they should be able to focus their studies by emphasizing human biology, health behavior, or health economics, policy and ethics, for example. Ideally, each of these general domains would include a “flagship” course taught annually to a broad audience.

The senior thesis could emphasize a relevant laboratory or field research experience closely mentored by a faculty member. In light of the ambitions of this report for international education, the School of Nursing’s proposal to pair undergraduates with faculty working abroad in the summer might represent the kind of novel opportunity that should be especially encouraged. This program, which lasts one month, begins with an intensive class at the Nursing School focused on community health. The remainder of the month is spent at various sites—this year they include Trinidad and Tobago, Ireland, Nicaragua, Mexico, Thailand and China—where students work on a community health project with the supervision of an instructor. Participation in similar programs run through EPH would be appropriate as well. Historical analyses would also be possible, such as a project relating newly emerging diseases to historical epidemics.

APPENDIX 3

CHARGE TO COMMITTEE AND WORKING GROUPS

President Levin's Charge to the Committee on Yale College Education

The three hundredth anniversary of the University's founding is an appropriate time to take stock of current strengths and take sightings for a future course. With this in mind, I am appointing a Committee on Yale College Education to assess the adequacy of the current undergraduate program and to consider changes and improvements. The Committee will look at many particulars, but a common question will direct its inquiry: What will an educated person need to know a decade or two from now, and what steps can Yale College take to ensure that students are given the best preparation for the future world?

The Committee, which Richard Brodhead, the Dean of Yale College, has agreed to chair, will deliberate in the academic year 2001–02, during which time it will consult widely with Yale faculty, students, alumni, and educators elsewhere. I have asked the Committee to make a preliminary report available for community discussion in the fall of 2002. It is anticipated that the final recommendations, revised in light of this discussion, will be delivered in the spring of 2003.

Several factors make this review especially timely and will contribute to set its direction. At this moment, Yale is embarking on a series of ambitious initiatives that will strengthen the University in major ways. One task for the committee will be to think how these projects can yield maximum benefits for the students of Yale College. As Yale undertakes a half-billion dollar rebuilding of the University's science and engineering facilities, for instance, we will want to ask how science education can be most effectively conducted and how undergraduates can be most effectively involved in scientific research. The creation of the Center for Globalization Studies and the expanded activities of the Center for Interna-

tional and Area Studies make it similarly opportune to ask how we equip students to understand and act in an increasingly interdependent world.

As these cases remind us, at Yale the college is surrounded by a virtually unparalleled array of intellectual and cultural assets—graduate and professional schools, research centers, library and museum collections, and the rest—that are far less closed off from undergraduates than at many other schools. Given the richness of these resources, a further task for the Committee will be to ask how Yale College can take full intellectual advantage of its setting in the larger university.

Though I would encourage the Committee to expand its agenda as it sees fit, to make its work purposeful, I would ask that its deliberations focus initially on four areas of education.

The research discoveries being made in the biological sciences have created radically altered prospects for individual lives and the life of societies. One task force of the Committee will acquaint itself with the University's resources in the biomedical, bioengineering and public health fields and envision ways to build on the strength of current programs. In particular, the Committee will ask how science students can be afforded the most stimulating opportunities to participate in front-line research. It will also ask how the implications of contemporary discoveries can be fully and searchingly explored in Yale College courses.

Given the increasing role that science and technology play as determinants of modern society, at the same time that Yale strengthens opportunities for students specializing in the sciences, we must afford all students the education they will need to be intelligent, effective citizens of their world. So in addition to seeking ways to strengthen research opportunities in the physical sciences and engineering, the second task force—working in close coordination with the first—will study science and technology education for non-science majors. This domain ranges through the classical science and engineering disciplines into newer interdisciplinary fields, like the study of the environment and of the social consequences of the digital revolution. There has always been valuable teaching in this area but there has been an ad hoc quality to the offerings available to non-majors. This group will be asked to envision a comprehensive, powerful plan of science education for non-specialists and to suggest how we can implement such offerings in a regular way.

To understand the whole of what the University has to offer, these two groups need to look across the borders from Yale College to neighbors that might enrich the experience of undergraduates—notably the Medical

School and the Nursing School, the Department of Epidemiology and Public Health, the School of Forestry and Environmental Studies, and the Peabody Museum.

“Globalization” is a name for the fact that societies are in continual interaction with other societies. In the contemporary world, these interactions have grown more rapid, more deeply transformative, and inclusive of more and more dimensions—political, economic, cultural, religious, environmental, and technological. A third working group will be charged to look at Yale’s offerings in the study of societies and their interconnections. In addition to reviewing existing programs, this task force will ask what benefits could be derived from Yale’s constellation of assets in the area of international and social studies: the Schools of Law and Management, the Yale Center for International and Area Studies, the Center for the Study of Globalization, the Economic Growth Center, the Institute for Social and Policy Studies, the Center for Comparative Research, and others. This committee will have the task of trying to define what constitutes an adequately “international” form of education and how Yale can provide it. This project will require review not of academic offerings alone, but also of the relation between formal on-campus study and experience abroad.

The fourth group will consider the education Yale College gives in the history of human expression and self-reflection. Yale College is unique in having its undergraduate school bordered by professional schools of Art, Drama, Music, and Architecture, in addition to an extraordinary array of further resources: the Divinity and Law Schools, the Whitney Humanities Center, two major art galleries, the Beinecke Rare Book Library, the Film Study Center, and the Digital Media Center for the Arts. Yale College derives benefit from these neighbors but we have not thought systematically about the role they could play in undergraduate education. In addition to reviewing instruction in Humanities departments and interdisciplinary programs, this committee will be asked to envision ways to make appropriate use of these adjacencies—an exercise that I hope will stimulate new thinking about the role of creative arts and performance in the Yale College plan of study.

A Steering Committee made up of representatives of the four working groups will coordinate the larger review. The Steering Committee will circulate larger questions and suggestions among the working groups and shape emerging recommendations into a coherent whole. Early in the process, the Steering Committee will seek opinions of the strengths

and deficiencies of existing programs from faculty, masters and deans, students, and recent graduates of Yale College. It will also press the working groups to suggest ways to reach certain general goals. These include: protecting and strengthening close intellectual contact between faculty and students; multiplying opportunities for students to engage in serious supervised research; increasing faculty participation in undergraduate advising; paying sustained attention to the development of student powers of expression; and enhancing the educational role of the residential college.

In these larger deliberations, the Committee on Yale College Education will draw on the work of a further constellation of existing committees: the Yale College Course of Study Committee, chaired by Robert Harms, which is considering the role of independent study projects; the Committee on Teaching and Learning, chaired by Charles Bailyn, which deals with academic advising and the evaluation of teaching; the Committee to Review the Residential College Seminar Program, chaired by John Rogers, which is studying the colleges as a base for intellectual activity; the Committee on Writing in Yale College, chaired by Linda Peterson; the Language Study Committee, chaired by Harvey Goldblatt; and the Project Advisory Board for the Center for Media Initiatives, convened by Philip Long.

COMMITTEE ON YALE COLLEGE EDUCATION
WORKING GROUPS

Chair: Richard Brodhead

Biomedical Education Working Group

Peter Salovey (Chair), Scott Berkowitz, Kim Bottomly, Ronald Breaker, Donald Engelman, Candace Feldman, Andrew Hamilton, Laura Oh, Scott Strobel

Physical Sciences and Engineering Working Group

Charles Bailyn (Chair), Charles Ahn, Justin Cohen, Joan Feigenbaum, Gary Haller, John Harris, Maxwell Laurans, Douglas Kankel, Daniel Kevles, Ronald Smith, Barbara Wexelman

Social Sciences and International Studies Working Group

Ian Shapiro (Chair), Rachel Alpert, Dudley Andrew, Chirag Badlani, John Gaddis, John Hartigan, Benjamin Polak, Stephen Pitti, Helen Siu, Jacob Sullivan

Humanities and the Arts Working Group

Maria Rosa Menocal (Chair), Jon Butler, Tali Farhadian, Christine Hayes, Amy Hungerford, David Mount, Patrick Pitts, Leon Plantinga, Joseph Roach

Coordinating Group

Richard Brodhead (Chair), Charles Ahn, Charles Bailyn, Jon Butler, Candace Feldman, Joseph Gordon, Andrew Hamilton, John Hartigan, Amy Hungerford, Douglas Kankel, Penelope Laurans, Maria Menocal, Patrick Casey Pitts, Benjamin Polak, Peter Salovey, Ian Shapiro, Jacob Sullivan, Barbara Wexelman

The following groups provided consultation to the CYCE Committee:

Committee on Writing in Yale College, Linda Peterson (Chair), Joseph Bizup, Julie Ehrlich, Joseph Gordon, Eric Kim, Laura King, John MacKay, Jennifer Pitts, Robert Sternberg, William Summers, Frank Turner

CYCE Language Working Group, Penelope Laurans (Chair), Rachel Alpert, Chirag Badlani, Nina Garrett, Harvey Goldblatt, Maria Kosinski, Maria Rosa Menocal, Barbara Rowe, Helen Siu, Jacob Sullivan

CYCE Advising Working Group, Penelope Laurans (Chair), Rachel Alpert, Jon Butler, Justin Cohen, Jill Cutler, Candace Feldman, Hugh Flick, Rosalinda Garcia, Pamela George, Joseph Gordon, John Loge, Laura Oh, Nicole Parisier, Renee Reynolds, William Segraves, Ian Shapiro, Stacie Torres, Betty Trachtenberg, Suzana Zorca

Library Report, Danuta A. Nitecki, with assistance from Todd Gilman, Nancy Godleski, Katherine Haskins, Soraya Magalhaes-Willson, Alice Prochaska, Sue Roberts, Barbara Rockenbach, Andy Shimp, and Alan Solomon

Committee Assistance: Katherine Lalli

SUMMARY OF MAJOR RECOMMENDATIONS

Teaching

The Committee on Yale College Education reaffirms the central place of teaching in the Faculty of Arts and Sciences.

Distributional Requirements

To ensure breadth of education and development of fundamental skills, the Committee recommends that the Yale College distribution requirements be revised so that students must take:

no fewer than two courses in the Humanities and Arts, two courses in the Social Sciences, and two courses in the Natural Sciences.

two courses in any field that give attention to the development of writing skills

two courses in any field that strengthen skills in quantitative reasoning and analysis

and such work as will allow students to attain competence in a foreign language at the intermediate level, or, if they have already reached it, to build their skills further

To support education in areas highlighted by the new requirements, the Committee recommends the creation of:

an expanded version of the current Bass Writing Program to support writing instruction across the curriculum

a center to support the teaching of quantitative reasoning

a center to support the teaching of science

and continued support for the Center for Language Study

To improve the function of the foreign language requirement, the Committee recommends:

requiring students to engage in some form of post-secondary language study regardless of the level achieved at the time of matriculation

permitting students to satisfy the foreign language requirement by completing the introductory level of language instruction in the classroom and then completing an approved summer study or internship in a foreign-language-speaking setting abroad

permitting three terms of foreign language (rather than the current four) to suffice to meet the foreign language requirement for students who arrive at Yale without demonstrable language skills

permitting students to join half-credits from disparate subject areas, for instance a language class and a lab

To encourage experimentation in appropriate areas but to control abuses of the current Credit/D/Fail system, the Committee recommends:

not allowing students to use the CR/D/F option in any course taken to fulfill the distribution requirements

allowing students to take any course not used to satisfy the distribution requirements CR/D/F, up to the limit of four courses in a student's career

Small Classes in the Freshman and Sophomore Years

To strengthen a culture of close intellectual contact between teachers and students, the Committee recommends:

making a major effort to increase opportunities for students to study with ladder faculty in small groups in both the freshman and sophomore years

housing this program at least in part within the residential college system

designating a member of the staff of the Yale College Dean's Office to coordinate small-group learning before entry to the major

Science Education

The Committee recommends that Yale bend every effort to make teaching in the sciences as compelling and richly available as any other form of study on this campus, both for students intending to go on in the sciences and for those who are not.

To strengthen education in science and engineering, Yale must undertake major curricular initiatives. The Committee recommends:

encouraging the development of courses similar in rigor to the introductory courses for science majors but different in approach

developing more opportunities for freshmen to have close contact with science faculty

conducting a major review of the laboratory courses attached to the large introductory surveys

enriching and expanding opportunities for direct participation in research and recognizing the value of outstanding research mentoring

strengthening the teaching of science and technology in social context

building a base of excellent interdisciplinary courses in health and society

establishing a Science Teaching Center with adequate resources to support these activities

appointing a council of faculty fellows within the Center to initiate course development in needed areas and to certify science courses to meet the distribution requirement

To improve and support the education of premedical students, the Committee recommends:

joining the call for a reassessment of medical school admission requirements

adding or re-deploying staff to strengthen premedical advising in Undergraduate Career Services

To encourage the broader study of science, the Committee recommends that:

a secondary concentration be created in the sciences

Science Hill be made a more attractive destination by:

improving shuttle service to Science Hill

making student services and amenities available on Science Hill

scheduling more non-science courses to meet on Science Hill and scheduling more science classes closer to central campus

integrating other Yale College activities, for instance performance and studio space, into the fabric of Science Hill

International Education

The Committee believes that academic study of the international world and first-hand experience of foreign cultures are crucial training for citizens of the global future. Given the importance of this training, the Committee affirms

that Yale undergraduates should be expected to gain experience of the larger world and to plan their time abroad as an integral part of their Yale education.

In support of international education, the Committee recommends:

- strengthening of broad and (where appropriate) interdisciplinary teaching in international fields

- seeking a major expansion of the number and variety of opportunities for work and formal study abroad towards which Yale College can guide students

- awarding Yale College course credit for supervised research abroad

- working toward the goal of funding the financial need of any student pursuing a Yale-approved opportunity abroad

Arts Education

The Committee affirms that the analysis of creative works and the actual practice of the arts are fundamental components of a liberal arts education. To strengthen arts education in Yale College, the Committee recommends:

- bringing the arts into the mainstream of liberal arts education

- adding faculty and facilities for the teaching of artistic practice such that Yale can offer both the training majors require and instruction for students in general

- recruiting distinguished practitioners of the arts and faculty who bridge the gap between artistic theory and practice

- forming a task force to study the role and organization of the visual arts in the Yale College curriculum

- establishing a liaison position to help faculty use Yale's art collections in the classroom

- creating credit-bearing internships for undergraduates in the Yale art galleries

The College and the Professional Schools

To capitalize on the neighboring professional schools as a resource for Yale College education, the Committee recommends:

- using professional school faculty where appropriate to enrich the undergraduate educational program

establishing a series of high-profile lecture courses taught by members of the professional schools and open to undergraduates

Implementation

To support the curricular developments the report has identified as vital to Yale College education, the Committee recommends:

requiring departments and programs to undertake a regular review of their undergraduate offerings in light of the larger aims of a Yale College education

increasing the Faculty of Arts and Sciences by at least ten percent over the next five years through the mechanism of the Yale College Pool

creating a task force to consider how interdisciplinary teaching in the Humanities can best be supported and how appointments mechanisms could be altered to meet these ends

Advising

To encourage students to make thoughtful and purposeful choices in composing their programs of study, the Committee recommends that Yale College make a major commitment to strengthening undergraduate advising. In support of this goal, the Committee recommends:

lengthening freshman orientation by two days with academic orientation given a higher priority in the program

giving residential college deans principal responsibility for designing the freshman advising system and introducing students to all aspects of advising

holding a major academic fair on the Tuesday of orientation with representatives from all departments and opportunities for students to meet with faculty

assigning each freshman a teaching member of the Yale College faculty as a faculty adviser

including in each college fellowship good representation from all academic divisions so that freshmen can have an adviser as close as possible to their field

appointing a Coordinator of Advising in the Yale College Dean's Office