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ABSTRACT

Problems with teacher demand/supply estimates are reviewed, and comments are made on current policies intended to increase both the supply and the quality of teachers. Some experiences and reactions to recent changes in credentialing and educational requirements are also noted, including revisions in state certification statutes, requirements for competency testing, and reforms in teacher education programs. The effects of various economic incentives to attract more able people into the profession and maintain them as teachers are discussed, including scholarship and loan programs, raising teacher salaries, and performance-based pay. Projections of future demand, in addition to using enrollment forecasts, must make estimates of teacher attrition and possible educational improvements that may call for additional teachers. Problems concerning estimates of supply have to do with uncertainties regarding the makeup and quality of the current teaching pool, the number of individuals expected to enter teaching in the future, and the number that can be expected to return to teaching from the large pool of trained, but presently inactive teachers. A three-page reference list is provided. (Author/CB)

ESTIMATES OF TEACHER DEMAND AND SUPPLY AND RELATED POLICY ISSUES

Senta A. Raizen

ESTIMATES OF TEACHER DEMAND AND SUPPLY AND RELATED POLICY ISSUES

Presentation at AERA Annual Meeting 1986
Senta A. Raizen

In this presentation, I will first review some of the problems with estimates of demand for and supply of teachers. Second, I will comment on several of the current state and district policies intended to increase both the supply and the quality of teachers.

Demand and Supply*

Almost uniformly, projections regarding the need for teachers are based on estimating the demand for teachers for the nation, for a state, or for a district, usually for a given date, next estimating the expected supply by that date, and then comparing the numbers thus generated to produce forecasts of shortages or surpluses. In each of these steps, there are problems.

Problems with Demand Studies

Such studies are generally of two types: (1) surveys of the opinions of selected groups about current teacher shortages, e.g., placement officials in teacher training institutions or state curriculum supervisors (Akin, 1984; Howe and Gerlovich, 1982; Shymansky and Aldridge, 1982), and (2) head count information, e.g., of teaching positions unfilled in a specific school year or filled by unqualified personnel (National Center for Education Statistics, 1984). In order to produce estimates of future needs, various factors are then used to generate demands for out-years: changes in student enrollment, expected attrition rates of teachers (i.e., numbers leaving each year), and a variety of such hoped-for improvements as reducing pupil/teacher ratios, eliminating emergency credentials, eliminating out-of-field teaching, and increasing high school graduation requirements (Cagampang et al., 1985).

- Problems with Opinion Questionnaires: Generally, it is unknown what criteria are used by respondents in their estimates of the number of qualified teachers available, say, in science or mathematics. Not only is the matter of defining teacher quality left

* Much of the material in the first section of this presentation is derived from three activities of the National Research Council: the work of the Committee on Indicators of Precollege Science and Mathematics Education (Raizen and Jones, 1985), a conference on demand and supply of science and mathematics teachers (Gilford and Tenenbaum, 1984), and a conference on teacher quality (Blank and Raizen, 1985).

up to the respondent, but it is not known to what extent individual perceptions take into account such other issues as teacher turnover, class size, and the like. Also, it is not possible to translate opinions into quantitative data to indicate actual numbers of teachers that are or will be needed.

- Problems with Head Counts: If a state accepts certification as a valid indicator of teacher qualification, then head counts that include positions unfilled, positions filled by teachers with less than standard certification (including certification for a field other than current assignment), and courses not offered for lack of teachers may give an indication of current demand. However, state certification requirements have been changing and will continue to change. Generally, teachers already in the system are grandfathered in or given a period of several years for bringing their credentials up to date. Hence, even within a state, certification may be a questionable indicator of quality. Nationally, certification varies so much over states and over time that it must be considered a highly questionable proxy for qualification.

- Factors Used in Projecting Demands: The demand factor easiest to establish is projection of enrollments, at least over the cohort of children born in the last 5 years. Even this factor is attended by some uncertainty. Beyond children already born, fertility forecasts have not been particularly trustworthy. Moreover, forecasts of immigration and population movements have been similarly flawed, being generally based on past trends and unable to anticipate shifts in such trends. The second factor, attrition rates of teachers, also tends to be calculated from past trends--often using data that are decades old. Attempts have been made to factor in changes in the average age of the teaching pool, possible changes in retirement age, and alternative job opportunities so as to generate upper and lower bounds for attrition. Current estimates range from 9 percent per year (Darling-Hammond, 1984) to 6 percent (National Center for Education Statistics, 1985) or even 5 percent (Shymansky and Aldridge, 1982). Such ranges leave plenty of room for errors in demand forecasts. As to the need for additional teachers generated by various desired educational improvements, obviously these can be manipulated to project widely varying demand estimates.

A rather serious problem with nationwide or statewide estimates of teacher demand is their aggregate nature. For example, past Department of Education statistics on demand for teachers have not distinguished among states or among fields of instruction. The recent California forecast (Cagampang et al., 1985) is to be commended for including enrollment projections by county, although the other factors used in demand projections are not disaggregated in this manner. The California enrollment projections show an increase of nearly 120,000 students in Los Angeles over the

next 5 years whereas Marin County will actually experience a loss of some 3,000 students. Even without growth, large urban districts have had a persistent shortage of teachers, as have isolated rural districts. Thus, New York City, Chicago, and Philadelphia continue to experience teacher shortages even though the states of New York, Illinois, and Pennsylvania report no shortages. State policies designed to increase teacher supply in general are unlikely to be able to address disparities among districts. Recent legislation in several states has mandated development of demand forecasts for specific fields deemed to experience scarcities, usually mathematics and science teachers, (e.g., Connecticut, 1985; Delaware, 1985; Florida, 1985; Illinois, 1983; Maryland, 1985; New Jersey, 1983; New York, 1983; and Pennsylvania, 1983). Such information is certainly more useful for policy purposes than aggregate numbers, although, in science, further distinctions needs to be made between biology and the physical sciences. Also, studies ought to address all fields, not just those thought to be areas of scarcity.

A second general problem is that demand forecasts tend to be based on extrapolation of current conditions, taking account of likely changes in enrollment, class size, and curriculum. They do not take into account possible structural changes in the education system--greater and more productive use of communications technologies, increased privatization of education, need for all-day and year-round parenting institutions--to name just a few.

Problems with Supply Studies

Supply studies and forecasts are open to even greater uncertainties than studies and forecasts of demand. They generally take into account the current pool of teachers in the system, anticipated graduates of teacher education programs, and possible returnees from the reserve pool (i.e., individuals trained to teach but not now teaching). For individual states, projections also should--but often do not--include in-migration of teachers from out of state.

- Problems with Estimates of Current Pool of Teachers: Supply will be strongly influenced by the quality criteria used to count who is in the current pool. Most classes have warm bodies in front of them, but states may wish to apply minimal standards of quality, e.g., certification, having passed competency tests, or a given level of subject matter preparation. Any one of these criteria may reduce the available pool in unknown ways or necessitate programs to allow underqualified teachers in the pool to meet requirements.

- Problems with Estimates of Newly Entering Teachers: Such estimates are often based on the number of anticipated graduates of teacher education programs (e.g., Connecticut, 1985; Maryland, 1985; Darling-Hammond, 1984). This assumes that new teachers will be drawn solely from teacher education institutions or programs

that result in teacher education degrees. At least for secondary school teachers, this is a gross underestimate. For example, in science and mathematics, as many as 80 percent of newly certified teachers appear to have majors other than in science or mathematics education, according to one analysis (Rumberger, 1985). Moreover, half the states permit the hiring of teachers who have bypassed many state certification requirements. Some of these, as in New Jersey, are intended to attract individuals trained in such fields of perceived teacher shortage as mathematics and science without their having to meet the usual teacher training requirements. A similar program is under way in Arizona (Babbitt, 1986).

- Problems with the Reserve Pool: This represents the area of greatest uncertainty. Graybeal (1983) has estimated that this pool is twice as great as the number of individuals actively teaching. Some states have reported that they were able to fill two-thirds or more of their vacancies from the reserve pool whereas others consider potential contribution from the reserve pool to be less than 30 percent of teachers available to fill vacancies. There is much speculation about what proportion of the reserve pool is actually available to take teaching positions and what incentives would persuade individuals to do so.

As with demand, a critical problem in estimating teacher supply is the definition of quality wanted in teachers. Standards used to define acceptable teacher quality will greatly affect forecasts. Since quality is not easily measured, certification is often used as a proxy. As noted, this is cause for serious concern due to large differences in requirements. Moreover, certification does not ensure effective teaching. Much has been written and a number of policies have been instituted to upgrade the quality of secondary school teachers. The paradoxical effects of some of these policies on teacher supply are discussed below.

Needed Improvements in Teacher Demand/Supply Estimates

- Better estimates of teacher turnover are needed. (Turnover is part of both supply and demand.) The experience distribution of the stock of teachers should be known and, for each range of years of experience, their attrition rates should be identified. Some states already have such information, for example, Illinois, New York, Michigan, and California.

- On the supply side, more informative data are needed on qualified versus less qualified teachers. Profiles of various levels of qualification could be constructed for various surveys (e.g., college credits in pertinent subjects, teaching experience by field, graduate training, pertinent inservice training, field of teaching assignment), so that forecasts could take into account alternative definitions of teacher quality.

- Supply and demand should be thought of as functions rather than numbers. The functions should include factors affecting career choices of prospective and current teachers and the possible effects of current policies to increase supply and improve quality. Forecasts should be based not on fixed estimates of numbers of people who are or will be teachers, but on conditional estimates that can be connected to specific assumptions about the effects of policies affecting teachers or about external conditions. For example, demand functions are needed that relate the number of high school science and mathematics teachers wanted by school systems to levels of funding (overall and for science and mathematics) and to curriculum requirements. Thus, resources made available for teacher salaries and other program costs will affect the demand side of the demand/supply model. Supply functions should relate the numbers of people potentially interested in teaching to the attributes that are required of them and to certification and hiring rules. How are eligible teachers defined, how can they be found, what does it take to draw them in? Hence, salary and other dimensions of compensation, for example, working conditions, are important supply side elements. To create the needed functions, response models are needed that deal with reactions to changes in these variables.

At this time, such response models do not exist. But there are some straws in the wind. The next section of this presentation will note a few actual or conjectured responses to current policies affecting teacher demand and supply.

Policies and Their Effects

Most recently enacted or proposed state (and very limited federal) policies concerning teachers can be grouped into two categories: (1) economic incentives and (2) changes in credentialing and educational requirements. Policies in both categories are intended to increase the supply of teachers and also improve their quality. A third policy category has been argued for by researchers and teachers: interventions that would make teaching a more highly professionalized occupation through improving the working environment and offering more opportunities for professional growth (Darling-Hammond, 1984; Schlechty and Vance, 1983). "Professionalization" strategies also are intended as a means to increase both teacher quantity and teacher quality. To date, policies aimed specifically at greater professionalism are little in evidence, though claims related to the professional standing of teachers are made for a number of policies in the other two categories.

Economic Incentives

Three types of policies provide economic incentives to draw people into teaching: (1) assistance with the educational costs of becoming a

teacher or retraining either through scholarships or, more frequently, through student loans that usually require a commitment to teach for several years; (2) raising salaries of entry-level teaching positions or for a system's teaching staff across the board, and (3) establishing a remuneration system based on performance or career steps rather than on length of service. Each of these economic incentives is seen as making teaching more competitive with other career options and thereby attracting not only more people but also people with desirable attributes like reasonably high academic ability who otherwise might choose different professions. Some responses to policies embodying one or another of these economic incentives are catalogued below.

Scholarships/Loan Programs. Programs spanning the range from outright scholarships to forgivable loans to subsidized retraining opportunities have come into existence in almost every state (Education Commission of the States, 1984). Most of the programs are targeted to prospective teachers in fields of perceived shortages, usually mathematics and science, or teachers who wish to retrain to enter these fields. Interestingly, programs for elementary school teachers, where the most immediate shortages are anticipated, are conspicuous by their absence. Possibly, policy makers hold that people considering teaching at this level have fewer alternatives from which they need to be lured than do prospective mathematics or science teachers. In fact, enrollment in teacher education programs started to rise before most of the scholarship/loan programs took effect. Presumably, word of the "teacher shortage" spread to students interested in being able to find jobs upon graduation. Reports the May 16, 1984, Chronicle of Higher Education:

> "Last fall Penn State enrolled 2,400 undergraduates in its education college. That was only a slight increase over the 2,345 of the previous year, but it marked the end of a 12-year decline, Mr. Hermanowicz notes. New applications for teacher education are also up for this summer and next fall at Penn State. The college has already admitted 540 new students, a 28-percent increase over last year at this time."
>
> "At Illinois State University, both applications and enrollments for undergraduate elementary-education programs are up, according to the assistant dean, John B. Godbold. More students are applying for practice teaching, another indication of the growing interest in education. He reports that 275 students have applied for practice teaching in elementary school for 1984-85, an increase of 20 over the number who taught this year. Applications from entering freshmen who have declared a major in elementary education have increased from 324 for fall, 1982, to 378 for fall, 1984, says Mr. Godbold."

> "In an informal poll conducted last week [1984], higher-education institutions in Arkansas, California, Illinois, Louisiana, Nebraska, Missouri, South Carolina, Virginia, and Utah reported increased enrollments in their teacher-education programs.... Deans and directors of education attribute the enrollment increases in part to a growing awareness of teacher shortages in some fields and geographic areas. The shortages present the real possibility that jobs will be available for new teachers."

The apparent result, reported the New York Times two years later (Jan. 5, 1986), is that the various incentives created by the states merely pay the way for individuals who would otherwise have paid their own way. For example, a recent survey of individuals who had graduated from college with "incentive" loans under Connecticut's program found that almost half of them were not teaching in Connecticut public schools--the condition for forgiveness of the loan--and that of those who were, more than 90 percent said the availability of the loan was not a factor in their decision to go into teaching in the first place. In fact, nationwide more than half the administrators of loan/scholarship programs for prospective teachers reported that there were not enough applicants for the funds available.

Raising Salaries. Just how great the disparities are at this point between teacher salaries and salaries in other professional positions requiring equivalent education is unclear (Feistritzer, 1985). Teacher salaries have been outstripping inflation since 1981-1982, gaining over 22 percent between 1982 and 1985. Even before these gains, the average starting salary for teachers with a bachelor's degree was $14,000 in 1982; comparable salaries were: for accountants--$16,700; for architects--$12,000; for chemists--$21,000; for computer programmers--$16,700; for psychologists--$14,500; for public relations specialists--$11,500; for reporters --$18,750. This picture does not change much as people continue to work: average salaries for teaching compared to these same professions showed a similiar distribution. Moreover, the average teacher salary is for a year of 180 working days, whereas the average number of working days in a year for other professions is 250. It is also interesting to note that 67 percent of teachers had household incomes between $20,000 and $50,000 compared with 53 percent of total college graduates; about 275,000 teachers had family incomes of over $50,000.

Of course, it may be necessary to pay teachers more than comparable salaries if alternative careers are otherwise more attractive. This appears to be the assumption behind initiatives in several states and a number of local districts to raise starting salaries. But moves to increase economic incentives at the entry level are not necessarily welcomed by teachers. In Montgomery County, Maryland, teachers recently rejected an unsolicited school-board offer to boost starting salaries by 16 percent to $20,000. Officials from the two major teacher unions said

this action on part of the local union was unusual, but not unprecedented. The local union said it spurned the offer because it primarily benefited those at the bottom end of the pay scale (Education Week, February 19, 1986).

The data cited above would indicate that some across-the-board salary raises have taken place. Indeed, some states have taken significant steps to raise the salaries of all their teachers, for example, Arkansas (Feistritzer, 1985). In other states, average salaries have risen because of attrition of teachers with fewer years of service, as the school population continued to decrease (e.g., Illinois, Mississippi, North Dakota, and Vermont). Both states that are experiencing salary creep because of loss of less highly paid junior personnel and states that are raising teacher salaries by considerable percentages may find the out-year costs greater than taxpayers are willing to support. Anecdotal evidence from some districts indicates that teachers eligible for retirement are being encouraged to leave so that they can be replaced by new teachers commanding less pay. Clearly, this sort of response to increased costs will affect both the demand for new teachers and also the quality of the teaching pool in unpredictable ways.

Remuneration Based on Performance or Career Steps. At this time, over half the states are considering paying teachers based on their performance or already have pilot or statewide programs in place. Proponents of such plans argue that performance-based pay will raise the status of the teaching profession, thereby attracting and retaining talented individuals. However, several of the proposed and operating programs are running into difficulties. According to Education Week (March 12, 1986), Florida's governor has proposed changing its troubled master teacher program to a career ladder program. In Tennessee, almost 90 percent of the teachers responding to a recent survey said that the state's career ladder program has had a negative effect on morale. They would prefer seeing the money intended for the upper levels of the ladder spent instead on reducing class size. In Texas, more teachers qualified for the first round of the state's career ladder than could be paid.

These problems should not be surprising, given the historical experience with merit-based pay schemes. Educational Research Service (1979) found that, in the past, such schemes have had an average life time of three or four years. Case studies indicate that all sorts of performance-based salary structures have been discontinued because of the difficulty and costs of administration and because teachers dislike them, even those who would be likely candidates for increased pay because of their excellent performance (Jackson, 1968).

No matter whether a particular plan is based on rewarding merit, selecting master teachers charged with additional responsibilities, or career ladders with a number of steps and associated job classifications, teacher evaluation is an intrinsic component and one that creates great

difficulties. Each evaluation method is open to criticism: evaluation by peers or supervisors may be biased; competency and skills tests may be unrelated to performance in the classroom; student performance data cannot be tied closely to what happens under one teacher in one year. According to some preliminary research, performance-based pay schemes survive when (a) they are used to supplement the pay of teachers in already high-paying districts, (b) the districts do not use student test-score gains as criteria for awarding raises, and (c) the extra pay is related to additional work, often outside the classroom (e.g., committee assignments, taking additional courses or inservice, or participating in community-school activities), rather than rewarding effective teaching performance (Murnane, 1985).

Understandably, given these findings, performance-based pay plans are accepted more readily when districts devise their own, sometimes without the more stringent conditions that might be imposed by a state. Performance-based pay plans may work better in theory than in practice. Their effects on teacher supply have yet to be demonstrated, although wealthy districts with successful plans may well be able to compete even better than they have in the past for the more able teachers. One may be skeptical about how helpful this will be to inner-city and rural school districts most likely to experience shortages of well qualified teachers.

Changes in Credentialing and Educational Requirements

Much has been made of the falling quality of teacher applicants. Generally, the evidence cited is based on SAT or ACT scores that, until recently, have been declining more rapidly for college freshmen who plan to go into teaching than for all college freshmen (Schlechty and Vance, 1983). The many national and state reports issued over the last five years on the condition of education almost uniformly have decried the quality of the teachers already in the classroom as well. While the economic incentives discussed above are intended to draw able people into teaching and keep them there, initiatives to increase credentialing and educational requirements are intended to screen out less able individuals or upgrade the competencies of those already in the pool. Almost every state has significantly revised certification and licensure requirements in the last five to eight years (Sandefur, 1981; Feistritzer, 1984), but most of the attention has been on the growing number of states--well over half at the last count--that require competency tests for certification. At least three states (Arkansas, Georgia, and Texas) have passed laws establishing competency tests for recertification of all teachers. In addition to such state initiatives, many teacher training institutions and associations of such institutions are advocating increased requirements for entering teacher education programs and being awarded teaching degrees, including minimum SAT scores, heavier emphasis on academic majors, and a five-year rather than four-year program before a teaching degree is awarded. Each one of these policies may have unanticipated effects on the supply of teachers.

Revision of State Certification Requirements. The large majority of states continue to use the "approved program" route for certifying teachers, that is, anyone graduating from a college or university teacher education program that is approved by the state automatically qualifies for teaching. Program approval generally entails specification of some minimum number of credits in general studies, professional education courses, and clinical experience such as practice teaching. A number of states also permit certification based on a baccalaureate degree obtained outside an approved program but which meets credit requirements.

Most of the recent changes in state requirements for teacher certification are intended to make standards more rigorous, often by increased requirements with respect to general studies, for example, requiring the equivalent of a major in the field of certification for prospective high school teachers. The control of the quality of the courses, however, is left up to the individual institution and therefore may vary widely from program to program. A few states, New Jersey in particular, have decreased requirements in professional education courses so as to encourage individuals with majors in the sciences or mathematics to enter teaching; other states like Arizona and school districts like Boston are attempting to attract such individuals by offering them a fast track for meeting certification requirements (sometimes accompanied by loans) while they are employed as teachers during the school year and in industry during the summer.

Insofar as more rigor is demanded of students preparing to be teachers, one might predict positive consequences for their quality and unpredictable consequences for the number enrolling--some individuals might be induced to select teacher education programs if they were intellectually more interesting; others might be discouraged by the greater prescriptiveness of the requirements. New Jersey's program of waiving professional education requirements appears to have attracted much interest, although so far only a handful of applicants have been placed in teaching positions. In point of fact, under conditions of shortage, states issue emergency certificates that allow districts to have teachers in front of all students as schools open in the fall. Thus, it is more likely that demand will affect de facto licensing requirements than that statutory licensing requirements will increase supply. Moreover, none of the reforms instituted by the states have reduced the many differences between their credentialing requirements which substantially reduce the ability of teachers to move from regions of teacher surplus to regions of teacher scarcity.

Competency Testing. State education agencies have been increasing their efforts to screen out more carefully and systematically than is possible through course requirements teachers who are academically unqualified. Generally, these efforts are based on the proposition that the public must be assured through some sort of test that all teachers have at least a minimum of knowledge and skills before entering the classroom.

Advocates also maintain that tests will help increase professionalism and thereby attract more people to the profession. As of summer 1985, over half the states are requiring specific tests for teacher certification ranging from tests of basic skills to tests in particular content areas (Feistritzer, 1985). While considerable argument surrounds he nature of what should be tested to establish teacher proficiency, there seems to be agreement developing that some sort of testing is appropriate before licensure is granted.

The results of the testing have been dismaying, if not surprising. Particularly in southern states, where the movement to test teachers has spread most rapidly, a disproportionately high number of prospective teachers who fail to pass the qualifying tests come from minority groups. In most of the states that publish competentcy-test scores by race, fewer than half of the black students pass, a rate far below that of white students (G. Pritchard Smith, quoted in the Chronicle of Higher Education, March 12, 1986). To give just two examples: In tests taken in Virginia since 1980, 56 percent of the students from historically black colleges have failed the communication skills portion of the national exam, compared with 6 percent of the students from historically white schools, according to state officials. On the general knowledge section of the test, students from black schools have failed at a rate of 45 percent, compared with 3 percent among students from white schools. In Texas, the proportion of whites teaching in public schools, where about half the students are black or hispanic, is likely to jump from the present 77 percent to 89 percent in the next decade because of the newly instituted teacher tests (Peter Garcia, quoted in the Chronicle of Higher Education, March 12, 1986). It appears that this method of screening out teachers will decrease the ethnic diversity of the teaching pool just as the ethnic diversity of the student body is increasing (Goertz et al., 1984). Moreover, critics are questioning whether the kind of low-level screening tests in current use will further indict teaching as unattractive to academically able people, thereby invalidating one of the purposes of the tests (Sykes, 1983).

Reforms in Teacher Education Programs. There are nearly 1,300 institutions of higher education that train teachers. In some states, all or nearly all the institutions in the state have teacher training programs (National Center for Education Statistics, unpub.). The programs vary widely both in their requirements (within a particular state's credentialing system) and in the rigor and quality of the courses offered.

Over the last decade, there has been an increase, on average, in the number of education courses and credit hours of practice teaching or other clinical experience required by teacher training institutions. More recently, changes in requirements have focused on improving subject matter preparation. So far, there appears to be consensus that secondary school teachers should have the equivalent of an academic major in the discipline

they are preparing to teach, though not all agree that a traditional college major in, say, physics will prepare teachers to teach the subject, given the nature of undergraduate courses (Arons, 1981). What the subject matter preparation of elementary school teachers responsible for teaching several subjects ought to be is less clear, although some have suggested academic majors in specific fields for them as well (Boyer, 1983). Outside adequate background in subject matter, however defined, there is little agreement on the knowledge base that is at the core of the teaching profession. Recommendations tentatively have been made (for example, by the Holmes Group Consortium, 1984) that teaching degrees should be awarded only after five rather than four years--a suggestion that, if carried out, obviously would increase the opportunity costs of entering the teaching profession.

Schools and departments of education also are endeavoring to improve their standards by raising admissions requirements (e.g., SAT or ACT scores, class standing in high school, grade point averages) and by administering tests of basic skills to weed out individuals with poor skills. The effects have been similar to those of the state testing programs: minorities, and particularly black and hispanic students, are being selected out in much greater proportions than whites. Some ways of improving teacher education must be found that will not lead to the exclusion of minorities from teaching.

Concluding Remarks

Citing some of the negative evidence on the results of current policy initiatives to increase both the quantity and the quality of teachers is not intended to discourage such initiatives. What is intended is to point out that apparently obvious solutions may not work as expected and that relatively easy-seeming fixes like administering competency tests to increase the quality of teachers or offering loans to increase their quantity may have perverse effects. If the goal is to provide the public schools with a greater number of competent teachers, a sustained effort will be needed aimed at changing some of the structural and cultural impediments to high-quality education that have been part of American schooling for many decades.

REFERENCES

Akin, James N.
1983 Teacher Supply/Demand 1983. Madison, WI: Association for School College and University Staffing.

Arons, Arnold B.
1981 Whither do we hurry hence? In Melba Phillips, ed., AAPT Pathways. Sony Brook, NY: American Association of Physics Teachers.

Babbitt, Bruce
1986 Recruiting the 'Best and Brightest' for Teaching: One State's Model. Education Week. March 5, 1986.

Blank, Rolf K. and Raizen, Senta A.
1985 Background Paper for a Planning Conference on a Study of Teacher Quality in Science and Mathematics Education. Committee on Research in Mathematics, Science, and Technology Education, National Research Council, Washington, DC.

Boyer, Ernest
1983 High School: A Report on Secondary Education in America. New York: Harper and Row.

Cagampang, Helen, Garms, Walter I., Greenspan, Todd, and Guthrie, James W.
1985 Teacher Supply and Demand in California: Is The Reserve Pool A Realistic Source of Supply? September 1985.

Connecticut State Department of Education
1985 Teacher Supply and Demand in Connecticut. April 4, 1985.

Darling-Hammond, Linda
1984 Beyond the Commission Reports: The Coming Crisis in Teaching. Santa Monica, CA: The Rand Corporation.

Delaware Department of Public Instruction
1985 Supply and Demand: Educational Personnel in Delaware, 1984-5. Prepared by Robert F. Boozer. Dover: Delaware Department of Public Instruction.

Education Commission of the States
1984 A 50-State Survey of Initiatives for Attracting Science and Mathematics Teachers. Denver, CO: Education Commission of the States.

Educational Research Service
1979 Merit Pay for Teachers. Arlington, VA: Educational Research Service.

Feistritzer, C. Emily
1984 The Making of a Teacher: A Report on Teacher Education and Certification, Washington, DC: National Center for Education Information.
1985 The Condition of Teaching--A State by State Analysis, 1985. Princeton, NJ: The Carnegie Foundation for the Advancement of Teaching.

Florida Department of Education
1985 Teacher Supply and Demand in Florida. Fourth Annual Report. Tallahassee: Florida Department of Education.

Gilford, Dorothy M. and Tenenbaum, Ellen
1984 Report of the Planning Conference for a Study of Statistics on Supply of and Demand for Precollege Science and Mathematics Teachers. Committee on National Statistics, National Research Council. Washington, DC: National Academy of Sciences.

Goertz, Margaret E., Ekstrom, Ruth B., and Coley, Richard J.
1984 The Impact of State Policy on Entrance into the Teaching Profession. Report to National Institute of Education. Educational Testing Service, Princeton, NJ 08541.

Graybeal, William S.
1983 Teacher Supply and Demand in Public Schools, 1981-82. Washington, DC: National Education Association.

Holmes Group Consortium
1984 New Standards for Quality in Teacher Education. Proposal to the Secretary's Discretionary Program/US Department of Education, the Ford Foundation, and the Carnegie Corporation of New York. College of Education, Michigan State University.

Howe, Trevor G. and Gerlovich, Jack A.
1982 National Study of the Estimated Supply and Demand of Secondary Science and Mathematics Teachers. Ames: Iowa State University.

Illinois State Board of Education
1983 The Supply and Demand for Illinois Mathematics and Science Teachers. Springfield, Illinois.

Jackson, Philip W.
196? Life in Classrooms. New York: Holt, Rinehart and Winston.

Maryland State Department of Education
Unpub. Supply and Demand for Mathematics and Science Teachers, 1985-1990. Office of Research and Evaluation.

Murnane, Richard J.
1985 An economist's look at federal and state education policies. In John M. Quigley and Daniel L. Rubinfeld, eds., American Domestic Priorities: An Economic Appraisal. Berkeley: University of California Press.

National Center for Education Statistics
1984 The Condition of Education. 1984 Edition. Washington, DC: US Department of Education.
1985 Projections of Education Statistics to 1992-93: Methodological Report with Detailed Projection Tables. Prepared by Debra E. Gerald. Washington, DC: US Department of Education.
Unpub. Teacher Certification Surveys, 1984 and 1985. Data quoted in Feistritzer, 1985.

New Jersey Department of Higher Education and Department of Education
1983 Report to the Advisory Council on Math/Science Teacher Supply and Demand. Trenton, NJ.

New York State Education Department
1983 Teachers in New York State--1968 to 1982. The University of the State of New York, The State Education Department, Information Center on Education, Albany, NY.

Pennsylvania Department of Education
1983 Science and Mathematics Teacher Supply and Demand and Educational Needs Analysis: A Pennsylvania Report. By James P. Dowart. Harrisonburg, PA.

Raizen, Senta A. and Jones, Lyle V., eds.
1985 Indicators of Precollege Education in Science and Mathematics --A Preliminary Review. Committee on Indicators of Precollege Science and Mathematics Education, National Research Council. Washington, DC: National Academy Press.

Rumberger, Russell
1985 The shortage of mathematics and science teachers: A review of the evidence. Educational Evaluation and Policy Analysis 7(4):355-369.

Sandefur, J. T.
1981 State Reactions to Competency Assessment in Teacher Education. Competency Assessment in Teacher Education. Washington, DC: American Association of Colleges for Teacher Education, August 1981.

Schlechty, Phillip C. and Vance, Victor S.
1983 Recruitment, selection, and retention: the shape of the teaching force. The Elementary School Journal 83(4):469-487.

Shymansky, James A. and Aldridge, Bill G.
1982 The teacher crisis in secondary school science and mathematics. Educational Leadership (November):61-62.

Sykes, Gary
1983 Public policy and the problem of teacher quality. In Lee S. Schulman and Gary Sykes, eds., Handbook of Teaching and Policy. New York: Longman Inc.

ABSTRACT

ESTIMATES OF TEACHER DEMAND AND SUPPLY AND RELATED POLICY ISSUES

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Problems with teacher demand/supply estimates are reviewed, and comments are made on current policies intended to increase both the supply and the quality of teachers. Demand estimates generally use either opinion surveys or head counts. Opinion surveys are problematical because factors being taken into account by respondents are unknown; head counts do not deal well with the quality of teachers being counted. Projections of future demand, in addition to using enrollment forecasts, must make estimates of teacher attrition and possible educational improvements that may call for additional teachers. Problems concerning estimates of supply have to do with uncertainties regarding the make-up and quality of the current teaching pool, the number of individuals expected to enter teaching in the future, and the number that can be expected to return to teaching from the large pool of trained teachers who are not active at present. The effects of various economic incentives to attract more able people into the profession and maintain them as teachers are discussed, for example, scholarship/loan programs for prospective teachers, raising teacher salaries, and performance-based pay. Some experiences with and reactions to recent changes in credentialing and educational requirements are also noted, including revisions in state certification statutes, requirements for competency testing, and reforms in teacher education programs.