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ABSTRACT

This speech outlines issues that the author thinks would have to be considered in building a research and development agenda concerned with the relationship of education to work. Background about U.S. investment in educational research and development is given and budgetary expenditures in the educational research and development field are compared with those for medicine and agriculture. The dimensions of American social, political, and economic existence which should be considered in developing an agenda for educational research are discussed. An analysis of population trends in the U.S. is given in relation to the topic. Other issues related to education and work, which are also examined, include the following: (1) The organizational system; (2) judicial influence; (3) the academic sieve: a need for reform (this area deals with evaluation criteria, e.g., for measuring creativity and decisionmaking abilities); (4) a needs assessment, and (5) three major evaluation questions: What do we want people to be able to do? What level of performance do we require? and How good is good enough? (LAS)

A RESEARCH AGENDA FOR THE NATIONAL INSTITUTE OF EDUCATION

by

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August 1976

This paper was presented as a keynote address at the Second Career Education National Forum, February 9, 1976, and reflects Dr. Hodgkinson's views at that time.

PREFACE

The Second Career Education National Forum, held in Washington, D.C. in February 1976, was evidence of The Center's continuing commitment to research and development in career education. Prominent researchers and academicians were joined by leading practitioners in a second nationwide effort to share ideas, research, and operational programs in career education. We are hopeful that this exchange will lend insight to and impact upon future developments at federal, state and local levels. Corinne Rieder, Associate Director of the NIE Education and Work Task Force, and I look forward to planning and organizing the Third Forum with hope that the interest and dedication of career educators will again form the foundation for stimulating discussion and thoughtful critique.

The Center is indebted to the National Institute of Education, sponsor of the Forum, for its support and advice in Forum planning. We also appreciate the time and efforts of those presenters who shared their insights with us all.

This monograph series includes Forum keynote presentations and additional papers from distinguished lectures presented at the Forum.

The Ohio State University and The Center are proud to share these papers with you.

Robert E. Taylor
Director

INTRODUCTION

Harold L. (Bud) Hodgkinson, 44-year-old Director of the National Institute of Education (NIE), heads an agency within HEW's Education Division that was created by Congress in 1972 to help solve critical problems in American education through research and development.

He is a firm believer in evaluating and improving the effectiveness of education programs and making education more accountable to students, parents, and taxpayers.

A native of Minneapolis, Minnesota, Dr. Hodgkinson joined NIE from the Center for Research and Development in Higher Education at the University of California, Berkeley, where he had been a research educator for seven years.

Previously, he was Dean of the College at Bard College in New York from 1962-1968 and Director of the School of Education at Simmons College in Boston, 1958-1961.

As Director of NIE, Dr. Hodgkinson heads a federal agency of some 350 persons with an annual budget of about $80 million.

He helped finance his education at the University of Minnesota by playing with a jazz combo. His B.A. degree was awarded in 1953. In 1955 he earned an M.A.T. degree at Wesleyan University; his doctorate in the sociology of education was awarded by Harvard University in 1959.

Like President Ford, who nominated him to be NIE Director on April 5, 1975, Dr. Hodgkinson is an avid swimmer. He taught lifesaving for many years.

His nomination was confirmed by the U.S. Senate on May 8, 1975, and he was sworn in as Director of the Institute on May 27.

The author of eleven books on American education, Dr. Hodgkinson is a former editor of the *Harvard Educational Review* and a special contributor to the *Chronicle of Higher Education.*

He directed the Institutions in Transition study for the Carnegie Commission, 1968-1970, and was director of a study of developing institutions for the U.S. Office of Education, 1970-1973.

Dr. Hodgkinson was president of the American Association for Higher Education, 1973-1974, and is a charter member of the American Association of University Administrators.

The Center for Vocational Education and the National Institute of Education are proud to share with you Dr. Hodgkinson's presentation, "A Research Agenda for the National Institute of Education."

A Research Agenda for the National Institute of Education

Harold L. Hodgkinson

Background—NIE Resources

In "setting the scene" for a discussion of the National Institute of Education's research agenda, I think it would be profitable to provide some background about the U.S. investment in educational research and development. The federal government spends approximately $511 million on educational research, development, dissemination and evaluation. In approximate figures, the states spend $40 million; the private foundations spend $57 million; and localities spend $4 million. Though we don't have adequate current data on local expenditures, I suspect that that figure is rising rapidly. From all sources, then, the best estimate is that about $617 million is spent in the United States for educational research and development.* This expenditure compares to $116 billion which is the best estimate of the *total* expenditures for education from all sources in the United States; a relatively small proportion.

It is interesting to compare the budgetary expenditures in our field with comparable ones for medicine and agriculture. Not only do these fields spend a far higher amount in their total for research, development, dissemination and evaluation than we, they

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*A low estimate is about $500 million; the high is about $790 million.

have a far longer history of federal support of research and development. People from the Department of Agriculture are always noting, "In '61 we did this," or "In '65 we did that," and it turns out they're talking about *18*61 and *18*65. The Department has a 100-year history of federally sponsored research dealing with agriculture. Comparatively, educational research is recent. The Cooperative Research Act, after all, was passed in 1962. And, unfortunately, though we're relatively new on the scene of major federal investments, people are expecting the equivalent of the cancer immunization shot or landing a man on the moon after very little solid, consistent federal effort. The amount of money being spent on educational R & D, compared to the total national investment in education, can only be described as "underwhelming."

The National Institute of Education has an authorized budget for FY '76 of $59 million. Figure 1 shows the total allocation of funds for FY 74-77, by program.

As is evident in Figure 1, the dissemination portion of the NIE budget has increased considerably. Our goal is to provide money to state and local agencies so they can build their capacity; to get the results of newly developed products into the hands of people who can use them.

Basic Skills, a program in which we put a great deal of time and effort, is producing research results on early reading skills in children, as well as some new thinking about information processing in grades four through six. Educational Equity's increased allocation will be earmarked for bicultural and bilingual studies, which, thanks to *Lau* v. *Nichols*, is an area of enormous importance to our society as a whole.

Education and Work's budget has remained relatively constant. The slight downward trend is due primarily to the phasing out of one major project. There will, actually, be more free money for new and exciting developments in Education and Work than there has been in the past.

NATIONAL INSTITUTE OF EDUCATION

Percentage Allocation of Funds by Program
FY 1974–1977
($ in millions & %)

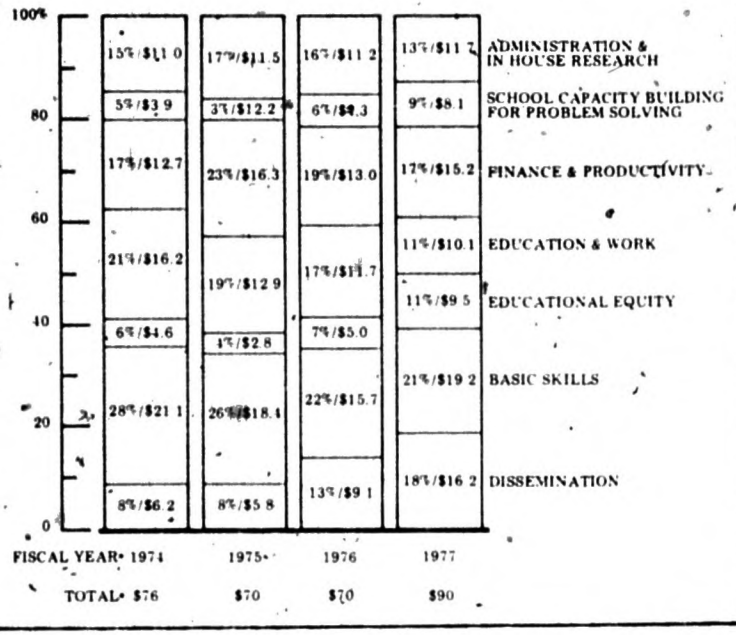


Figure 1

Finance and Productivity deals primarily with effective and efficient ways of delivering new kinds of education to new populations. We support the ATS-6 satellite program and the University of Mid-America, two non-traditional and rather radical approaches to delivery.

Finally, School Capacity for Problem-Solving, one of the more interesting ideas, is based on the notion that every school and school system has the capacity to improve itself. The NIE's role is to help those school systems become more autonomous and more capable of improving. This notion will also be applicable to colleges and universities, although we do not yet have such a program.

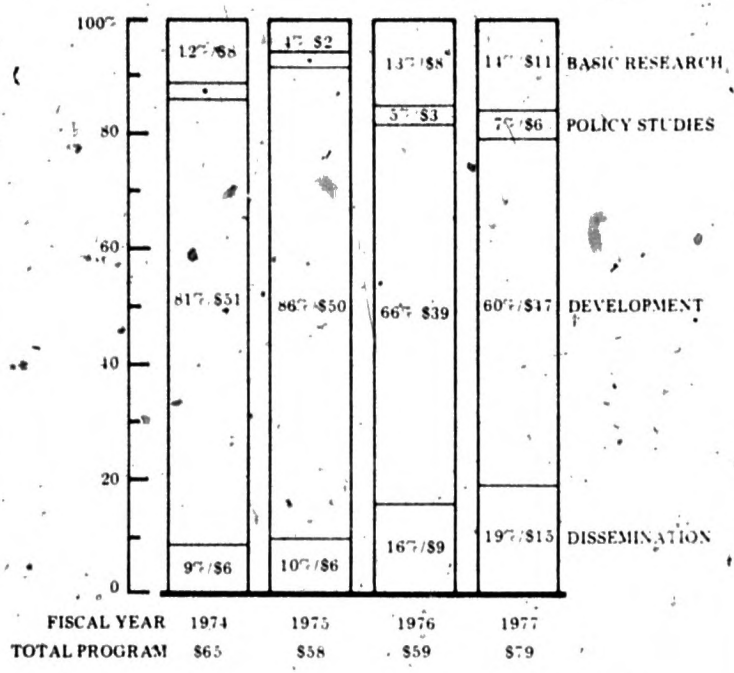
Most of our overall effort has been in elementary and secondary education; however, the post-secondary segment will be approximately 10 or 11 million dollars next year. We have invited a distinguished educator, Wilbert McKeachie, president-elect of the American Psychological Association, to spend a month as visiting scholar at the NIE to help us organize the programmatic elements of this post-secondary thrust.

Note a rather interesting point: although the total budget figure is up slightly for '77, the proportion of money that is spent on administration, primarily salaries and expenses, is actually a smaller proportion of the total in '77 and '76. I think we're the only agency in the federal government that said we could administer a larger budget with the same number of staff than we had last year. That's heresy in Washington.

Where do we spend our research money? Figure 2 shows the breakdown of funds in four areas: basic research, policy studies, development and dissemination. As Figure 2 indicates, basic research has been systematically increased, and it's our policy to try to increase it even further as we learn more about how to explore those fundamental questions underlying our activities. The Institute's allocation for policy studies has also increased, and

NATIONAL INSTITUTE OF EDUCATION

Allocation of Funds by Type of Research Activity
FY 1974–1977
($ in millions & %)



Estimated allocation of funds by type of research activity for NIE program groups—fiscal year 1976

- Dissemination and Resources—87% dissemination
- Basic Skills—30% basic research and 60% development
- Educational Equity—84% development and 8% research
- Education and Work—66% development, remainder in dissemination and research
- Finance and Productivity—66% development
- School Capacity for Problem Solving—33% basic research, 40% development, 8% dissemination

*Less than .5%

Figure 2

is now at a 6% level. This figure does not include some of the congressionally mandated studies, such as the study of compensatory education and also the study of school violence. Congress has suggested that we undertake certain major studies for them, and I agree that one of the functions of the Institute should be to provide the Congress with policy evidence which will enable them to write better legislation in the future.

An Agenda for Educational Research

What are the dimensions of American social, political and economic existence we should consider in developing an agenda for educational research? There are two publications on this topic which I consider almost biblical in importance. The first one is called *The Condition of Education* published by the National Center for Educational Statistics. This book, I think, contains the most complete account of how education meshes with the needs of society. The second one is really becoming biblical if it isn't actually—it's called *Social Indicators 1973* published by the Office of Management and Budget. It tells more about the American public population than an average layman might be interested in knowing. It covers population data, health, public safety, education, employment, income, housing, and leisure and recreation. What is amazing about these statistics is the way they are beginning to dovetail: the way in which patterns are beginning to emerge about the American population as a whole.

In terms of the phenomena that we ought to consider it is essential to understand that some factors are beyond our control, but we nevertheless have to take them into account when examining the efficiency or effectiveness of the educational system in this country.

Perhaps an example will clarify this notion. In December 1975, Robert Livingston, a neuroscientist at the University of

California, San Diego, announced that the results of a recent study indicated that more than a million children under age four in the United States have stunted brain growth due to malnutrition. The average deficit in brain size for children below the poverty level is about 125 grams below the normal size of 1400 grams. Livingston also estimated that 60% of all pregnant women at or below the poverty line were suffering from malnutrition serious enough to damage their babies, and he concludes:

> A corresponding proportion of the difficulties children experience in school and later in their career development may be due to undernutrition affecting their brain growth in uteral development and during early life.[1]

The fact that human potential can be lowered by forces like nutrition have important implications for what we can and cannot ask the schools to do. No school, no matter how excellent, will be able to give the child from a poor background his 125 grams of brain weight back. Just as the search for a cure for cancer is shifting toward greater interest in environmental factors associated with carcinogens, so we also must begin examining the environmental factors that may be limiting the human potential of our students and, ultimately, our work force. As we think about more integrated social policy, it may be that the best policy decision we could make as a nation regarding education would be to make sure that every pregnant woman has an adequate nutritional diet.

Population Trends

A serious analysis of population trends is imperative in considering a research agenda. As shown in Figure 3, we are still

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[1] Livingston, R.B.; Calloway, D.H.; MacGregor, J.S.; Fisher, G.J.; Hastings, A.B. "U.S. Poverty Impact on Brain Development in Growth and Development of the Brain," chapter from the book *Growth and Development of the Brain*, M.A.B. Brazier, ed., Raven Press, New York, 1975, pp. 377-394

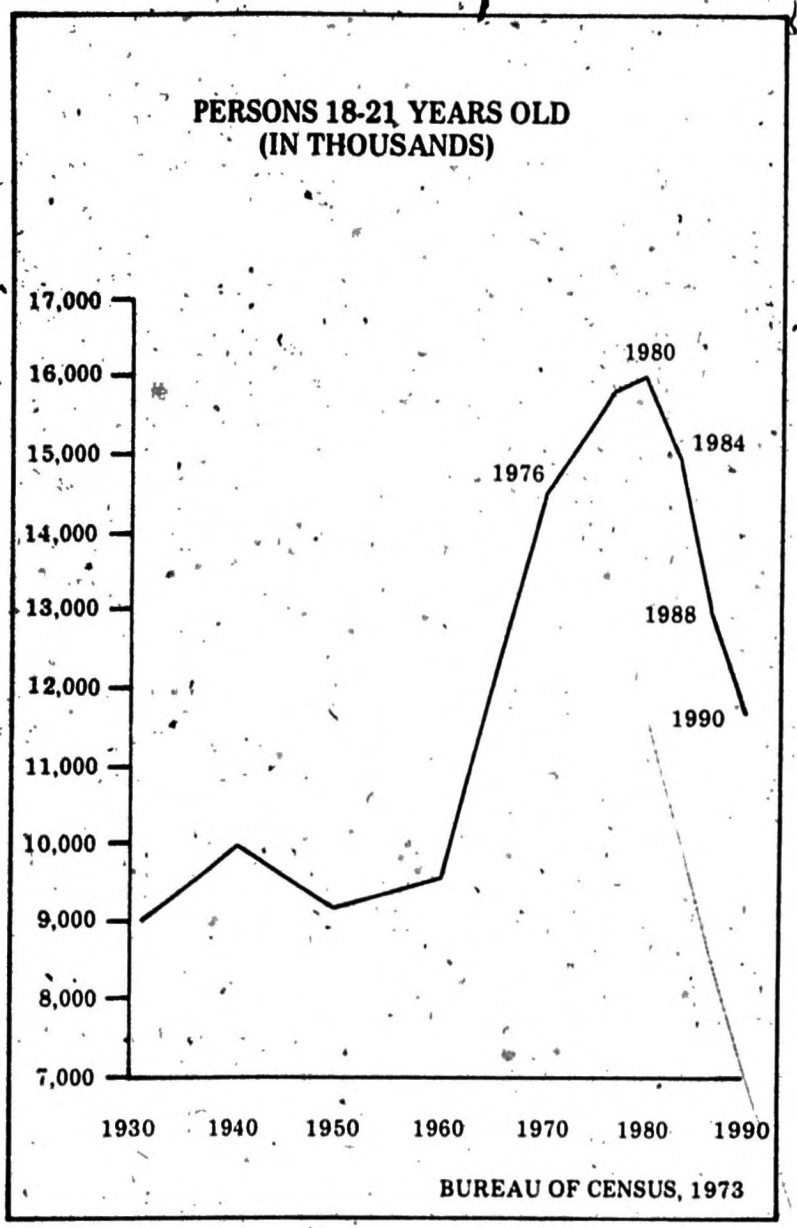
PERSONS 18-21 YEARS OLD
(IN THOUSANDS)
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
1930
1940
1950
1960
1970
1980
1990
1980
1984
1976
1988
1990
BUREAU OF CENSUS, 1973

Figure 3

on a slight increase in terms of the number of people in the 18- to 21-year old category, but in 1980 those numbers begin to go down, and they go down in a rather sharp fashion.

We are literally running out of young people. You have been told that before, but here is something that I don't think you have been told. If you look at where the decrease is coming, as designated in Figure 4, you will find that, in terms of the total birth population in 1960-72, it is primarily the Caucasian birth rate that has shown that decline. In this particular case, for example, most of the total decline comes from the Caucasian sector, but if you look at minority births from 1960-72, the line remains remarkably straight. That means that there is a higher percentage of the births in 1972 among minority groups—20 percent compared to 15 percent, in 1960. The numbers have not changed, but the proportion of births in minority groups has gone up significantly.

Illustrating the situation is Figure 5, taken from *Social Indicators 1973*. It illustrates the situation vividly, showing a downhill roller coaster line representing the number of 18-year-olds who are white, and a steady, only slightly declining line, representing the number of 18-year-olds who are black. The percentage of 18-year-olds who are black goes to 12 percent in 1965, to 18 percent by 1985. If you add all the minority groups in the 1985 data, it does look as if the 18-year-old cohorts by that time will be something like 30 percent from minority background. These are terribly important statistics when you think about the job of education.

In addition to having a declining number of 18-year-olds, we have a higher percentage of those people who come from backgrounds which don't work terribly well in conventional education settings. It seems then, that we have a large mission in terms of providing adequate education and adequate transition from education to work for that particular segment of the population.

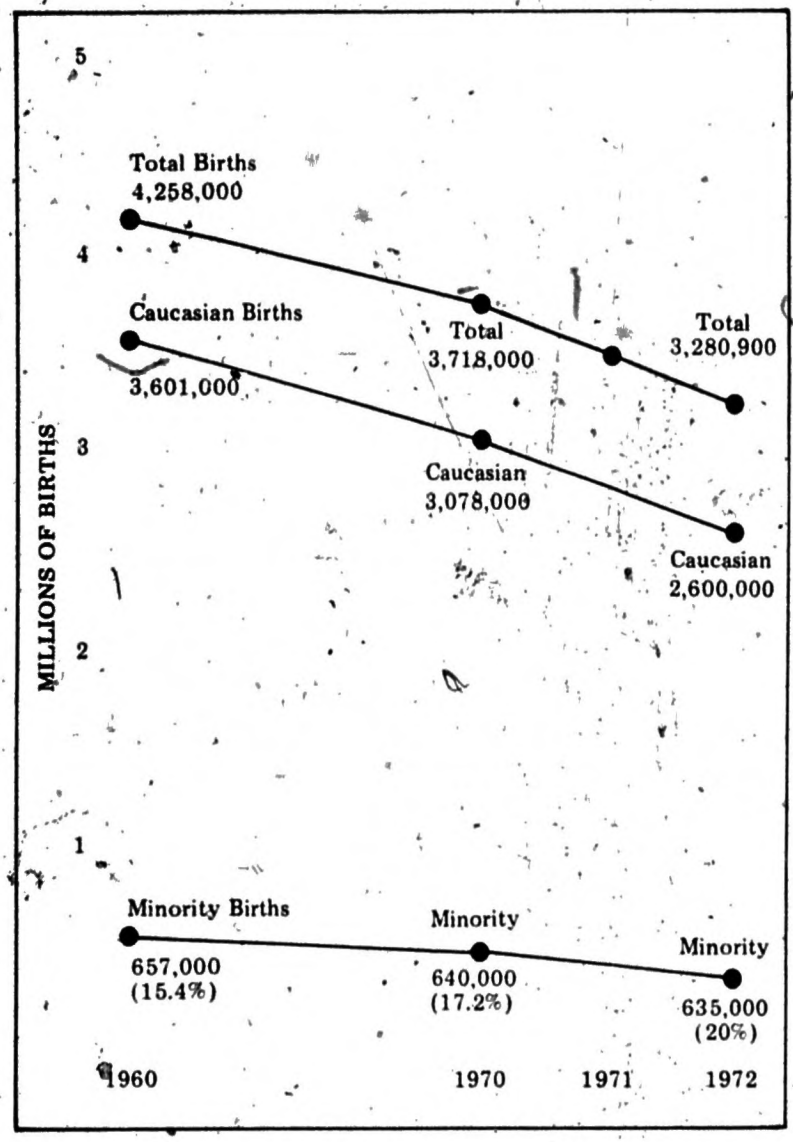
5
4
3
2
1
MILLIONS OF BIRTHS
Total Births
4,258,000
Caucasian Births
3,601,000
Minority Births
657,000
(15.4%)
Total
3,718,000
Caucasian
3,078,000
Minority
640,000
(17.2%)
Total
3,280,900
Caucasian
2,600,000
Minority
635,000
(20%)
1960
1970
1971
1972

Figure 4

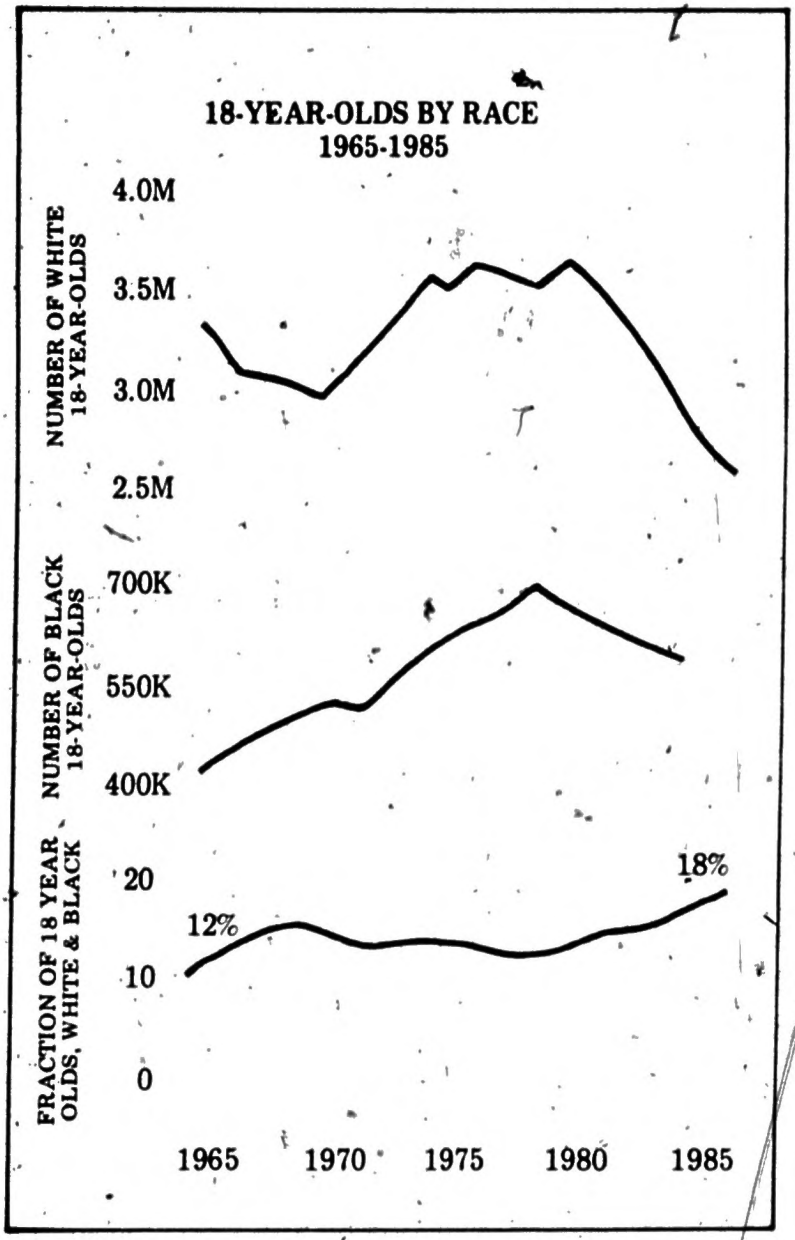
18-YEAR-OLDS BY RACE
1965-1985
NUMBER OF WHITE 18-YEAR-OLDS
4.0M
3.5M
3.0M
2.5M
NUMBER OF BLACK 18-YEAR-OLDS
700K
550K
400K
FRACTION OF 18 YEAR OLDS, WHITE & BLACK
20
10
0
12%
18%
1965
1970
1975
1980
1985

Figure 5

One of the promises we educators have always made to people is "Come to us and we will make you rich." If you look at income data in Figure 6 (this is for 1969; income data for some reason takes four years to get together), comparing people with four years of high school and those with four years of college, you do find that college graduates made more money but in the 60% range you cannot tell from the level of income how many years of education a person has had. If you subtract doctors and lawyers from this group, it virtually removes the advantage.

It is important to realize that the person who goes to college still makes more money, but the amount of increase is less than it used to be. Figure 7 shows that in 1970 high school graduates were making about $8,000 per year, and in 1972 they were making $9,500, reflecting an increase of $1,000. During the same period, college graduates went from $11,100 to $11,500 for a grand total of $400 increase. College graduates still make more than people who have high school diplomas, but think of the life style in 1972 that you could carry on for $11,100 compared to the life style you could carry on for $11,500. Let's discuss some data, not yet published, which is an attempt to correlate lifetime earnings based on two factors: years of higher education, and the choice to join or not to join a labor union. The data thus far supports the notion that if you want higher earnings over your lifetime, the best thing you can do is to join a labor union as quickly as possible. That is something to think about.

This trend is not necessarily bad, but it must be recognized. Street cleaners in San Francisco, for example, make $13,000 a year while assistant professors in the state college system make $11,000. Look what street cleaners do. They do a very important job nobody else wants to do, and Clark Kerr once said that it may be wise to get used to paying people more to do disagreeable jobs that must be done, and that we don't want to do. That may be painful to think about, but it is also rather interesting. All you have to do is compare a teachers' strike with the garbage collectors' strike, and I think the point is clear.

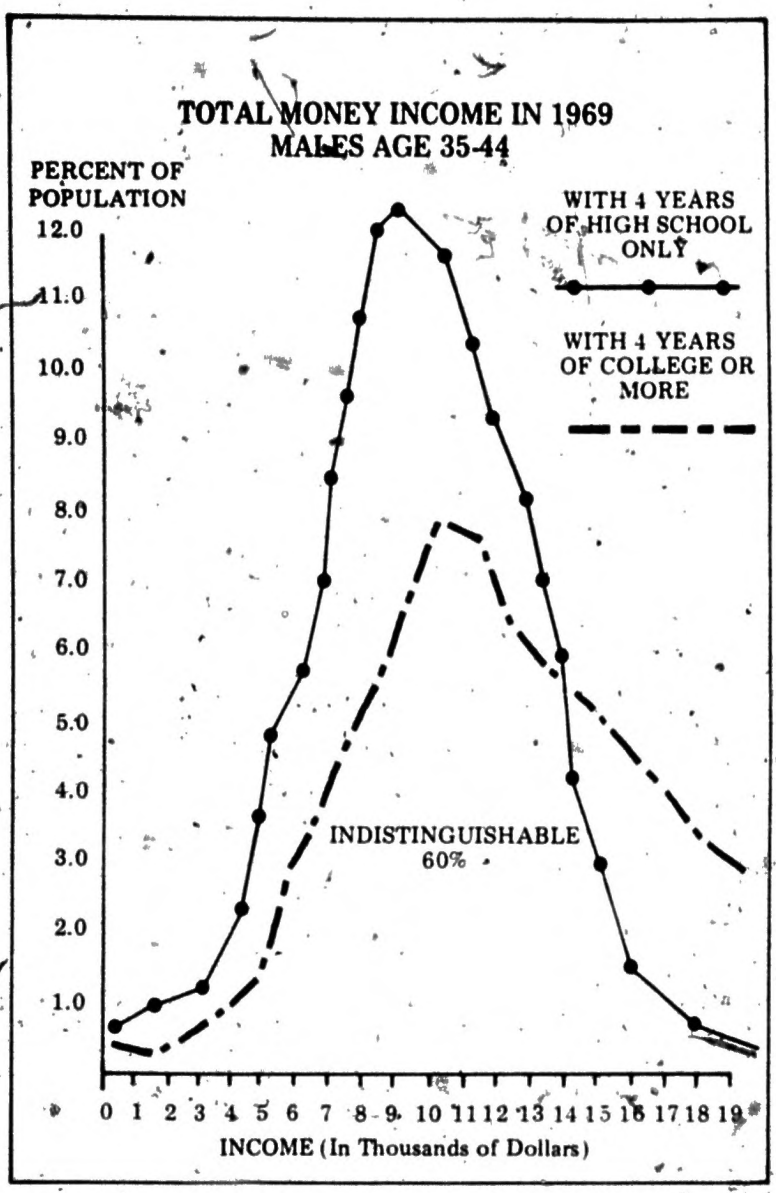
TOTAL MONEY INCOME IN 1969
MALES AGE 35-44
PERCENT OF POPULATION
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
WITH 4 YEARS OF HIGH SCHOOL ONLY
WITH 4 YEARS OF COLLEGE OR MORE
INDISTINGUISHABLE 60%
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
INCOME (In Thousands of Dollars)

Figure 6

U.S. YEARLY INCOME LEVELS
AGES 25-34
(MALE AND FEMALE)

1970	1972	INCREASE
High School Grads:		
$8,377	$ 9,451	+$1,074
College Grads:		
$11,133	$11,553	+$ 420

(From Stanley Nollen, Georgetown University, December 1973)

Figure 7

Issues Related to Education and Work

The Organizational System

Now, in relation to education and work, I'd like to present a metaphor that may be useful in setting a context. When we normally think about a cafeteria, we envision the system shown in Figure 8. A person enters the line, goes through the system and leaves. It's what systems people call a linear one-way bounded system. Once you get in it, you can't get out of it, and you must go one way. There are some fascinating parallels between the cafeteria system and the education and work system. We've usually thought, in America, that a person first goes to school, then goes to work, and then retires and has leisure, usually when he she is too old to enjoy it. This notion pervades our thinking about schooling, too. If a person drops out for a quarter, that person is considered a default and, therefore, somewhat immoral. We consider the person to be dead as far as higher education is concerned. This model of the cafeteria is very much the way we consider education still, and the way we consider work, still.

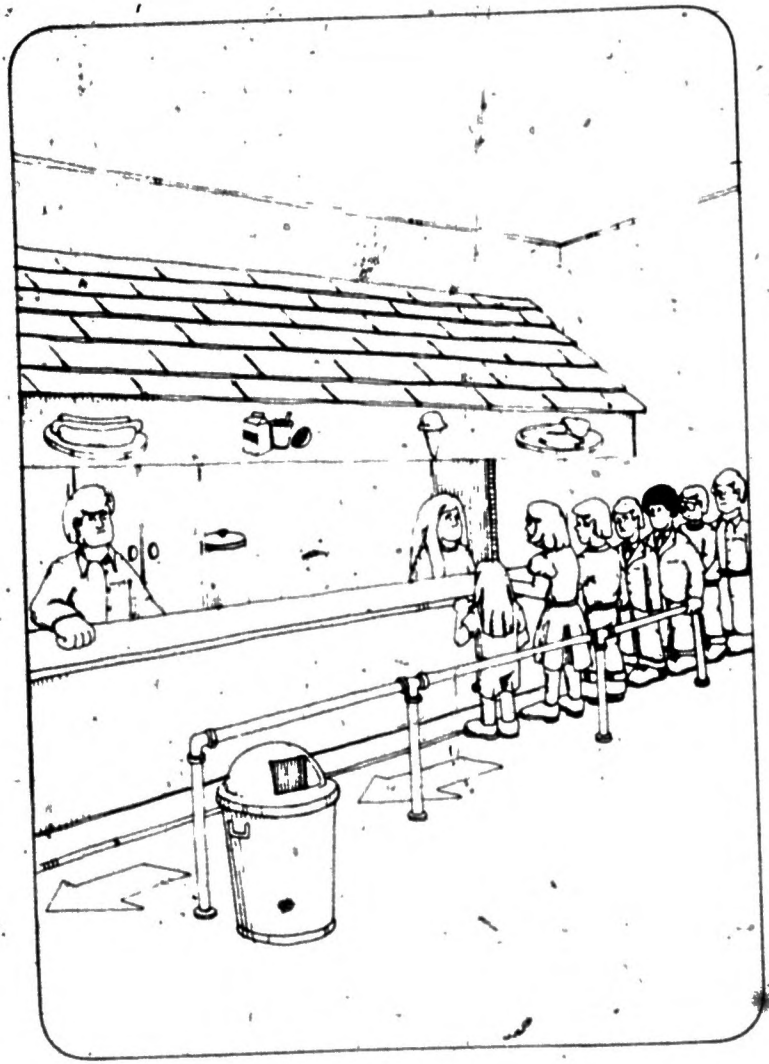

Figure 8

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Now there's a new version of cafeteria management, and about 400 cafeterias in the United States are now operating in this mode. It's called the scamble or random access system (Figure 9). Once you enter into this arena, you are free to go wherever you want, pick out the meal you want, and leave. It looks like absolute chaos, but the amazing thing is that this system is about 20 percent more efficient than the linear system for a very simple reason. In the one-way line, you are forced to go by much that you may or may not want. You also have to wait for the person ahead of you to make his/her decision before you can make yours, and in addition, you can't go back. If you make a mistake you just have to deal with it for the rest of your life. This second model provides an enormous amount of flexibility on the part of the purchaser.

When this system was presented to a group of cafeteria managers for their judgment, there was a very interesting response. Almost everyone said, "It's immoral." And when the people were quizzed to find out what they meant by that, their response was fascinating. They said, "We set up the line so you buy the good stuff first, before you get to the desserts, by that time you don't have any room on your tray. You are protected from yourself. With the second pattern," said the cafeteria managers, "the people will take nothing but desserts." And I thought about Cotton Mather, Max Weber and the John Calvin version of the Protestant ethic. If cafeteria managers assume that people are inherently evil, I wonder what educators think. It occurred to me that educators would probably think the same thing about this system; that is, if you take English 101, naturally you ought to take English 201, and then English 301 and 401. The question of whether English 401 is at a different *inherent* level of difficulty compared to English 101 is a question that is seldom asked.

So, as we think about delivery goods and services, we have to remember that, though in education and in the world of work, goods and services have been delivered in this linear fashion in the

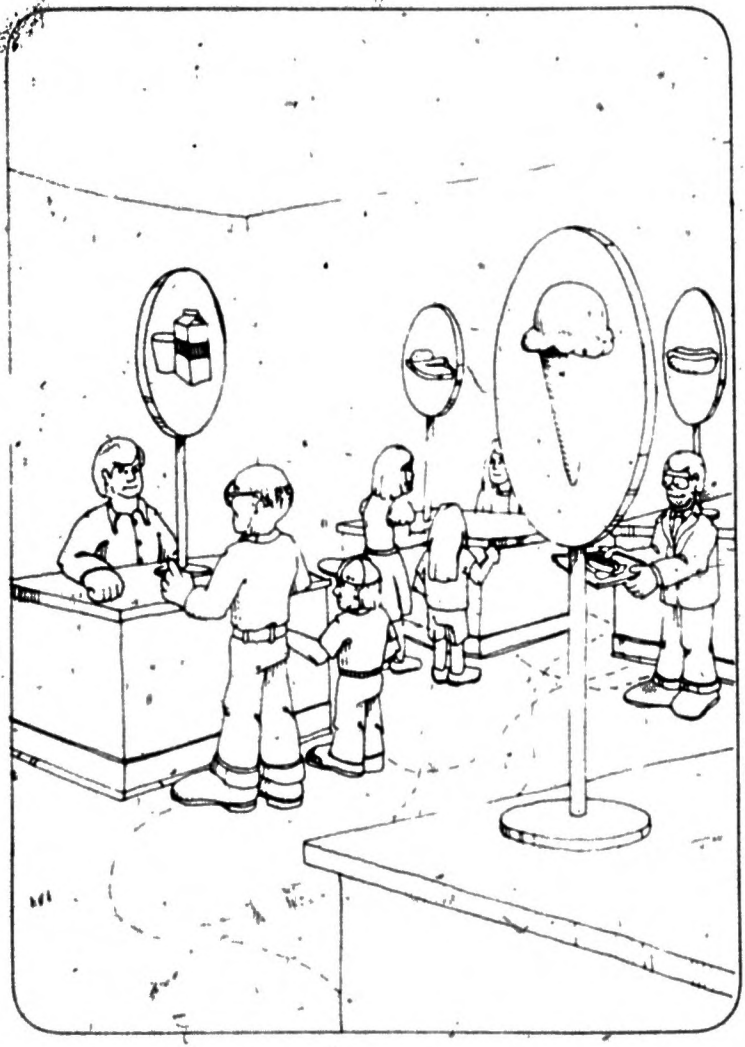


Figure 9

past, but they will in the future be delivered in a random access way. This will cause major changes in our view of organization, both of education and of the world of work. Lifelong learning is just one example of this flexible cafeteria. The proponents of lifelong learning argue that a citizen is inherently eligible for any education he/she wants, at any time during his/her life. Clearly, it's difficult to adapt lifelong learning needs to the linear, bounded education system.

Judicial Influence

In addition to those organizational factors, we are finding, increasingly, that the courts are delving into the relationship between educational degrees and the world of work. *Griggs* v. *Duke Power*, in my opinion, is a landmark decision. It is the first time the courts have ordered that an educational degree or a diploma can be used as a prerequisite for job applicancy if it is proven that *only* people who have earned that degree or diploma can do that job well. The Griggs decision has an enormous number of implications which we ought to take seriously.

Armstead v. *Darkfield District* involves a public school teacher who did not have a masters degree and she was, therefore, not given tenure. She took the case to court arguing that it was up to the school district to prove that people who have M.A. degrees teach better than people who don't, and that's a very tough case to prove. Similarly, this year two faculty members in teaching-oriented colleges, who have been denied tenure because they lack a Ph.D., have taken their case to court on the grounds that it is up to the college to prove that people who have Ph.D. degrees teach better than persons who do not.

The relation of the credential to the world of work is being questioned for the first time, and I suspect in the next five years there will be a major batter in the field of accreditation where *institutional* legitimacy is concerned, and licensing where *individual* legitimacy is concerned.

In addition, we've looked at the modus operandi of higher education institutions—especially those "elites" who raise their status by rejecting people. When asked about the ranking of his/her institions, many college or university deans will tell you the percentage of applicants who are *rejected*. Though that statistic is the measure of performance, it doesn't say anything about what they *did* accept. It says simply, "we're so good, that we can let almost anybody go away and still maintain our viability as an institution." Research has since made such statements questionable.

David McClelland, past president of the American Psychological Association and professor at Harvard, looked at all of the studies in which people have tried to correlate grades in college with success in later life, using fourteen different criteria for success, some of which were income, philanthropic contributions, interest in community affairs, and interest in the arts. Researchers had great difficulty demonstrating that grades in school or college are related in any other behavior of any importance whatsoever. It seems so self-evident to educators that those who do well in their classes must go on to do better in life that they systematically disregard evidence to the contrary. We educators believe that *we* prove *our* worth when our students enter what many student cultures refer to as "the after life." We think that the GPA will help them through adulthood. Unfortunately, the GPA's meaning is often quite contrary to a prediction of success. It is not the straight "A" students in law school who necessarily become the most creative or famous lawyers. It is not the straight "A" students in medical school who become the most skillful, important or creative physicians. We then have some problems in terms of what our system of evaluating people means in terms of what American society needs. That is another reason why the whole open learning strategy begins to be so important.

One final example. The chart on the following page (Figure 10) shows a group of second grade students in a typical American

ACADEMIC ABILITY AND ACHIEVEMENT OF 26 SECOND GRADE STUDENTS

STUDENTS	ACADEMIC
1	++
2	++
3	++
4	++
5	++
6	++
7	++
8	+
9	+
10	+
11	+
12	+
13	+
14	+
15	0
16	0
17	0
18	—
19	—
20	—
21	—
22	—
23	—
24	—
25	—
26	—

LEGEND: ++ = Highest + = Above Average 0 = Average
— = Below Average

Figure 10

26

classroom, ranked according to their academic ability and achievement. The double +s are the high standards and the straight lines are the lows. Knowing this about them in second grade, one might expect to be able to make some fairly accurate predictions about how long they will stay in the educational system, and where they will go. We expect that the ++s will go to selective four-year colleges and universities, both public and private, and probably move on into managerial professional positions. The +'s will go to less selective institutions, usually state colleges, will probably move at the most, into lower-level management-type positions. The 0's, if they go at all, will go to community colleges and will be engaged in clerical and technical work. The —'s, obviously, are the dregs of American life.

Now let's look at this same group of second grade students based on some other characteristics that may be important for American life, including creativity, planning, communicating, forecasting, and decision-making. (See Figure 11.) All of these are measurable, and teachable. We know we can improve the ability of individuals on each of these traits.

First of all, note how our high academics score on creativity measures—they are about the lowest people in the class. The high creatives are all at the bottom of the academic distribution. This is true not just in this class of 26 second graders, incidentally. Getsells and Jackson established that it is fairly true in a national sample as well. On measures of planning, communicating, and forecasting, again, you find that the distribution of talent ranges throughout the academic range. The notion that we have creamed off the best from the top simply doesn't work when other variables are considered, especially in relation to the world of work. Most important to me is the decision-making category. This not only involves making decisions, but making decisions that turn out to be correct. On this particular dimension, the three best decision-makers are the three lowest in academic aptitude and achievement. It seems to me that for anybody who's ever chaired a faculty meeting, the truth of that just bursts upon you.

MULTIPLE TALENT SCORES OF 26 SECOND GRADE STUDENTS

Students	Academic	Creativity	Planning	Communicating	Forecasting	Decision Making
1	++	+	—	0	0	0
2	++	+	—	0	—	—
3	++	—	0	+	—	—
4	++	—	0	0	0	0
5	++	—	—	0	0	0
6	++	—	—	0	0	0
7	++	—	0	0	—	—
8	+	++	+	++	+	0
9	+	++	+	+	0	0
10	+	0	++	0	+	+
11	+	+	+	++	0	0
12	+	+	0	0	+	++
13	+	++	0	+	0	0
14	+	—	—	—	0	—
15	0	+	—	++	—	0
16	0	++	+	+	0	0
17	0	—	—	++	0	0
18	—	++	+	+	0	0
19	—	++	0	0	0	—
20	—	++	—	0	0	0
21	—	++	—	0	—	—
22	—	+	++	0	0	—
23	—	—	0	++	0	0
24	—	0	0	—	+	++
25	—	—	0	0	+	+
26	—	—	—	—	—	++

LEGEND: ++ = Highest + = Above Average 0 = Average — = Below Average

Figure 11

This little chart, then, indicates something important about the academic sieve: many people possessing varied talents are let through the sieve because the sieve doesn't allow for the range of talent that is needed by the American society.

One final point about the ability we have to evaluate people's worth. I'd like to mention briefly a study that, for me, epitomizes the strength of educational evaluation. A required "Introduction to Natural Science" course is taken by 1400 freshmen at a major state college. The students hate to take it because it is required, and they aren't interested in science anyway. The faculty don't like to teach it because they don't get any credit toward tenure for it, but on the other hand, this course subsidizes all the graduate courses and research at this particular institution. And, therefore, the faculty are vociferous in their defense of the course. In this experiment every section in the course was given a weekly exam. The section tests were rotated so that every week the evaluators had some idea of where the learning for that particular week was and how far the students had moved. The results are interesting if you try to plot a mean learning curve for the semester (see Figure 12). The first seven weeks: absolutely nothing. The students are clearly thinking about work and courses that interest them, their major, the typical freshman curriculum, which has something to do with liquor and the opposite sex. The mid-term, again, didn't seem to turn anybody on; as a matter of fact, it was a disaster. In week 10, all of the section people said to their students, "If you don't all get busy and study, you're all going to flunk this course." Now, B. F. Skinner has told us that negative reinforcement never leads to learning, but we have living proof that he's wrong. Because by the time the course is over, the resultant mean score is 68. The faculty say, "Wow, 68, that's really good." And the first question, 68 of what? And the answer was 68 of 100 of course. Well, then what's 100? Is it all the material in the course? Well of course not, we had to boil it down and just put the important stuff in the final. Well, if that's the important stuff, why did you teach the rest of it? . . . and so the discussion went. What happened

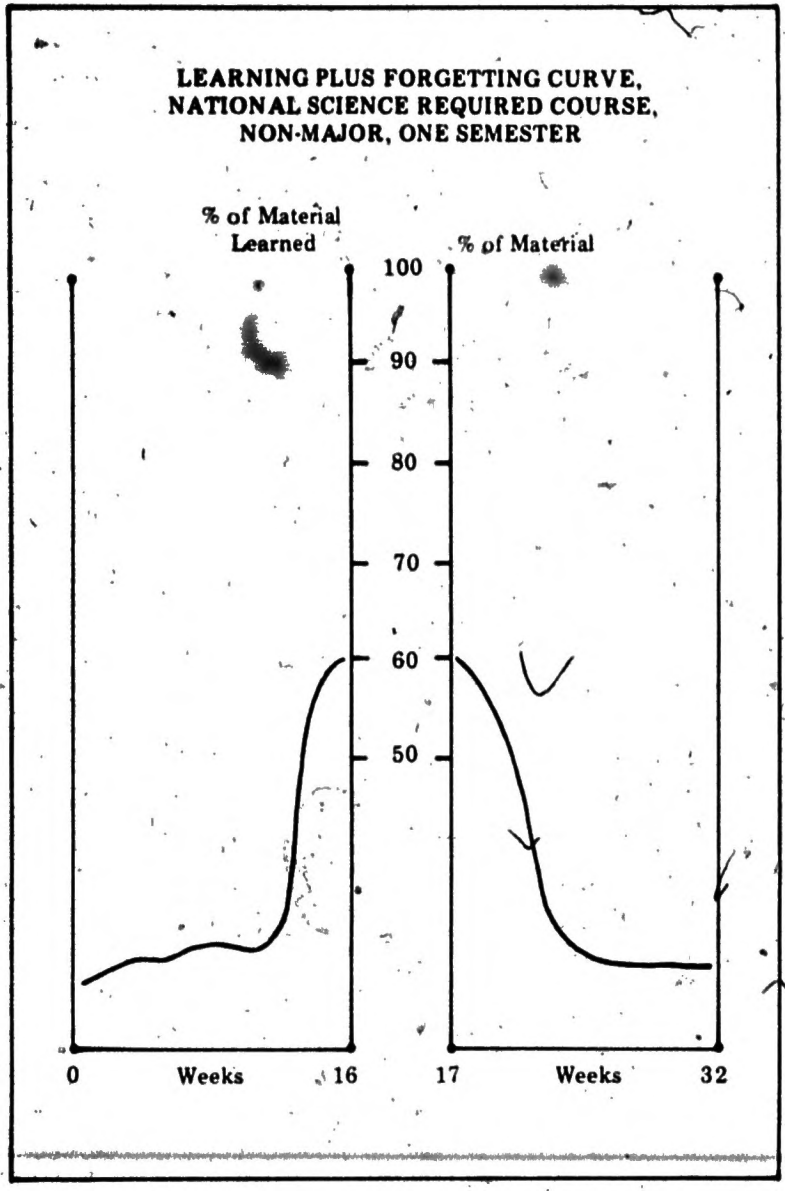


Figure 12

Figure 13

next was that the students were followed for 16 more weeks after they were no longer taking the course to see how long it took them to forget the material that was put into their heads so painfully. And there's a remarkable parallel between the slope of the learning curve and the slope of the forgetting curve (see Figure 13). This little exercise cost the taxpayers of this state $145,000. And for their $145,000 what did they get? They got about 3½ weeks of knowledge out of 32. I think if I were a taxpayer of that state, I'd begin to ask some questions. Like, first of all, what should you expect in terms of student retention? Some very interesting questions are raised there. When this data was presented to the faculty, they felt, of course, that the course nevertheless ought to be taught. Clearly their own work was involved, because they love to do the graduate courses that this course made possible. In addition, they indicated that this material is absolutely vital because of the average American's performance as a voter. You would have to make decisions on scientific policy, and this is why the course was important. Of course, if that's true, all national elections would have to be held between semesters because that's the only time they remember it.

Let's think about some learning curves. When you learn to walk you generally keep on. It's fun. Nobody hits you for it. You get rewarded for it occasionally. Walking is OK. Talking is the same kind of thing, as is reading, that once you learn, you tend to keep on. But consider for just a minute, the geography of Brazil. Most 10-year-olds are experts on the geography of Brazil. They knew the rivers, the tributaries, the climate, the capital city, the imports, the exports, the rainfall. I think you'd probably agree that the forgetting curve on that material is relatively short. Similarly with division of fractions. So, one can raise some new questions about the effectiveness of an education. How long should people retain material after they've been exposed to it? What is an efficient institution? What is an effective institution?

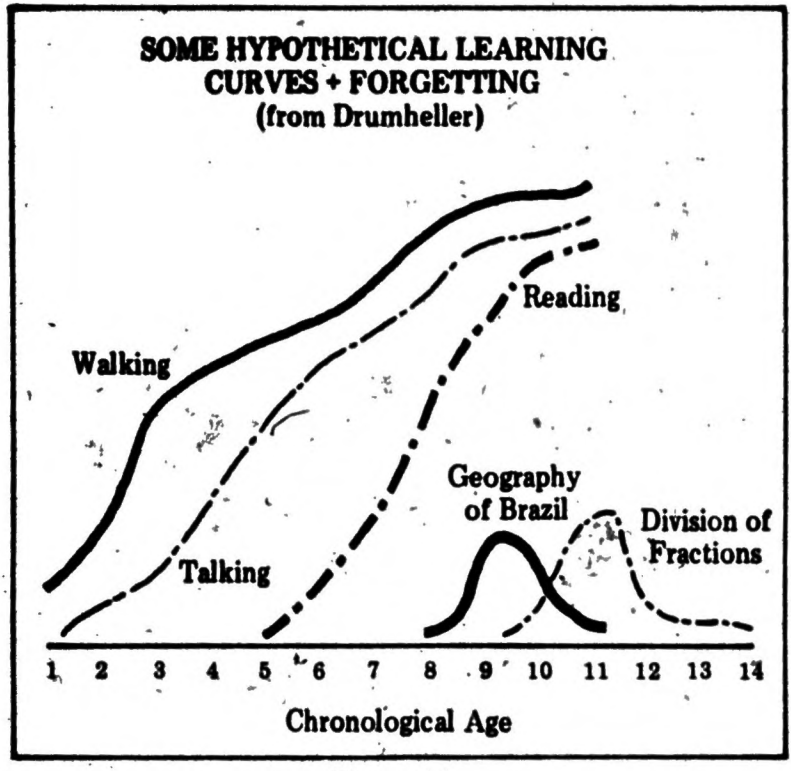
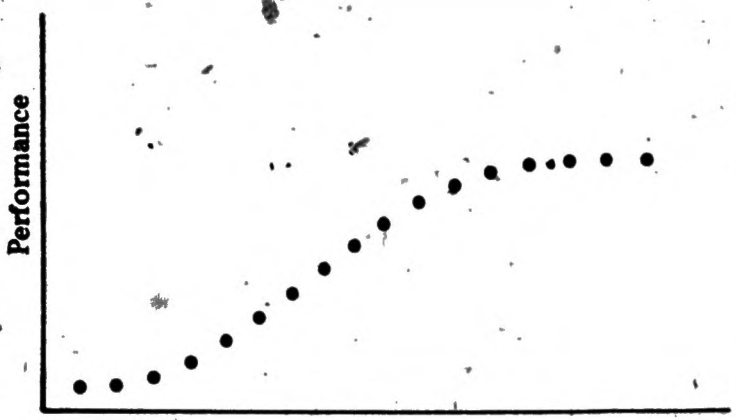
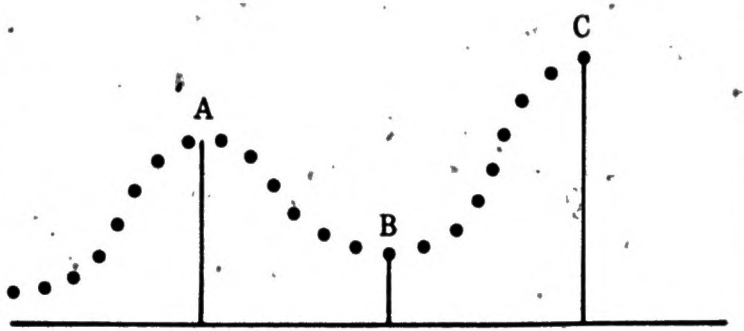


Figure 14

The fact is, we can easily measure most of those things now if we want to, and can show quite conclusively exactly what the rate of retention is. A friend of mine who is a dean of a medical school said that may be true for your undergraduates, but it certainly isn't true for professionals. So, we talked about that a little, and finally he bet that his first year students would remember 85% of the material of the first year, if they were retested one month after the end of the first year. So his first year class was retested, and the scores showed that the freshman class remembered



"Classic" S Learning Curve



Curve of Learning (A) Forgetting (B) and Relearning (C)
(from Drumheller of Ed. Tech Systems)

Figure 15

45% of the material on the final exam. Now again, I don't know what that means when you consult your local family physician, but it did give us some new dimensions on what people ought to remember, and what an institution should do if it calls itself a college, a university, or a school.

An Assessment of Needs

There is another data set that is essential to consider in terms of developing a national education research agenda. What perceptions do 30-year-olds have about the world? Figure 16 shows data from a group from the Project Talent data base. These subjects were 15-year-olds in 1960, and now they're 30. They were asked to reflect on their lives as adults. "Health," "spouse," and "job satisfaction" were especially important, and it was concluded that, according to this data, most people were satisfied with them. "Developing a mature understanding of life" was important and most people were relatively satisfied. But on "intellectual development," 84% thought it was very important and only 54% were satisfied with their intellectual development. Now one interpretation of that result is that some people have an enormous desire to be all things and know all things, but I don't really think that's the case. I think this statistic is a comment on bad teaching. In addition, the same survey indicated that vocational guidance was terribly inadequate both in high schools and in colleges. If I would make any recommendation today, it would be to establish good programs for training people in vocational counseling both for high schools and colleges, as well as for the world of work. Vocational counseling involves personal sensitivity, the ability to listen to people, the ability to provide them with accurate information. I have no data to support this contention, but I'm quite sure that a great deal of very inaccurate information is now being passed on to students. There must be some way to change that. In addition, the lifelong learning market is really large. There are 13

DATA FROM 1,000 30-YEAR-OLDS;
15 YEARS AFTER PROJECT TALENT (1960)

85% High school diploma (only 50% of their parents have it).
25% Four-year college degree (only 10% of parents do).

Quality of life items from data

	Very Important	Satisfied
Item: Health	over 90%	86%
Spouse		82%
Job		79%
Children	88%	82%
Develop a mature, personal understanding of life	88%	72%
Intellectual development	84%	54%

(Department of HEW)

Figure 16

million Americans who would go back to college or university, or other training institutions today if they only knew where to go. Many of the problems that institutions are having with decreasing enrollment could be solved if we could find ways of getting more adults into colleges and universities and other settings. Indeed this is happening now. The community colleges have done an excellent job in beginning to meet some of these new needs and they will continue to do so in the future. However, when you hear the rhetoric about the new students, they're supposed to be women,

ethnic minorities, blue collar, unemployed. And then if you look at who they really are, you find that they're white, male, middle class, managerial backgrounds, full-time employed, some previous college experience. The group that's actually returning to college is very much like the typical 18- to 21-year-old undergraduate. They're just older. Their college was deferred for some reason: marriage, military service, and now they're back. So we still are not meeting the agenda that I outlined initially, which is meeting the educational needs of the poor, and racial and ethnic minorities, both in terms of personal satisfaction and occupational success.

In addition to the instructional services, I think it's important to remember that adult needs are seldom related to course work. One particular survey shows that 48% of the adults wanted to take a course, 31% simply wanted to assess their personal competencies. They wanted to check their personal growth and potential. Twenty-eight percent simply wanted to check their strengths and weaknesses in skills and subjects; they were not interested in job and college entry. And, most interesting for me is the fact that 20 percent of the sample, and it was a good random sample of the population, expressed, in a face-to-face interview, a need for personal counseling. If one-fifth of the American adults feel a need for personal counseling, and will admit it face-to-face to an interviewer, a very real problem exists. And that problem will not be handled through the establishment of conventional course work or conventional patterns of faculty advising. Indeed, what we may have to think about is an alternative that is not related to colleges and universities at all. It may be that we'll have to start thinking about "collection points" where adults normally congregate and begin developing a program to make available to people in that setting certain kinds of highly skilled counselors who would be able to assess people's needs, locate diagnostic centers which provide the needed services to assess their potential, what they ought to be doing, and then refer them, if necessary. Such a program is currently in operation

in the state of New York, under the direction of Norm Kurland, and it seems to me that it's a forerunner of the type of programs we will soon have to develop.

In addition to that new kind of delivery system, we may have to separate degrees from credentials, due to the fact that though most degrees are not legitimate predictors of job success they're used that way. If we separate degree granting and credentialling through a regional examining institute, we can meet the needs of all adults and do it well. Figure 17 is illustrative of the flexibility of such a credentialling system. Of the four individuals, the first has no college, requests certification as a computer programmer claiming he/she has the skill. That person can go directly to the regional examining institute, and, having the necessary skills, he/she can be certified as a programmer and can move directly to a job. Individual B has no college education, but wants credit for previous experience in order to be admitted into college at an advanced level. The REI grants the credit based on an analysis of previous experience, and the person goes into the college. Individual C has credits from various sources and wants to combine those credits to fulfill degree requirements. (In one case in Berkeley we found one person who had 250 credits of the undergraduate level and no degree because no institution would recognize the credits from any other institutions he'd been to.) Again, the REI would have authority to combine the credits so that a degree would be granted. Individual D wants diagnostic counseling only, not a degree or certificate. That person goes to the REI, receives those services that he/she needs. There isn't a college or university I know of, with the exception of perhaps one, that can meet the needs of all four individuals at the present time.

Now, finally, as we start thinking about who's going to make it in the world of work, we have to ask some evaluation questions. There are only three that concern me. First, the criterion question: "What do we want people to be able to do?" The second is a standards question: "What level of performance do we require?

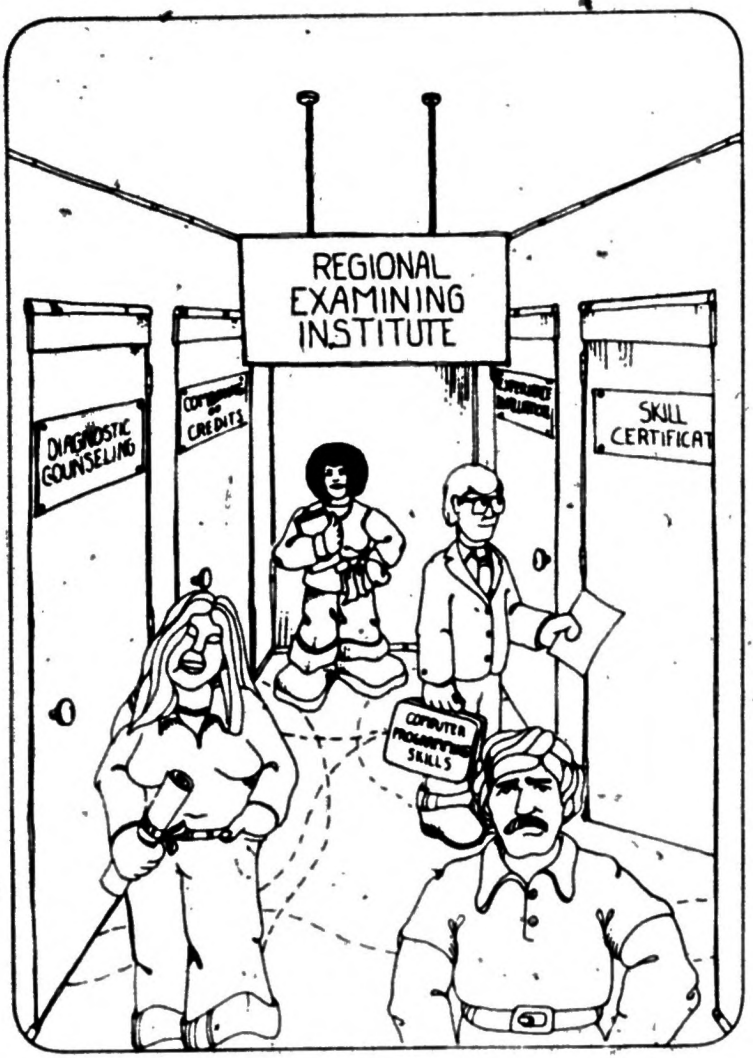

REGIONAL
EXAMINING
INSTITUTE
DIAGNOSTIC
COUNSELING
CREDITS
SKILL
CERTIFICAT
COMPUTER
SKILLS

Figure 17

How good is good enough?" And the third one is the technique question: "Are there ways to measure those things?" Knowing what we now know, it seems that since the competency-based programs greatly increased our specificity of criteria, we now can identify with some certitude what we want people to be able to do. I consider that a net gain. On the standards question, "How much is enough?" it seems to me we still have a long way to go. There is very little evidence that our standards are particularly related to the needs of society or to the needs of an individual. So the question of "How much is enough?" is the question which I think will preoccupy us in the next few years. The technique question is all but over. That is, if you know what it is you're going to measure, there's a technique to measure it.

Some who are in competency-based programs say, "That standards question doesn't matter any more because we have defined competencies and therefore we needn't worry about standards." Is that really true? In one particular area, when the question regarding criteria for high school graduation was presented, some people thought everyone should know how a car operates. One of the things you have to know if you are going to work the car is how to change a tire. So a subcommittee was established to deal, in an hour or two, with this very simple problem of deciding whether a person was a competent tire-changer. And this is what they came up with: first of all, does that mean that a person has to know how to change *any* tire on *any* car, or just their own? How about trucks, and bikes and motorcycles? Secondly, do they have to know how to use equipment like air wrenches and hydraulic jacks? Do they have to know how to repair leaks in tires, or do they put on the spare even if it's flat, which 50,000 Americans do every year? Finally (and this is where the standards question comes in), they come up with the question of how much time one should allow to change the tire? A pit crew at Indianapolis takes two seconds; the average weekender, if there's no coronary involved, takes about 35 minutes. So standards came down to the ultimate decision of the amount of time one is allowed to accomplish the act. And it seems to me we need to rethink that a little bit because some people may be a little slower and may do it a little better.

Tire changing—and yet, though we think it is simple, knowledgeable adults assigned to establish criteria for the task come up with more questions. And in the process they are quoting Thomas Jefferson, Paine, Roosevelt, and Lincoln. So, I think the issue of competency cannot be decided until we can answer those standards questions.

We do know quite a bit about what predicts success on the job, and it's clear that the best way is probation, or work experience programs. You can evaluate a person on the job and find out what they can do. Job training is not quite as good, and simulation is even more inadequate. General traits and basic traits, verbal ability and figural relationships have the lowest predictability of job success. However, notice that the tests we give most often in colleges and universities are verbal and figural relationship, though we know they have the lowest job success relationship. There is evidence to believe that we need to seriously examine these evaluation procedures. We also know a lot about the kinds of skills that people ought to have. We know that they are working with "data" skills, "people" skills, and "things" skills, and that these can be arranged in order of difficulty and can be operationally defined so that they become part of the public domain.

I'm not saying that higher education ought to become vocationalized. I *am* saying that these skills are equally useful for the liberal arts, and that we need to begin specifying the criteria people should attain, whatever the objective.

I've tried to outline a few of the issues that I think one would have to consider in building a research and development agenda concerned with the relationship of education to work. I've covered many aspects of the topic, and I hope that I've introduced questions and issues which will challenge you to formulate ideas about what a research agenda ought to be, and then communicate those ideas to us.