

The Status and Prospects of the Economics Major

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Recent reports on higher education in America (Boyer 1987; Association of American Colleges 1985) have attempted to shift the emphasis from fields, curricula, and courses to expanding the abilities, capacities, and achievement levels of students. Initial reaction to these reports concentrated on general education as the principal vehicle for enhancing student learning. More recently, attention has shifted to the undergraduate major as an additional and perhaps more effective means of accomplishing this goal.

The Association of American Colleges (AAC), an organization of over 600 universities and liberal arts colleges, has led efforts to focus on the major by conducting a systematic study of it. This project builds on the association's 1985 report, which highlighted the problems of undergraduate education. The new project is particularly concerned with what the association calls study-in-depth, which is described as

the capacity to master complexity, the abilities required to undertake independent work, and the achievement of critical sophistication through sequential learning experiences. . . . [T]he common tendency to identify the major with "coverage" of particular content results in shallow learning unless students also grasp the assumptions, arguments, approaches, and controversies that have shaped particular claims and findings. (National Advisory Committee 1989, 2)

Study-in-depth requires that students learn to use inquiry and argumentation strategies pertinent to particular fields of study. It also stresses the

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ability of students to work with increasingly complex interrelationships among data and concepts in their fields and across fields:

"Depth cannot be reached merely by cumulative exposure to more and more . . . subject matter." It requires that students grapple with connections across subject matters. It implies that students develop the capacity to discern patterns, coherence, and significance in their individual learning. (National Advisory Committee 1989, 2)

The study-in-depth project includes reports on twelve liberal arts disciplines (Association of American Colleges 1991). The purpose of these reports is to describe the undergraduate major in each discipline and what each seeks to accomplish, to indicate how they are succeeding and failing, and what might be done to improve and strengthen them. This is the report on economics. (How it developed is reported in the appendix.)

BACKGROUND

Economics is a popular major, constituting almost 2 percent of majors nationally (National Center for Education Statistics 1988). About 32,000¹ economics majors graduate annually from approximately 900 universities and colleges that offer an economics major (Siegfried and Wilkinson 1982). Economics enrollments have grown steadily since 1975-76, perhaps reflecting a belief that majoring in economics will improve a graduate's job prospects. Table 1 contains National Center for Education Statistics (NCES) data on the number of graduating economics majors in the United States at five-year intervals and American Economic Association (AEA) data on the number of graduating economics majors at two different constant samples of economics departments, those offering a Ph.D. program in economics and those that do not. Over the period 1975-76 to 1985-86, the number of graduating economics majors grew at an annual rate of 3.5 percent, according to NCES data, and 5.0 percent, according to AEA data.

Administratively, economics departments are divided among colleges of arts and sciences (65 percent), schools of business (30 percent), and a few other administrative units (e.g., school of social sciences or administrative science). What economics majors study does not seem to depend on the department's location (Siegfried and Wilkinson 1982, 132). Therefore, this article discusses the economics major without regard to its administrative location.

Most economics majors plan to continue their education beyond the baccalaureate level, but fewer than half actually do. Of those who do continue their education, about half pursue a masters of business administration, and most of the rest enroll in law school; less than 3 percent enroll in economics Ph.D. programs. Those who enter the labor force directly after graduation go into a variety of occupations in a diverse set of industries, government agencies, and not-for-profit organizations. Few describe their employment as an "economist" (Siegfried and Raymond 1984).

PURPOSE OF THE ECONOMICS MAJOR

The purpose of the economics major² might be ascertained in several different ways. The most obvious approach is to ask faculty members who teach economics courses and set the economics curriculum what they expect the economics major to achieve. Another perhaps less satisfactory method is to ask graduating economics majors what they expected to accomplish from their undergraduate experience. A third approach is to infer these expectations by observing what students learn and how they learn it from being an economics major.

These different approaches would not necessarily yield similar answers. The first approach is not well articulated, though most faculty members would be able to offer some description of what the major seeks to attain. The second method has not been attempted in any systematic way.³ The third approach has received only limited attention (Siegfried and Raymond 1984; Hansen 1986). Using the first approach, we attempt to describe the most common view of faculty about the purpose of learning economics.

A broad consensus exists among economics faculty that enabling students to "think like an economist" is the overarching goal of economics education. All other virtues follow. But what does it mean to think like an economist? Do students understand the diverse approaches of different economists and the limitations of the prevailing paradigm? Can we assure that they can really think more like an economist by the time they graduate?

The typical response from an economics faculty member might go something like this: Thinking like an economist involves using chains of deductive reasoning in conjunction with simplified models—such as supply and demand, marginal analysis, benefit-cost analysis, and comparative advantage—to help understand economic phenomena. It involves identifying tradeoffs in the context of constraints, distinguishing positive (what is) from normative (what should be) analysis, tracing the behavioral implications of some change while abstracting from other aspects of reality, and exploring the consequences of aggregation (e.g., the fallacy of composition). It also involves describing the redistributive implications of changes in economic institutions and policies, amassing data to evaluate and refine our understanding of the economy, and testing alternative hypotheses about how consumers and producers make economic choices and how the economic system works.

Thinking like an economist includes problem-solving and creative skills. Problem-solving skills that emphasize analytical reasoning using the techniques and principles of economics increase understanding of economic behavior and improve a student's ability to predict the consequences of changes in economic forces. Creative skills help determine how to frame questions, what tools and principles apply to particular problems, what data and information are pertinent to those problems, and how to understand or explain surprising or unexpected results.

Economists' problem-solving skills have several distinguishing features. First, they emphasize *deductive reasoning*. What insights can be derived logically from a set of premises?

Second, because most economics problems are complex and deductive reasoning is limited in its capacity to examine many forces simultaneously, there is an emphasis on *parsimonious models*—models that focus on the more important behavioral relationships in our complex world. To some people, economists tend to abstract too much from the richness of human behavior and reality; to many economists, the strength of their analysis is the provision of focus and, thus, clarity of thought and analysis.

Third, the fundamental *principles* of economics are thought to be *universal*. Although a Marxian economist sees a world much different from that seen by a neoclassical economist, each embraces a well-defined caricature of the economy that they believe reveals behaviors that transcend fields and problems.

Fourth, the economic approach emphasizes *decisionmaking* techniques, perspectives on how choices are made, and the consequences of these choices. This approach orients economists toward (1) the examination of *tradeoffs*, a comparison of alternatives; (2) measuring the costs of one choice in terms of the foregone benefits of another, or *opportunity costs*; (3) formulations involving *constrained maximization* with carefully specified constraints (necessitated by scarcity); and (4) issues relating to *efficiency*, getting the most out of limited resources. Finally, while all economic problems involve normative issues, a strong bias exists toward an analytical approach that abstracts from or downplays "value" issues.

Understanding economic relationships is the central goal. This involves formulating hypotheses to explain these relationships, constructing models that capture their essential features, assembling empirical observations bearing on these relationships, and testing the hypotheses using quantitative techniques. Such testing not only increases the understanding of economic phenomena but also promotes ever more effective predictions of the consequences of changes in our evolving world. In essence, this is the form of scientific method that is used in many disciplines, but economists usually must conduct their hypothesis tests without the luxury of controlled experiments.⁴

Equally important are creative skills. Identifying economic issues and problems, framing them in ways other people do not see, devising novel policy proposals for dealing with problems, analyzing both the intended and unintended effects of policies, and devising innovative methods to estimate the magnitude of these effects—all are as central to the discipline as is the development of logically coherent theories. Understanding complex problems can require considerable abstraction, or at least, decomposing problems into manageable components. Meaningful abstraction and decomposition represent the stock in trade of economic thinking and require sophisticated analysis, extensive practice and training, hard work, and a dose of good luck. The economist's approach involves isolating important feedbacks and interrelationships that can alter the analysis of outcomes and

predictions. The most coveted economic analysis is that which challenges conventional wisdom, or, in the policymaking context, isolates unintended outcomes. Finally, the specification of "constraints" and the articulation of a strategy to manage best within those constraints involves creative judgment. What is a constraint in one problem can be a mechanism for change in another; what is and should be maximized in one problem may be of little relevance to another. To think like an economist involves a highly disciplined "mind set," yet one that is creative—willing to speculate about alternative relationships and to examine their implications.⁵

Thinking like an economist is facilitated by practice in applying the deductive and creative skills to a wide variety of economic issues, problems, and policies in diverse economic, political, and social settings. It is only through continued and extensive practice that the process of thinking like an economist becomes internalized and an integral component of one's intellectual equipment.

Thinking like an economist is also facilitated by breadth and depth of knowledge and by the general forms of human reasoning that cut across the disciplines. An understanding of economic institutions and their historical context is an essential ingredient of economic analysis. An economic argument contains not only logic and facts but also analogies and stories. Facts and logic alone rarely suffice; context is important. An understanding of America's recent economic decline is shaped by the facts of Britain's history, by the logic of playing catch-up, by analogies to earlier civilizations, and by stories of arrogance punished by failure.

The construction of economic arguments can help connect the study of economics with the rest of what students learn. Similar arguments are employed across disciplines. The equilibrium achieved in the world market for copper has striking similarities to the equilibrium achieved in a chemical reaction or the equilibrium achieved in *Hamlet*, act 5, scene 2. Ecological models of animal behavior and economic models of human behavior also exhibit striking similarities. What is important and what is shared across fields in the liberal arts curriculum is argument. Fields as different as literature, chemistry, and economics do not share much content, but they do share general forms of human reasoning.

Economics is particularly well suited for facilitating learning across the curriculum. Positioned methodologically between the sciences and the humanities, it crops up everywhere, largely because the central rationale underlying economics, coping with scarcity, is pervasive. The form of economic argument (frequently quantitative, always parsimonious), however, sometimes inhibits communication across disciplinary boundaries.

In the economics major, we share with other disciplines a desire to empower students with a self-sustaining capacity to think and learn, and to take an active role in their education. They should know how to pose questions, collect information, identify and use an appropriate framework to analyze that information, and come to some conclusion. The end result is to

qualify students to make informed decisions about their lives and communities long after their college experience.

THE REALITY OF THE ECONOMICS MAJOR

Both the structure of the economics discipline and the major itself can be likened to a giant tree. The major is rooted in the introductory courses, which introduce students to economic thinking and its applicability to a variety of issues. The trunk is a core set of principles, analytical methods, and quantitative skills that are widely accepted in the profession. The branches of the tree, extending in all directions, represent the array of subdisciplinary fields, ranging from monetary economics to industrial organization. These subfields reflect the main points of interest and research in economics and generate the problems to which principles and quantitative approaches can be fruitfully applied.

These two characteristics of economics—a central core of theoretical and empirical knowledge, combined with opportunities to extend that knowledge to a wide variety of topics—differentiate it from the structure of other social science disciplines. Whereas economics can be likened to a tree, other social sciences have a more hedge-like structure of separate and largely independent subfields with their own content and methodology. This structure implies that it is just as challenging, for example, to study local politics as international relations, or social disorganization as small-group behavior. A hedge-like structure can sometimes obscure connections among the separate areas of inquiry within the discipline.

Looked at another way, the economics major is a helix—plowing the same ground repeatedly at progressively greater depth. It goes beyond a simple accumulation of exposure to successively more topics. Basic principles introduced in beginning courses are reinforced and refined in intermediate theory courses and then rediscovered and extended in elective courses. This repetition and apparent redundancy is essential because “application” of economic principles (in contrast to learning economic “technique”) is very difficult to master and requires practice over an extended period of time and across several courses. Indeed, arguments first made in an introductory course are often not fully grasped until the senior year (or beyond).

The curriculum for an economics major⁶ typically begins with a two-semester sequence in principles of macroeconomics (the study of aggregate income, employment, and price phenomena) and microeconomics (the study of individual firm, worker, and consumer behavior) or sometimes with a single-semester introductory course combining the two.⁷ These introductory courses enroll students who ultimately major in economics, have other majors such as political science or business administration, or are fulfilling general education requirements. With over a million students enrolled annually in introductory economics courses and only 32,000 graduating majors, students enrolled in the introductory economics courses are obviously primarily nonmajors.

Following the introductory courses, most majors take two intermediate theory courses (macroeconomics and microeconomics) and a course in basic quantitative methods. In the intermediate theory courses, ideas introduced in the first courses are re-examined, usually with more powerful (and less restrictive) analytical tools.

Intermediate theory courses accomplish three goals. First, they show how economists use theory, how rigorous thinking can illuminate economic phenomena, and how theory and real-world events interact to produce new knowledge, concepts, and theories about the economy and how it works. Second, they provide prerequisite tools for economic analyses in elective courses. Third, they offer important signals on what the major is like, what content must be mastered, what skills must be developed, and what standards of performance must be met.

The quantitative methods course usually emphasizes statistics and hypothesis testing. A few programs, about 6 percent, also require a course in econometrics.

Finally, in junior-senior-level electives—such as international trade and finance, economic history, public finance, industrial organization, labor, urban and regional economics, monetary economics, environmental economics, comparative economic systems, and economic development—students acquire substantive knowledge. These courses bring economic principles, analytical methods, and quantitative skills to bear on problems in diverse contexts. Seldom are particular elective courses prescribed.

The typical economics curriculum rarely provides any kind of culminating experience. Some programs, about 7 percent, almost all located in selective liberal arts colleges, require a major research paper or thesis, the final stage in a student's transition from neophyte to independent thinker. The comprehensive senior examination is found mainly in small liberal arts colleges, and in only a quarter of them. Even less common is the senior seminar, offering students the opportunity to integrate ideas gathered from various courses.

Undoubtedly, mathematical aptitude and skills are useful to an undergraduate economics major. The relationship between incremental and average values, for example, is pervasive in economics. Mathematics can clarify relationships and improve student understanding. Consequently, economics majors sometimes are required to take calculus to prepare for intermediate theory courses.⁸ The important principles in intermediate macro and micro, however, can be learned without calculus, and how much calculus is actually used in undergraduate economics courses remains unknown.

If calculus is not used in subsequent economics courses, the link between it and economics is obscured, lessening students' incentives to understand calculus when it is first introduced and, depending on the quality of the calculus course, discouraging students from majoring in economics. Because the typical general calculus course contains much material unrelated to the economics major, it may be impossible to reinforce the link sufficiently to motivate economics students to learn calculus well. A calculus course for

economics students should cover partial and total differentiation, constrained and unconstrained maximization, and integration, and it should emphasize application and interpretation rather than drills in computational skills or formal proofs of theorems. This, unfortunately, does *not* describe many first-semester college calculus courses.⁹

Calculus is not essential for all undergraduate economics majors. Few intend to pursue graduate study in economics, and those who do will need to supplement their economics education with a grounding in mathematics that extends well beyond basic calculus. Though calculus can help some students understand economics concepts, the mathematics often becomes an end in itself rather than a means to facilitate the learning and a deeper understanding of economics. Lamentably, calculus tempts instructors to emphasize algebraic manipulation at the expense of intuitive explanations of economic behavior. It is relatively easy to teach formal tools and technique, but it is difficult to provide students with the capacity to use these tools. It is this latter goal, however, that constitutes the rationale for the mathematics requirement in economics.

Calculus is required in some economics programs to signal students that quantitative and analytical aptitudes are useful in learning economics and to limit access to the major. But it is not a sharp signal. A great deal of the mathematics useful in economics is not covered in a first-year calculus course, and much of what is covered is never used in economics. Thus, the role of a calculus requirement in the economics curriculum is ambiguous.

Similar problems sometimes haunt the quantitative methods requirement. Originally conceived as a means of providing students with a sufficient empirical foundation to enrich their understanding and facilitate their active participation in applied courses, the requirement all too often fails to fulfill this purpose. Although this requirement presupposes the development of skills in working with real data, contrived numerical examples are more common in these courses. Instructors of elective courses frequently complain that students come to them ill-equipped to interpret empirical evidence, much less to conduct their own empirical studies. These courses are often overloaded and taught at too fast a pace to adequately prepare students for the empirical dimension of elective courses. Frequently, data appraisal (e.g., survey design, sampling procedures, data accuracy) is squeezed out of the course, and some quantitative methods courses fail to cover adequately the philosophy, appropriate use, and limitations of hypothesis testing and regression analysis. Sophistication in empirical work requires more than just training in statistics. It requires attention to observation skills, measurement problems, and empirical judgment. Students need guidance on how to judge the quality of data, and how to identify evidence that would help to resolve an empirical dispute. Too often a superficial exposure to (but not an understanding of) more sophisticated techniques is emphasized at the expense of a more *thorough* understanding of basic concepts.¹⁰

Economics majors are rarely systematically exposed to conflicting values in their economics classes, a feature with mixed blessings. Introductory

students are likely to be taught early that economists are concerned with positive and not normative issues, that markets determine who will work and for how much and what will be produced and for whom. Advanced students are introduced to subtleties such as why different people have different productivities, or why income is distributed unequally. Although economics courses routinely discuss the sources of poverty and the possible consequences of adopting different policies to alleviate it, usually little is said about what kind of commitment *should* be made by individuals, groups, or perhaps the government. Economists feel more comfortable describing the origins of the disadvantaged than grappling with the extent of society's responsibility to improve their lot. Since the exposure of students to such problems in other courses is typically value oriented, economics provides a useful balance and an alternative, even if limited, perspective.

The premise that economics is purely a positive science is illusory. Students learn implicitly a good deal about values and ethics: the value of a person's services is determined by the market; if certain people had higher opportunity costs, they would be paid more; and the value of some people's work in the market is fixed when they stay home to raise children. An apparently "positive" idea such as opportunity cost carries normative connotations, for example, when earnings are used as a measure of "worth." The implicit values ought to be made explicit, and they seldom are. Thus many students learn that efficiency is more important than fairness without ever questioning the idea.

Generalizing about the success of the major is difficult because in spite of widespread agreement about course requirements for an economics major, great variety exists in what actually goes on in individual courses, with sharp differences between university departments whose majors often number in the hundreds and small liberal arts colleges where student-faculty interaction is more intense. Students in these latter departments are more likely to be in smaller rather than larger classes and thus experience more classroom discussion, more essay than multiple-choice exams, and more writing of substantial papers.¹¹

Considerable evidence suggests that *introductory* college economics courses are effective in that students understand economic processes considerably better after taking one (Siegfried and Fels 1979; Siegfried and Walstad 1990), and apparently the effects persist over time (Saunders 1980). By contrast, comparable evidence on the major is sparse (Hartman 1978). Nor do we know whether any real success is achieved in enabling students to learn after they leave college, or to equip them to analyze contemporary economic problems of the kind they will read about in the press, encounter in work, or deal with as citizens.

ON TEACHING AND LEARNING IN THE MAJOR

What are the strengths of the economics major and where are the best opportunities for improvement? Its overriding strength is a well-defined and

commonly accepted core of analytical principles. Depth in economics should therefore be somewhat easier to define and assess than in majors that lack a common core. Depth in economics involves sufficient mastery of these principles, coupled with a creative sense of how they can be applied in a variety of circumstances, so that the graduate is able to engage in independent, original economic thought.

The common core also facilitates communication among students and faculty in different fields within economics. Students can use their common understanding of principles to bridge institutional or chronological gaps. Because there is widespread agreement about the structure and content of the undergraduate curriculum, little faculty energy is dissipated in debates about course requirements. Differences of opinion about curriculum manifest themselves largely as differences in what is taught in courses of the same title and how it is taught. A laissez-faire attitude toward course content and method often results in considerably more variety than is apparent from catalog course descriptions. When this variety penetrates the core curriculum, however, it can lead to confusion and frustration in the elective courses, which depend on the core to establish a uniform foundation for all students.

Because the basic principles of economics apply to a wide array of problems, majors are usually exposed to different types of inquiry, all within courses that constitute the traditional major. The commonality of the principles offers opportunities to make connections by spanning apparently dissimilar subjects. The sequential curriculum facilitates study at progressively greater depths; the common core of principles, coupled with their wide applicability, allows repetition to reinforce important ideas, making it easier for students to carry their learning forward after graduation.

Finally, the enthusiasm of most academic economists for their discipline and work is a great asset. It often leads to inspired teaching and a meaningful learning experience for majors.

The economics major is not without problems, however. The major's current popularity, coupled with staffing constraints, has forced class sizes upward. Large classes lead instructors to adopt a lecture approach, emphasizing passive learning, narrow forms of evaluation, few or no writing assignments, and a reliance on textbooks (rather than real books) and routine problem sets; all of these practices limit intellectual stimulation.

In our enthusiasm for teaching students to think like economists, we sometimes teach as doctrine that everyone *should* think like an economist and that this is possible only with the use of marginal analysis. The neo-classical paradigm in economics stresses "marginality," examining relatively small changes while holding other factors constant. Most tools of economics are appropriate to this perspective, and this dictates the types of problems selected for analysis, as well as the approach to them. Many problems, however, require solutions involving *large* changes, structural changes in the jargon of economics. The discipline is less well equipped to analyze such changes, and the capacity of students to interact with other disciplines using a broader mind set can thus be limited. The "cross-talk" of econo-

mists and sociologists or historians hinges at least partly on this difference in methodological perspective. The wide acceptance of marginalism in economics may itself inhibit what we can say about things and what we learn from other disciplines. Increased sensitivity to the normative nature of various paradigms might help students *evaluate* the contribution and limitations of thinking like an economist. The scant attention from the economics profession to the place of the discipline within the liberal arts curriculum produces little guidance for students to connect economics to the information and methods provided by other disciplines.¹² This presumably unintended arrogance nurtures occasional overconfidence, which can undermine the effectiveness of the whole enterprise.

Finally, the amount and type of student writing assignments and oral presentations in many programs not only fail to prepare students for the demands they will encounter after graduation, but they also limit their ability to demonstrate their mastery of economics while in college.

Class Size

In recent decades, economics enrollments (Table 1) have increased faster than teaching staff. Larger classes¹³ dictate less than ideal teaching and evaluation techniques. Though classes are smaller at some institutions, large introductory economics classes at Ph.D.-granting institutions still exert considerable impact on the prevailing structure of courses and attitudes of faculty members, most of whom had experience as teaching assistants in large classes. Except in smaller liberal arts colleges, heavy reliance is placed on lecturing, sometimes even when class size permits pedagogical approaches that encourage active participation by students.

TABLE 1
Graduating Economics Majors in the United States

	NCES total for all four-year colleges and universities	AEA sample of 26 M.A. and Ph.D. institutions		AEA sample of 30 four-year colleges	
		Group total	Per institution	Group total	Per institution
1965-66	11,555	-	-	-	-
1970-71	15,758	-	-	-	-
1975-76	14,741	1,109	42.6	544	18.1
1980-81	18,753	1,488	57.2	843	28.1
1985-86	21,602	1,883	72.4	960	32.0
1988-89	-	2,435	93.6	889	29.6

Source: Data in the first column are from NCES (1988); data in the next four columns are from the AEA (1975-76 and 1988-89). The number of institutions in the NCES survey varies over time as institutions offer or drop a major in economics. Because data reported from the AEA are for institutions that reported in all of the listed years, the data are from a constant, although limited, set of institutions and reflect enrollment patterns within existing institutions only.

Undergraduate economics classes are typically taught in three different forms (Bartlett and King 1990). In large research-oriented universities, the principles courses are typically taught in lectures with 100 to 500 students. The instructor lectures in a noninteractive way, and is a "manager" of instruction, coordinating weekly question-and-answer sessions with teaching assistants. Sometimes lectures are supplemented by computer-managed instruction packages. Information on student understanding comes mainly through multiple-choice exams.

In a second format, classes are much smaller (25–40 students), facilitating student-faculty interaction. The instructor lectures, sometimes spontaneously taking (or asking) questions. Workbooks, problem sets, and simulations often provide students practice in working with basic concepts and economic problems.

A third approach, used primarily in seminars with relatively few students and at smaller, liberal arts colleges, combines the lecture-discussion format with more direct and intensive student-faculty interaction. Students are sometimes required to engage in a research project or write a position paper. They are evaluated on the basis of oral presentations and written work and often have an opportunity to rewrite papers in response to criticism.

In smaller classes, instructors can expect students to be more than mere receptors of economic knowledge and manipulators of contrived exercises. The sad fact is that students are often expected to learn to think like economists without having opportunities to learn gradually how economists go about doing economics. After a lecture on buoyancy, students are thrown into the deep end of the pool, and many discover that without practice and encouragement they cannot swim.

The size of introductory economics classes varies enormously. In 1980, the average introductory class size was 58, with a standard deviation of almost 50 (Sweeney et al. 1983). Advanced courses were usually much smaller (around 35 students).¹⁴

Allowing students more opportunity to become active learners will require classes of fewer than 25 students. Smaller classes provide greater opportunities to mesh pedagogical methods with the needs of various students. Students are likely to be more directly and personally engaged in learning, which will reduce apathy and frustration. In smaller classes, instructor morale and, hence, instructor enthusiasm are likely to be better, and enthusiasm is accepted as one of the most important characteristics of an effective teacher (Siegfried and Walstad, 274–75).

One approach to the class-size problem is to deflate the myth that economics is a subject well suited to being taught in the largest lecture hall on campus. This, of course, has staffing implications that extend beyond economics departments. As long as the myth persists, it may be wise to replace large (50 student) sections of multisection introductory economics courses (not intermediate theory courses) with one gigantic section, subject only to classroom size limitations. The released faculty can then be used to staff a number of other introductory economics sections, each sufficiently small

(20 or fewer students) to facilitate writing assignments, classroom discussion, and other teaching tactics that foster intellectual development.¹⁵ Or the released faculty can be used to subdivide other courses in the major (particularly intermediate theory courses) where enrollment pressures stifle classroom interaction. Only the best lecturers/course managers should be used in the gigantic principles section. Almost all students (including those in the gigantic section) might benefit if three introductory economics sections of 50 students each were converted into one of 110 taught by the best lecturer and two sections of 20 that capitalize on the opportunity to assign papers and exploit classroom interaction. Or if, for example, the three introductory economics sections of 50 students each were combined into one class of 150, and the released faculty were used to divide an intermediate theory or elective course of 60 students into three sections of 20 students each. Do not misinterpret our argument; we do *not* advocate consolidating sections of courses that are currently small enough to engage students as active learners.

Instructional Methods

Effective learning requires active participation by students. The system of incentives, paramount in channeling student energies, should encourage this activity. Exams should challenge students to use what they have learned in new settings and not merely require them to solve mechanical problems or regurgitate the textbook. In field courses, students should be expected to use the tools learned in prerequisite courses. More hands-on experiences, independent studies, and senior theses, for example, should help students perceive order in the economic world and still appreciate its inherent ambiguities.

An innovative approach to teaching economics developed at Denison University illustrates a way to engage students actively in the learning process (Bartlett and King 1990). A lecture/laboratory format rather than the traditional lecture or lecture/discussion format is used in most economics courses at Denison. In economics laboratories, students use real-world data to develop, explore, and test economic theories. The tutorial nature of laboratories creates an apprenticeship atmosphere drawing students more actively into the learning process.

In a similar vein, the University of Arizona, Indiana and Texas A & M Universities, and the California Institute of Technology (among others, we suspect) incorporate laboratory experiments into some economics classes. Arizona and Texas A & M teach an advanced course in experimental economics, and Indiana University has an honors seminar on the subject. Experimental economics provides majors with opportunities to conduct and participate in economics experiments, inducing them to think about how consumers, workers, and business firms make economic decisions.¹⁶

Active learning can also be nurtured through independent research projects, which offer students opportunities to frame unstructured problems,

pose appropriate questions, select analytical methods, gather requisite information, interpret results, and defend their conclusions to a critical audience. Success in an independent research project can also build student self-confidence.

The principle tool for teaching economics is still the textbook.¹⁷ Textbooks have grown immense. Good as most are, we question the efficacy of relying so heavily on the predigested material presented in the usual textbook and its panoply of supplements and teaching aids. Undergraduate economics majors are seldom encouraged to read those books (Hansen 1988) that reflect the efforts of economists to understand difficult real-world problems. Textbooks provide finished (sometimes dead) knowledge rather than knowledge in the making and often represent a superficial yet overwhelming smorgasbord of loosely connected ideas rather than in-depth development of a coherent theme with related evidence and argumentation.

Problem sets are a form of writing peculiar to economics, somewhat akin to the laboratory report of a chemistry course. When problem sets are merely exercises in engineering calculus ("Here is a demand curve, production function, and input prices: maximize profits"), they teach little economics. When they ask students to identify important constraints and to bring intellectual order out of the buzzing confusion of the world, students can learn economics and how to express their ideas about economics. The heavy reliance on hypothetical facts in problem sets to ensure a "definite" answer may leave students with the impression that careful observation of the world is unimportant, that answers can be derived from theories with little basis in reality. Increased use of actual situations or of observed reality would help students appreciate the art of blending argument with observation to arrive at useful insights about the world.

Packing 450 students into a large lecture hall and sending untrained graduate teaching assistants¹⁸ to meet with smaller discussion groups periodically is not the best way to teach economics-in-depth or to reach the increasingly diverse population of undergraduates. Yet in many institutions, large introductory economics classes are inevitable.

Technology can help confront the problem in the form of computer-managed instruction, where regular computer assignments discipline study effort (Kelley 1968; Siegfried and Fels 1979, 942-43). Computers can also simulate market behavior and aggregate economic activity (Case and Fair 1985). At the least, computers are the pencil and graph paper of today's student.¹⁹

Finally, repeated doses of a single pedagogical technique, such as lectures, are likely to suffer from diminishing marginal returns. Because the human mind responds to variety, a balance among various approaches is likely to be more effective than reliance on any single method of teaching. Though movies, novels, simulations, videos, mock hearings, and radio broadcasts could all be incorporated into an instruction menu, they typically are not.

Writing

Readin', writin', and 'rithmetic are of course central to a liberal arts education. Two centuries ago, Edmund Burke (1955, 73) grouped economists with calculators, "in whom," he lamented, "the glory of Europe was extinguished forever." The glory may be less today, but the modern world depends on knowing how big is big. Likewise, a student's ability to read and listen should be sharpened by majoring in economics. Close reading of poetry is no more exacting than close reading of economics, though close economic reading is usually less self-consciously taught. The middle of the triad—writing—is a particular problem in economics today. Writing and speaking should play a large role in the economics major but usually do not. Writing clearly is the acid test of thinking like an economist. Students do not understand the theory of rent until they can apply it in their own words to the burden of the debt, say, or the effect of school expenditures on house prices.

Large classes, a fetish of "objectivity," the "need" to cover so many topics in each course, and a sense of inadequacy among faculty about their own writing may explain why economics majors do relatively little writing. The sheer amount of time required to do it right is, no doubt, another reason. Yet economists recognize the power of writing in their own research and in their efforts to influence economic policy. The nationwide movement of "Writing Across the Curriculum"²⁰ offers possible help. Economics faculty can with modest effort learn how to make writing integral to their advanced courses within a reasonable time commitment.

Although typical class sizes may preclude meaningful writing assignments in most introductory courses, increasing the amount of student writing in intermediate theory and economics electives is both feasible and desirable. Word processing offers an often overlooked and widely available opportunity. By reducing the cost of rewriting, word processors allow faculty to work *with* students during the course to improve writing and argument. This is a marked advance over the traditional approach, in which the instructor laboriously provided detailed feedback at the end of the semester, only to have it ignored by the student.

Perspective

Thinking like an economist need not inhibit one from thinking in other ways. But if economics is learned in isolation, other ways of knowing may be devalued. Neils Bohr noted the "precluding feature of knowing": for example, observing that people are sometimes rational in making decisions may preclude remembering that frequently they wander in a fog of indecision. Or taking a Western view of the dividing line between the family and the marketplace can make it harder to understand a Moroccan bazaar or an Israeli kibbutz. Moreover, economics can downplay equity and subjectivity, for economists have, as we delight in saying, a comparative advantage in efficiency and objectivity. Such specialization can leave students unable to

cope with the imprecision and ambiguity of the world, choosing unreflectively the hard half of the false dichotomy between hard and soft. Yet when well taught, the economics major can provide students a solid intellectual platform from which to discover and evaluate the whole.

The wide applicability of the principles of economics often tempts us to overlook the limitations of thinking like an economist. In our enthusiasm to demonstrate the power of economic analysis, we risk becoming doctrinaire. If we really want to foster independent and critical thought by our students, we need to demonstrate open-minded, self-critical thinking. Teaching whatever paradigm we choose as "the truth" does not help. But criticism must be introduced carefully. Excessive negativism at the beginning may discourage students from grasping any of the ideas of economics. As Joan Robinson (1955, 30) argued, everyone ought to learn at least enough about the popular paradigms of economics to know how to avoid being deceived by economists.

The enthusiasm frequently engendered for specific economic models can also have pedagogical consequences. When enthusiasm crosses the fine line dividing it from dogmatism and when economic models are initially revealed as self-evident truths, debate is stifled and learning is sacrificed. Under such circumstances, is it any surprise that critical discussion of methodology is difficult to stimulate in later elective courses?

Helping students think more like economists should not overshadow the broader intellectual context within which the subject is taught and learned. Economics is an essential, but nonetheless single, element of the liberal arts.²¹ Economists' proclivity to narrow and compartmentalize aspects of problems should be combined with other approaches to complex problems; education in the liberal arts is a vehicle for doing this. Economics also needs to be placed within the context of the sciences. The comparison informs students about the similarities and differences among the various sciences, human and physical. It can question the oft-voiced superiority of economics over the other social sciences and contest the view that economics is the physics of the social sciences.

The Give and Take of Teaching

An especially important, but largely ignored, principle of education is that teaching is not simply a matter of stuffing student minds with facts, theories, and empirical techniques. The ability of teachers to effectively convey ideas to students depends on their capacity to understand students' perspectives and orientation, to recognize the experiences of students, and to connect with students' prior knowledge. For example, a 19-year-old coming fresh from what often amounts to a socialist community (the family) and with little experience with scarcity or choice, may find it difficult to grasp capitalist economics.²² Moreover, undergraduates of all ages may be at radically different stages in their capacity to work with ambiguity and abstraction. Numerous studies following the groundbreaking research of William Perry (1970) on Harvard stu-

dents have found across a variety of institutions and student populations that first-year college students employ dichotomous thinking—things are either right or wrong, black or white. As students mature, their ability to cope with abstraction and ambiguity often improves, suggesting the need for tailoring instructional strategies to students' stage of development. In addition, 19-year-olds are just as interested in learning how to manage their emotions and achieve autonomy as they are with developing a sense of intellectual, physical, and social competence (Rodgers 1980). In short, academics occupies only a small part of their attention.

The changing mix of students warrants more explicit attention. Women now constitute a majority of all persons enrolled in American colleges and universities. In spite of the enthusiasm reflected in their growing matriculation rates, the college experience engenders for many women a "decline in the level of their intellectual and personal aspirations" (Schaefer 1985). Many little things, when cumulated, can make the college classroom a chilly place for women to learn. Commonly used examples from sports may be one of these "things." Textbooks with few women presented in nontraditional roles is another. Feiner and Morgan (1986) found women mentioned in fewer than 1 percent of the examples in introductory economics textbooks. To the extent that the material is devoid of experiential content for half the audience, learning is diminished.

The competitive, aggressive standards of argument that pervade certain disciplines, including economics, also make some women uncomfortable (Ehrhart and Sandler 1987, 7). Although the expert-and-client model appeals to some students, others may prefer more cooperative methods of learning (Maher 1987). To facilitate learning in a diverse group of students, instructors need to employ an array of pedagogical techniques.

The content of economics can be an obstacle to students who believe in altruism and find the assumption that individuals maximize utility a repelling thought. Similarly, the methodology of economics may be an obstacle to students who learn more effectively using first-hand, observational strategies in contrast to the "out-of-context" learning of abstract models (Belenky et al. 1986). Instructors need to find the most effective blend of abstract and contextual material to make the powerful ideas of economics accessible to all students.

Attention must also be given to evaluation. Based on a large sample of data from Great Britain, Lumsden and Scott (1987) found that male economics students do better than women on multiple-choice questions and vice versa for written essays. A proper balance of evaluation instruments is necessary to compare properly the achievement of all students. Large lecture halls, hierarchical models of teaching, abstract modeling, and culturally biased forms of evaluation may discourage some students from pursuing economics and inhibit others from fulfilling their potential as economics majors.²³

Cultural differences in learning also deserve attention. Asian-, Hispanic-, and African-American students come from diverse cultural backgrounds.

The diversity of experience represented by these backgrounds can be a source of examples with which economic principles can be illustrated. It also means that the effectiveness of idiomatic and culturally dependent analogies will be less when some students do not understand the context from which they are drawn.

Learning is jointly produced by students and teachers. The effectiveness of different pedagogical techniques depends on the task at hand, the instructor's talent, and the intelligence and energy of students. Economics instructors are well aware of their personal advantages in using different pedagogies (one might be a star lecturer, while another may excel at leading discussions), but they rarely devote much attention to the fit between their delivery and the audience. The resulting disappointment could be reduced if courses were more frequently designed on the basis of students' needs rather than the alleged needs of the subject or the teacher's apparent gifts (Charlkins, O'Toole, and Wetzel 1985; Wetzel, Potter, and O'Toole 1982).²⁴

WHAT AND HOW MUCH DO OUR STUDENTS KNOW?

With the exception of a few liberal arts colleges, little is done to assess the impact of the economics major on our students' intellectual development.²⁵ It is assumed—hoped may be more accurate—that climbing the tree of economic knowledge, represented by a succession of progressively higher-level courses, produces graduating majors who can better see and understand how to think like an economist.

In order to evaluate our success in educating majors to better understand how to think like economists, we need to identify how to measure the proficiencies of students in doing such thinking. That, in turn, requires a definition of "thinking like an economist." An economics major should be able to analyze (complex) problems involving dimensions of scarcity. This typically involves decomposing problems in ways that highlight behavior, constraints, tradeoffs, and feedbacks. Because the quality of economic analysis is determined by the accuracy of the descriptions of behavior and the reliability of the forecasts made on the basis of these descriptions, students must become acute observers of the world; and they must be able to collect and use data to specify and assess relationships. Economics majors should be able to combine these skills with the methods and results of alternative perspectives and approaches to problem solving, thereby showing an awareness of the limitations of economic analysis while placing its contributions in appropriate perspective. They should be able to demonstrate their proficiency at these tasks through a variety of competencies.

Hansen (1986) recently specified a set of competencies through which a graduating economics major might be expected to demonstrate the ability to "do" economics. These include: gaining access to existing knowledge, displaying command of existing knowledge, displaying the ability to summarize and interpret existing knowledge, using existing knowledge to ex-

plore issues, and creating new knowledge, including the formulation of questions and organization of an analytical approach to them.

A successful assessment program could provide feedback to help a department revise its courses, alter its pedagogy, restructure its major, or, in extreme cases, rethink its entire undergraduate program. Evaluation can also inform students about their success in achieving the goals set by economics departments. Current graduates have only the vaguest idea about what and how much they learned as economics majors, frequently never understanding what their instructors and their undergraduate program have been trying to accomplish.

Implementing an evaluation program would be relatively simple if assessment instruments sensitive to the kinds of proficiencies of interest to departments were readily available. The availability of such instruments would obviate the need for each department to develop its own instruments and also provide useful information to departments trying to calibrate the exact levels of proficiencies for their students.

Because valid and reliable examinations are essentially a public good, available for use by one department even after being "consumed" by another, and because their preparation entails substantial fixed costs, we recommend that the Committee on Economic Education of the AEA, perhaps in conjunction with the Joint Council on Economic Education, assume responsibility for developing exemplary programs to help departments evaluate how well they prepare their majors to understand how to think like economists. Such a project would begin with an examination of existing assessment instruments, including those produced by national testing organizations and those developed by the few departments that do attempt to document what their graduating seniors know.

An end-of-the-major assessment program, particularly if it involves external examiners, can lead to a constructive change in the learning environment. It can make students and faculty allies in the common goal of helping students understand economics. As students strive to attain the expected proficiencies, faculty members may see their roles recast along the lines of coaches rather than referees. In short, external assessment holds out the promise of making students and teachers collaborators rather than adversaries in the learning process.

RECOMMENDATIONS

Foundations

The foundations of the major rest on three sets of courses: introductory macro and micro, intermediate macro and micro, and quantitative methods.

Intermediate macro and micro. Departments have often, by default, relinquished control of these courses to those who teach them. *Departments need to coordinate the content of the intermediate theory courses to insure that they establish a foundation of knowledge and skills.*

Although most intermediate macro and micro courses develop well the rigor and elegance of economic theory, they tend to slight its evaluation. In particular, the usefulness of theoretical topics and paradigms, largely assessed by confronting theory with data, applying models to various problems, and comparing the outcomes of alternative theoretical constructs, merits greater emphasis. These courses should *establish explicit connections between theory and its empirical counterparts, to help students appraise the importance of theoretical constructs, provide a basis for selecting assumptions, and show that theory is relevant.*

To achieve the overall objective of the major, the intermediate macro and micro courses must *emphasize active student learning, practice in applying what students learn, and the exercise of critical judgment.* Much of this can be accomplished by increasing the number of carefully structured writing assignments that demonstrate the power of application.

Certain practices war against enhancing the effectiveness of the intermediate theory courses. One is the preoccupation with formalism rather than a focus on logically rigorous analysis of economic issues. The intermediate theory courses can reveal the power and excitement of the discipline, provided they convey how economists use theory, how rigorous thinking can illuminate economic phenomena, and how theory and real-world events interact to produce new knowledge, concepts, and theories about the economy and how it works.²⁶

Quantitative methods. Economics is an empirically oriented discipline. The focus is on explaining and testing our understanding of economic phenomena. Hence, students need an appreciation for an ability to deal with empirical matters. Rather than view this as a matter of learning statistics, we need to ask what it is that students must know to function as economists. The foundation in empirical methods depends on (1) knowing something about the measurement of economic variables (methods of data collection, reliability, etc.); (2) being able to organize, work with, and manipulate data for purposes of comparison; (3) the capacity to test hypotheses with empirical data; and (4) knowing how to interpret the results of various statistical procedures. *The quantitative methods course should be reoriented from its almost singular statistical focus to emphasize this wider range of quantitative methods employed by economics.*²⁷

Breadth Requirement

*A respectable economics major requires at least five (three-credit-hour) courses beyond the foundations to provide sufficient opportunities for students to appreciate the art of applying economic principles and concepts in different institutional contexts. The chosen electives should be distributed to ensure an appreciation for the historical, international, and political context of economics.*²⁸ Such breadth will help students avoid a narrow parochial perspective based solely on marginalist thinking and should prepare them to deal sensibly with problems that involve other than atomistic models of individual choice.

Contextual inquiry includes courses in economic history (where connections between economics and history are explicit), history of economic thought (where different modes of thought are exposed), comparative economic systems (where social/political/cultural dimensions that influence distinctive economic systems are compared), and area studies (where synthetic analyses of countries and regions are explored). Such courses illuminate the importance of context and structure—initial conditions and constraints—and take the edge off narrow thinking about economics.

International courses include not only trade and finance, but also economic development, area studies, and comparative systems; other courses may fit too (e.g., the multinational corporation). Such courses place students in a stronger position to use their tools of economic inquiry in a world that is rapidly becoming more integrated.

Public-sector economics courses include not only public expenditure analysis and taxation but also some offerings in theory (stressing public goods, externalities, collective decisionmaking, and market failure), labor economics (stressing aspects of regulation), and the like. Such courses simultaneously illuminate and qualify the role of individual, free-market choice, a dominant paradigm in economics. Students should gain greater appreciation for methods of collective choice, including nonmarket options for resource allocation. These dimensions of decisionmaking account for one-third to almost all resource allocations in most countries, and they are just too important to relegate to a few weeks of exploration in the foundation courses.

All elective courses should forge explicit links to both economic theory and empirical methods. Students should be expected to fit theoretical principles to the particular institutions studied in the field courses. Assignments should reinforce students' understanding of empirical methods acquired in the core quantitative methods course.

All courses that can satisfy the breadth requirement should contain a substantial active-learning component, such as oral and/or written reports, interactive computer simulations, class discussions or laboratory exercises, and should draw on a broad array of source materials. These courses should not rely exclusively on textbooks for assigned reading.²⁹

Depth Requirement

To complete the process of intellectual maturation, *every student should be required to apply what he or she has learned to an economic problem and, in the process, acquire experience really "doing economics."* For a particular intellectual encounter to accomplish this goal, *it should involve considerable responsibility on the student's part for formulating questions, gathering information, structuring and analyzing information, and drawing and communicating conclusions to others in an oral and/or written form.*³⁰ The depth requirement should be implemented in each elective course and complemented through the establishment of "capstone experiences" such

as special seminars or traditional opportunities for senior theses, honors research projects, and independent studies.³¹

HOW TO MAKE IT WORK

A respectable economics major that teaches students to think like an economist in a way that has lasting benefits requires considerable instructional resources, especially if, as we argue, students must obtain extensive practice at really *doing* economics. At a minimum, such a major is characterized by the following:

- A strong introductory sequence stressing the application of economic tools to a variety of problems.
- Rigorous intermediate theory courses, typically taught in relatively small classes (20–25 students) that actively engage students in doing economic analysis.
- Background courses in mathematics and quantitative methods stressing the application of techniques *used* in economics.
- A minimum of five (three-credit-hour) economics electives, three of which provide breadth to the major in terms of a contextual, international, and public-economics perspective. These courses should emphasize writing, oral presentations, research projects, argumentation, and feedback.
- A capstone experience that synthesizes the applications, encourages students to integrate economics with the rest of their college learning experience, and accords opportunities for creative writing.

Deans and chairs will immediately observe that such a major is expensive, and thus compromises must be made. It is our argument, however, that unless this type of experience is offered to economics majors, the *minimum* mastery level of understanding how to think like an economist is sacrificed. Compromises that significantly reduce this goal invariably result in majors' simply being exposed to economics in varying degrees, and, as a result, the lasting effects of the experience are diminished, if not foregone.

How is it possible to make such a major work? The answer, it seems to us, is painfully simple: ration access to the major to fit the resources available while maintaining quality standards and fulfilling the responsibilities of each college or university. Placing a limit on the number of economics majors will conflict with the philosophy of many institutions. But unconstrained access to a major without concomitant resources, resulting in sufficiently diminished standards so as to compromise the intellectual integrity of the enterprise, is also at variance with prevailing educational philosophy. Responsible educational planning requires "living within one's budget" of instructional resources, and the issue of *how* to ration access to the major then becomes paramount. (We are *not* arguing for *more* resources being devoted to economics instruction, although in some cases that may be appropriate.)

The method of rationing may vary, depending on an institution's policies and procedures (e.g., some preclude the use of minimum grades in prior

courses as a method to limit enrollment in a popular major). Whatever method is used, however, rationing should be *educationally sound* with respect to the *goals* of the major. Our preference is to offer intellectually challenging intermediate macro, micro, and quantitative methods courses whose reputations insure that the number of students intending to major does not exceed capacity.

What does and does not constitute intellectual challenge in such courses? It does *not* require the use of formal (and seemingly difficult or sophisticated) tools (mainly mathematics) that can constitute a barrier to learning;³² and it does *not* involve the use of unfair or tough grading standards, unreasonable assignments, or scare tactics as techniques to discourage enrollments. It *does* involve holding students to the standard of properly *applying* reasonably sophisticated economic ideas to a variety of unfamiliar problems. This standard is intellectually more demanding than facility with formal tools *per se*, and it is, in fact, the best early indicator as to whether a student has the ability to come to grips with the major—to think like an economist.³³

The undergraduate economics major has slipped in quality over the past two decades as large enrollments undermined standards. We see no reason, however, why large *enrollments* in economics courses need pose a problem. Indeed, offering high-quality economics principles courses (even if taught in large classes) should be a primary objective of an economics department within the liberal arts college. A related goal is to ensure that economics is one of the most exciting and intellectually challenging majors. Having said all this, we believe the real challenge is to make certain that economics majors understand how to think like an economist—surely a highly demanding but attainable goal. To accomplish this, instructors need to make tough choices—the hallmark of economics.

Appendix How This Report Was Compiled

In August 1988, AAC invited the AEA to participate in its Project on Study-in-depth. John Siegfried, Chair of the AEA Committee on Economic Education at the time, assembled the task force that prepared this report. The task force met as a group in January and March 1989, and in February and June 1990. Members of the task force interviewed economics majors at their respective institutions and conducted a written survey of majors. For "facts," the task force relied heavily on the 1980 surveys of economics departments and students conducted by Siegfried (Siegfried and Wilkinson 1982; Siegfried and Raymond 1984).

Drafts of the report were presented at the 1989 annual meeting of the Joint Council on Economic Education, at seminars at Grinnell, St. Olaf, Carleton, and Middlebury Colleges, and Wake Forest and Miami Universities, and the 1990 meetings of the AAC. A late draft was read by nine undergraduate economics majors at five different institutions who offered useful advice. A summary of this article was presented at the December 1990 meetings of the AEA.

To evaluate some of the conclusions and to test the acceptability of the recommendations, in May 1990 we asked one faculty member at each of 127 colleges and universities to react on behalf of his/her colleagues to parts of the report. Responses were received from 83 institutions, a 65 percent response rate. Responses were re-

ceived from 36 research universities (as classified by the Carnegie Foundation for the Advancement of Teaching), 29 doctorate and comprehensive colleges and universities, and 18 four-year liberal arts colleges. Highly selective colleges and universities were deliberately overrepresented in the sample. Respondents were asked to react to statements in the report on a scale of 1 to 5, ranging from strong disagreement to strong agreement. These reactions are reported in endnotes.

NOTES

1. The latest available NCES data reported 21,602 bachelor's degrees awarded to students graduating in 1985-86 with a major in economics. NCES data do not count double majors, and thus the data are sensitive to which of two majors is reported as the "first." By matching a sample of 435 institutions' reports to NCES with data reported directly from their departments of economics, Siegfried and Wilkinson (1982) estimated that NCES tallied only 68 percent of the majors reported by the departments. Based on this finding and the latest NCES data, we estimate that about 32,000 economics majors earned baccalaureate degrees in 1985-86.
2. To evaluate the conclusions in this article, we conducted a survey of 83 colleges and universities in May 1990. The questionnaire was sent to 127 institutions, generating a 65 percent response rate. Respondents were asked to react to statements in our report on a scale of 1 to 5, ranging from strong disagreement to strong agreement. Of the 80 respondents, 68 either agreed or strongly agreed (ratings 4 or 5) with this statement of purpose. None of the 74 respondents reported that they disagreed or strongly disagreed (ratings 2 or 1) with the statement.
3. When we asked seniors at our institutions what they had expected from the major, many answered: "Learn how to run a business," or "Learn about the economy."
4. Colander and Klammer (1990, 189-90) attribute much of the cynicism about economics to the religious fervor with which leading research economists embrace the principle of logical positivism, that science is advanced by the empirical testing of well-specified propositions. Slavish devotion to the principle means that economics *becomes* the specification and testing of hypotheses, which are evaluated solely on the basis of their predictions. There is no (or little) role for making reasonable assumptions or understanding economic reality. The cynicism occurs when a consensus about the appropriate empirical tests is absent. The hypotheses cannot be sorted on the basis of agreed criteria, and conflict arises about how to select among them. One solution is simply to do abstract theoretical work and declare it to be truth. Another approach undertakes empirical tests where empirical testing cannot be done. Others turn to less formal evidence to distinguish among the hypotheses. The resulting confusion and contradictions undermine the integrity of the process, and consumers of economics, as well as economists, become cynical about its value.
5. The AEA's Commission on Graduate Study in Economics has identified seven skills that reflect the essential competencies of economists: analytics, critical judgment, mathematics, computation, application, communication, and creativity. The need for these skills varies among different economists and at different levels in the education process. Thus, it is not obvious what weight should be given to each skill in the major, let alone in individual courses. It is clearly inadvisable to try to develop all these skills in every course; rather, special attention should be given to the development of particular skills, depending on course content, placement in the curriculum sequence, and the cognitive development of students. Additional consideration should be the comparative advantage of particular faculty members because it may be possible to improve the fit between the skills to be emphasized and the talents of those imparting the skills. Finally, some skills are more difficult to teach and learn than others; some are best acquired through practice and coaching while others are better suited to formal instruction; and some come more easily to certain students than to others.
6. Requirements for the economics major at 546 colleges and universities in 1980 are reported in Siegfried and Wilkinson (1982). The typical senior economics student is described in Siegfried and Raymond (1984). Facts relating to the economics major are taken mainly from these sources.

7. Three-quarters of introductory economics students take a two-semester sequence; one-quarter take a one-semester course (Sweeney et al. 1983).
8. In 1980, about a quarter of undergraduate economics departments required their majors to take a course in calculus; in contrast, 81 percent of the institutions in the 1990 survey reported that calculus was a prerequisite either for their major or a course in it.
9. On the other hand, 75 percent of the respondents to the 1990 survey reported that their institution's basic calculus course is appropriate to the economics major.
10. Becker (1987, 19) concurs that the emphasis in an economics major's quantitative methods course should be on "the application of statistical measures and statistical inference in an economic analysis" and on the "interpretation, the limitations, and the significance for economics of statistical techniques."
11. In 1980, the typical senior economics major wrote 4.5 term papers of 5 or more pages in economics courses. The standard deviation of 3.5, however, suggests that almost 20 percent of graduating seniors wrote no more than a single term paper in all of their economics courses combined (Siegfried and Raymond 22). In the 1990 survey of 83 colleges and universities, only 77 percent reported that a typical graduating economics major would have written at least one major economics paper. Students typically wrote more than two major papers at only 22 percent of the institutions; at 21 percent, including mostly large universities, the typical economics major did not write a single substantial economics paper.
12. As part of the AAC project, 970 students at 37 colleges and universities were asked whether (1) *information* acquired in other courses outside of their major or (2) *skills* acquired in other courses outside of their major were required to solve problems or answer questions on examinations taken in courses in their major. The sample was not random; the 123 economics students in the sample came from 9 institutions, primarily those at which the authors of this article teach. The economics students agreed with the two statements less frequently (6 percent for economics vs. 11 percent for other disciplines for information, and 24 percent vs. 32 percent for skills) than students majoring in other subjects.
13. The 1990 survey asked how economics class sizes compared with average class sizes in other departments. Of 73 institutions responding, 26 reported class sizes at least 50 percent above the institution average (or "much larger"), 33 reported class sizes somewhat larger (up to 50 percent), 10 reported class sizes equal to the average, and 4 reported smaller than average classes. Liberal arts colleges follow the same trend as universities.
14. Average class sizes for intermediate microeconomics, intermediate macroeconomics, and quantitative methods were 34, 38, and 37, respectively; all other economics courses averaged 29 (Siegfried and Wilkinson 1982, 128, 133).
15. The effectiveness of this strategy depends on the accuracy of the beliefs that (1) "increasing class size from current levels of 30 to 40 or more, up to several hundreds, may not radically affect college student achievement" (Williams et al. 1985, 315); and (2) decreasing class size from 30-40 to 15-20 can improve achievement (Glass and Smith 1979, v) and may alter the character of the course in worthwhile ways. Experience in "doing economics" rather than "learning about economics" is more likely in smaller classes.
16. Information about experimental economics in the curriculum is available from Donald Wells at the University of Arizona or from Arlington Williams at Indiana University.
17. For a discussion of introductory economics textbooks, see Bartlett and Weidenaar (1988) and the Spring 1988 and Winter 1991 issues of the *Journal of Economic Education*.
18. There is some evidence that training economics teaching assistants enhances their students' learning (Lewis and Orvis 1973; Watts and Lynch 1989).
19. In a Third World development course at Duke University, each student writes a lengthy research paper on a country of choice. The student is provided computer output (based on standard computer modeling) indicating what the country's development pattern *should be* if it were "typical" of the Third World at that country's actual stage of development. The student plots the country's *actual* experience with 15 to 20 development indicators against this hypothetical norm and explains the deviations and accounts for the conformities. This generates a vigorous appetite for theory and order, the need to organize complex problems into manageable parts, the realization that factors outside economics must be included in the analysis of economic indicators, the importance of historical perspective, and sorting out the short from the long run. In short, it stimulates in-depth learning in important dimensions.
20. "Writing Across the Curriculum" programs require a sequence of writing assignments. Papers are evaluated on both content and presentation by faculty who are trained to provide useful feedback to students. First drafts are marked and returned with sufficient time

for students to revise and resubmit, thus encouraging students to learn from their professors' advice.

21. Economics majors are typically required to take only a quarter of their undergraduate course work in economics (Siegfried and Wilkinson 1982, 127, 128).
22. The concern with the effect of age on students' ability to grasp economics is not new. Clow (1899) reported that the president of Tufts College (Capen) at the 1898 AEA annual meeting expressed doubts about "the wisdom of trying to teach [economics] to immature minds."
23. NCES (1988) reported 50.8 percent of the 1985-86 bachelor's degrees were earned by women. Economics has a relatively small percent of female undergraduate majors (34.4) compared to foreign languages (72.4), psychology (69.0), sociology (68.9), English (67.1), biology (48.8), mathematics (46.5), political science (39.6), history (36.6), and chemistry (35.9). Disciplines with a smaller percentage of female students than economics are philosophy (32.8) and physics (14.6). On the other hand, the proportion of undergraduate economics majors who are women has grown rapidly since 1977-78, when it was but 24.9 percent.
24. Or, if instructors' teaching styles were publicized sufficiently, students could select courses and sections that are taught in a style most complementary to their learning skills.
25. Only 17 of the 83 institutions in the 1990 survey indicated that they used any form of senior comprehensive examination. Most of those used standardized multiple-choice exams (the Graduate Record Examination in Economics or the Educational Testing Service's economics comprehensive examination) and expressed dissatisfaction with them.
26. Only 33 of 81 survey respondents reported agreement or strong agreement with our initial recommendation about intermediate theory courses. They objected mainly to the advice that departments "reassert collective control" over the content of these courses and to our recommendation that the courses emphasize applications. Upon reflection, we concluded that they had valid arguments and revised the recommendation accordingly. We still believe that *coordination* of the content of core courses, which are used as a foundation in subsequent instruction, is important and that intermediate macro and micro should emphasize the *value of theory for explaining economic phenomena*. We do not recommend, however, that intermediate theory courses consist of an endless string of applications, sacrificing the opportunity to demonstrate the value and usefulness of logically rigorous argument. With these changes, we expect that a substantial majority of the respondents would now agree with the recommendation.
27. Of 81 respondents to our survey, 60 either agreed or strongly agreed with this recommendation; only 5 disagreed.
28. The rationale for contextual inquiry, particularly the historical and international, is expressed forcefully in a broader context (Harvard's core curriculum) by Rosovsky (1990, 120-25).
29. Of 82 respondents, 56 either agreed or strongly agreed with this recommendation; only 4 disagreed.
30. Of 79 respondents, 57 either agreed or strongly agreed with this recommendation; 10 disagreed, almost all on the basis of insufficient resources to implement it.
31. Another approach would be to require a substantial project of each student which would be done in conjunction with any economics elective the student chooses. Attaching it, albeit loosely, to a regular course improves the chance that the student possesses sufficient substantive knowledge of an area to complete such an ambitious undertaking.
32. "Many [undergraduate economics programs] use techniques as a way of regulating the number of majors. If there is a shortage of majors, lower techniques; if there is a surplus of majors (depending on the political relationship the department has with the dean), raise techniques" (Colander and Klammer 1990, 197).
33. Introductory courses should not be used to ration access to the major because such courses should be widely accessible to nonmajors and students of diverse backgrounds and goals.

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NOTICE

Expanded Time for AP Examinations

Beginning with the 1993 administration, the Advanced Placement (AP) examinations in microeconomics and macroeconomics will be expanded from 1½ to 2 hours each, making possible an increase in the number of both multiple-choice and free-response questions. For both examinations, the multiple-choice section will consist of 60 questions to be answered in 70 minutes. The free-response section of each examination will be expanded to 50 minutes and will consist of 1 long and 2 shorter questions. The long question will account for ½, and each shorter question, for ¼ of the student's total free-response grade. The multiple-choice section score of each exam accounts for ⅓ of the total AP grade; the free-response section, for ⅔. Students will still have the option of taking one or both exams for a single fee; separate grades will be reported for each exam.

Applications for Readers Accepted

The increased number of free-response questions on each exam will require an increased number of "readers" to grade the answers. The reading of these papers occurs annually on a college campus sometime in June for about 6 days. Readers are college professors and high school teachers of economics.

For more information contact:
Claire Melican, Educational Testing Service, Princeton, N.J.