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Allocation of Resources in Education

THE NEED for education and training directed towards national growth potential of the future, rather than the agriculture of the past, has already been mentioned. Structural maladjustments in the farm industry will find their more permanent and minimum pain solution in the occupational selection of youth. Policy need not, of course, wait for the gradual replacement of one by another of overlapping generations. But the process of individuals giving up an occupation that partly fell upon them by birth for one matching other of their abilities is best accomplished by persons entering, or only shortly in, the labor force. Direction towards matching productivities of the resources that make up the individual with demands for these same services requires time for absorbing investment to develop them, however. Hence, for these reasons, it is useful to explore this facet of policy somewhat more deeply. Over the sweep of decades it will be the important policy in respect to potential welfare of people originating in agriculture, more so than all other policies aggregated together, for the particular population strata. Our approach is in a broad view of education as it relates to persons in agriculture, but is much more constrained than analyses examining the nation's educational system. Our focus is on education of the individual. A later chapter deals with the more specific developmental aspects of agricultural research and education.

The major contribution which can be made by agriculture to economic growth in future decades is through appropriate education of its youth.

Becker has estimated, for the entire U.S. and not for agriculture, the private return for high school education to be 19.2 percent, and return on college education to be 12.5 percent.¹ Return on all social investment in education is estimated to average about 10 percent, more than for the average returns of industry and agriculture. This education will be important as it prepares human resources to be efficient managers in agriculture, but more so in providing education and training adapted to the skilled and professional fields of greatest demand derived from economic growth.² Provision of more human resources to these fields will be a greater immediate contribution to national growth than upping the rate of output progress in agriculture. Improved education will be needed in agriculture so that diminishing returns won't be encountered in traditional inputs, with ratio of input to output in national food requirements increasing. This is true because farming, as other industries, increasingly rests on capital rather than labor and major human input for success being managerial and professional ability and because some, but smaller in proportion to the past, consumer gain can be made in releasing labor from agriculture. But the major direct contribution of agriculture to national economic growth will still rest on the training of youth who enter the nonfarm labor force. For this reason we need to look somewhat more deeply into the educational phase of resource allocation and development.

EMPHASIS IN EDUCATION

Research and educational programs directed to agriculture have been extremely successful in contribution to national economic growth. The latter, national economic growth, has indeed been a sufficient justification for these efforts. (See Chapter 16 for discussion of returns from investment in agricultural research and education.) The indirect gain or return to the society of consumers, not only in abundance and price of food but also in increased availability of resources for nonfood products, has outweighed direct gains to agriculture itself in recent decades. More of the investment in agricultural education and research will need to be justified in terms of national welfare and consumer return. If we accept these facts, and the facts have empirical basis, then education or research for agriculture needs some elements added and some change in emphasis. Largely the needed elements are those to help agriculture adjust to economic growth and to give people from agriculture a better opportunity to capitalize on favorable employment outlook from growth.

Education to date has been that which causes or forces changes in the

¹ G. S. Becker, "Underinvestment in College Education," *Amer. Econ. Rev.*, Vol. 50, and "Investment in Education," *Nat. Bur. Econ. Res. Ann. Rep.*, Vol. 39, pp. 38-40. Also see figures quoted from Becker's study in T. W. Schultz, *Education and Economic Growth*, Sixtieth Yearbook of the National Society for the Study of Education.

² For discussion of growth of supply and demand of professional resources in scientific fields, see D. M. Blank and G. J. Stigler, *Demand and Supply of Scientific Personnel*, National Bureau of Economic Research, New York, 1957.

structure of agriculture and brings about the need for adjustment. But it has left farm youth and their parents caught in the whirlpool of market forces, with little aid in adjusting to the changing structure which efforts in education and research have brought about. This void stems partly from a tendency to view agricultural research and education in an economic framework which is too narrow relative to their over-all social consequences. Typically, the framework viewed is that of relationships within the unit of the farm firm or household, or within a commodity sector. From the inception of major professional efforts for agriculture, including vocational training, the supposition has been that the beneficiaries are farm people, and only indirectly and incidentally the nonfarm public. A century back, this was more true, especially in terms of gain to agriculture. But it has not been the case since 1930, nor will it be in the 1960's. A main effect has been gain to the consuming public and an immense contribution to national economic growth. The gains have been real and important.

This, the contribution to national economic growth and progress, is broad over-all framework in which major research and educational programs in agriculture of the future need to be viewed and justified. The changing proportions of farm and nonfarm populations will require it. It is a framework which not only justifies continued and public support of research and education, but it also provides a basis for emphasis and structuring of programs to mesh with national needs in the future. Educational programs which rest on an economic growth framework will be much broader in structure than those which suppose agricultural education and research to have the single purpose of aiding people in farming to farm better.

The opportunities and needs in education for the future are not less, but are greater, in complexity than in the past. They will better recognize the relative shift in demand for products and the labor resources going into them than has been done in the past. They will guide more youth into nonfarm professions in response to changing structure of the economy. They will recognize that their success in increasing productivity of labor in agriculture has the very effect of reducing the labor force in agriculture. Finally, they will recognize that agriculture has become a complex and scientific occupation, requiring a richer mix in capital proportion, with need for education more in basic science and management and less in today's facts and do-it-yourself skills.

This regearing of education is necessary as new technology in farming replaces people and frees them for the labor force of other industries. As mentioned in Chapter 12, agricultural education, or even education in rural areas, of the decades past has had the main goal of turning farm youth back into agriculture, even when many had little hope of success and income in doing so. So great was this obsession that little else in vocational training has been offered in many rural communities. As Table 13.1 indicates, rural states have concentrated vocational training on agriculture, and this has been most true in those states where farm

TABLE 13.1

PERCENTAGE ALLOCATION OF VOCATIONAL EDUCATION FUNDS AMONG CATEGORIES
(CENSUS REGIONS AND SELECTED STATES, 1955-59)

Region or State	Percentage Allocation Within Region or State for:			Percent Allocation of Region or State Is of U.S. for:		
	Agri- culture	Home ec.	Trades and industry*	Agri- culture	Home ec.	Trades and industry†
U.S.	31	30	39	100	100	100
New England.....	11	18	71	2.3	3.8	12.8
Mid. Atlantic.....	16	13	71	6.5	5.6	24.4
E. North Central.....	31	31	38	16.3	17.2	16.3
W. North Central.....	41	31	28	12.3	9.8	5.9
S. Atlantic.....	36	34	30	19.9	20.0	12.8
E. South Central.....	42	36	22	11.2	10.1	4.7
W. South Central.....	42	38	20	20.9	20.1	7.0
Mountain.....	32	32	36	4.3	4.5	3.6
Pacific.....	21	28	51	6.4	8.9	12.4
New York.....	13	9	78	2.3	1.7	12.0
Minnesota.....	38	28	34	3.1	2.4	2.1
Iowa.....	49	33	18	2.7	1.9	.8
South Carolina.....	44	36	20	2.8	2.4	.9
Georgia.....	44	40	16	4.8	4.6	1.2
Tennessee.....	37	38	25	2.8	3.0	1.6
Alabama.....	42	33	25	3.1	2.6	1.5
Mississippi.....	48	37	15	3.0	2.4	.7
California.....	19	26	55	3.8	5.7	9.1

Source: *Digest of Annual Reports of State Boards for Vocational Education to the Office of Education*, Division of Vocational Education, U.S. Dept. of Health, Education and Welfare, Office of Education (fiscal years ending in 1955-59).

* Includes Distributive occupations, nursing, area programs and other minor allocative categories.

† Trades and industries only.

income and opportunities are meagerly low. In the more industrialized states, where youth are better acquainted with occupations in industry and the professions, we find the greatest allocation of vocational education to occupations other than agriculture and home economics. It is in the low-income southern states and the midwestern agricultural states, regions where the migration from farm to industry has been at most rapid rates and will continue so, that allocations to vocational agriculture have been greatest. In both Iowa and Mississippi, for example, nearly half of all vocational education funds was allocated to agriculture in the period 1955-59. These two states allocated about 85 percent of vocational funds to agriculture and home economics.

This focus, for the great number who eventually find their abilities and capital situation to favor employment in other industries, has caused many to have vocational opportunity closed to them, or to stumble to it only after large financial sacrifice. Technical research and education has freed people from the industry, then left them stranded in agriculture, with emphasis continued on farming education to replace or free even more people from agriculture. It is obvious that most mechani-

cal practices substitute for and replace labor. But biological practices serve similarly. Practice combinations which increase per acre grain yield by 20 percent substitute for nearly as large a percentage of the labor required to produce a given output. A combination of livestock practices which reduces the amount of feed to produce a given amount of meat or milk serves similarly.

Complete Educational Training for Farm Youth

Vocational education and 4-H training in agriculture have been efficient and successful as have other public educational and research programs for the industry. But all of these programs help change the structure of agriculture from within. This investment in agricultural training has shown all boys involved how to be better farmers and has given a better vocational opportunity to those with capital who could farm and participate in rapid advance. But while the vocational opportunity for some farm boys has been increased, the opportunity for others has been lessened as a result of the program. Under economic growth and rapid technological development, it is important to focus on vocational opportunities for farm boys who no longer have satisfactory alternatives in agriculture. We lack complete vocational and educational programs for farm youth until training is provided equally and appropriately for the greater number who have no promising future in agriculture. Farm youths have been handicapped seriously, in opportunity to capitalize on native capacities and abilities, by educational policy concentrated on farming.

As investment is made in education and research for agriculture specifically, we need to invest in services which help restore balance in both the resource and income structure of the industry. Two things are needed: (1) Research, education and programs which aid in increasing economic efficiency for farmers remaining in the industry needs to be maintained at appropriate level. Agriculture is a competitive industry. It will continue to be so, even with policies which lessen competition at level of commodity price, and farming can be conducted profitably only by those who have the proper abilities, skills and capital. Vocational training, education and a flow of information to operators who will or should remain in farming need to be continued for economic growth purposes. Young people need to be trained to take their place. This training needs to be even better than in the past, considering the growth in commercialization and competition of agriculture. It must rest more on basic knowledge and less on do-it-yourself skills. In the decades ahead, a greater proportion of farmers than in the past will need formal and advanced education in agriculture because of the growing complexity of agriculture. (2) A parallel effort is needed to educate more appropriately those forced or drawn from agriculture and to aid in the structural adjustment of agriculture. The larger adjustments in occupational and geographic migration and the activities which will facilitate them must revolve largely around the more flexible part of the farm labor force, namely youth.

With prospects for continued technological improvement and increases in output, the adjustment period for agriculture is going to extend for a long period into the future. Balance will be created as much by preventing young people, when their incomes and life satisfactions will be greater in some other occupation, from entering agriculture. We provide a positive service to these persons by training, informing and counseling them so that they make correct choices when they enter the labor force. We provide them a disservice if we encourage or allow them to enter farming, only to find out four or five years later that they have made a mistake and must switch from farming. In this sense, we need to consider vocational agriculture not as a self-contained educational program, but as part of a larger systematic vocational training program. For rural youth, as well as those in urban locations, we need counseling and training for those who will enter farming as an occupation.

One goal is to identify those who have the ability and capital to make a success of commercial farming in a competitive future. And competition will prevail. Programs which stabilize and support prices or provide quotas for each farmer still allow and encourage competition. The competition is in the pricing and purchase of resources and quotas to produce the output, if not at the commodity level. But an equal goal is to properly identify and train those who have neither the interest, ability nor resources to make a success of farming. Research and educational programs, financed from public funds, should have the effect of increasing aggregate human welfare. Never should they contribute to lessening the potential welfare of a large population stratum simply to allow projection of an institutional or educational structure of the past into the future, or in projecting gain of the persons who run such a program at loss to those who are misdirected in vocation. The need is not to eliminate successful agricultural educational and research programs of the past, because these contribute greatly to national economic progress. Instead it is to add program elements which facilitate the adjustments partly created by these research and educational efforts. We have an incomplete educational program for agriculture until we do so. We are subject to criticism until we provide vocational and counseling services which are as effective for those displaced from agriculture as for those trained to maintain the industry.

Aggregate Knowledge

Educational and research organizations directed at agriculture need to give more attention to the mass effect of their activities and the relationship of agriculture to the total society. They must broaden their view of the human resources in agriculture. These resources are not adapted only to agriculture, but represent humans with talents and possibilities which are often more important if guided into the services demanded by a wealthy and growing society. Through the educational system, they should be provided the opportunity and choice mechanism for selecting occupations on which rapid economic development places income pre-

miums. In this sense, educational complex oriented towards people on farms needs to concern itself with areas given little emphasis in the past. It must turn its attention to the welfare of people replaced by technical advance in agriculture. It needs to turn its attention to secondary social adjustments, created in rural communities as farms become larger and population becomes smaller. It needs to concern itself with wider educational and employment opportunities for some rural youth than they have had in the past, just as it needs to emphasize improving the ability of those youth who will return to farming.

Increased scientific knowledge has stepped up the rate of technical change, causing applied knowledge obtained in vocational education to become obsolete more rapidly and with need for structuring adult education accordingly. Education for youth and families engaged in farming needs to be broadened, beyond consideration of improving the enterprise and increasing profits to an over-all view of agricultural industry in the national economy and of agricultural policies which are consistent with both economic growth and improved resource returns in farming.

Increasingly, farm people are of high literacy. They will make major choices in respect to private affairs in the market through decisions and prices to purchase resources and expand farm operations, follow particular consumption patterns or choose particular occupations. They also will make major choices through the voting mechanisms and decide for or against agricultural policies which affect the welfare of themselves and the nation. They function in a home and community setting which is more complex and less detached than previously. Choices for the business and household are more nearly joint ones, involving knowledge in both areas by husband and wife. Agriculture is much less unique and distinct as an occupation and way of life than in the past. Certainly these facets of change should be recognized in agricultural education for the future. No force has been much stronger, in the span of two or three generations, than education in diverting the personal distribution of income over the masses of the population. Labor of agriculture, particularly that in the chronically low-income and Negro-operator strata, has been long disadvantaged in this respect—as has agriculture as a whole.

With public education an investment subsidy to the individual, the the individual's ability to obtain a share of this capital and realize future premium earnings on it depends on his access to wealth and his ability to forego earnings while in school. This education investment or factor cost has been estimated at \$2,240 for eight years of elementary school, \$5,680 for four years of high school and \$13,200 for four years of college at 1956 prices.³ Of this total factor cost, 43 percent is attributed to earnings foregone through high school, and 53 percent through college. The person unable to go to high school and college misses about \$10,000 in public capital investment in education. With high rate of return on this over his lifetime, the opportunity for capitalizing on public investment causes him large sacrifice as compared to other persons. But it is less the

³ Schultz, *loc. cit.*

amount of capital that is important; it is more the opportunities which are opened with the education. Inability, and surrounding motivational forces, which force low levels of schooling on farm strata drives them into the lowest of unskilled employment opportunity, or to life on an inadequate farm.

Data on migrants from farms indicate great voids have existed in opportunity to capitalize on education services produced under public enterprise: For farm migrants in the nonfarm labor force of 1949, 8.5 percent of white and 30.8 percent of Negroes had less than five years of education, 35.2 percent of whites and 43.8 percent of Negroes had only five to eight years of education.⁴ In the urban labor force as nonmigrants from farms, only 2.3 percent had less than five and only 16.1 percent had as little as five to eight years of education. In the farm population over 25 years of age, 20.3 of whites and 53.0 percent of Negroes had less than 5 years of education. In the farm population of the North Central region, 62.9 percent of whites over 25 years in age had less than a high school education; the comparable figure for Negroes in the South was 73.1 percent. Table 13.2 indicates that the labor force which does remain in agriculture has been at the lower end of the educational ladder, exceeding unskilled labor only very slightly in educational attainment.

ALLOCATION OF RESOURCES TO EDUCATION UNDER GROWTH

Economic growth takes place especially because labor is high in productivity and produces more than it consumes, because capital accumulation takes place and further increases labor productivity and because scientific discovery and knowledge also occur, adding to both labor and capital productivity. Education is an input or resource which thus leads to increased scientific knowledge and, hence, to increased labor and capital productivity which promote economic growth. But, since national economic growth causes change in consumption patterns, in allocations of the individual's time and even in his preferences and values, one of these variables cannot be considered as "exogenous," and determined outside of the system. Instead, education and scientific advance, national income and values or preferences are three "jointly determined variables," each determining what the magnitude of the others will be, or should be. There is not a "one way-relationship" between education (scientific advance) as the "determining variables" and national income and personal or community values as the "determined variables." National income and consumer values (preferences of people) equally determine what the level and direction of education and science can or should be. While education and science are sometimes carried on for the sake of "pure" ends, unrelated to the desires and preferences of consumers, they more often are directed towards the products, services and activities desired by consumers. This is true for education aimed at eventual employment

⁴ D. G. Johnson, "Policies To Improve the Labor Transfer Process," *Amer. Econ. Rev.*, Vol. 50.

TABLE 13.2

EDUCATIONAL ATTAINMENT BY OCCUPATIONAL GROUPS, UNITED STATES, 1959

Occupational Group	Educational Attainment Levels			
	Average years completed	Percent with:		
		Less than high school	High school graduation	Some college
Professional and technical	16.2	6	19	75
Proprietors and managers	12.4	38	33	29
Clerical and sales	12.5	25	53	22
Skilled	11.0	59	33	8
Semi-skilled	9.9	70	26	4
Service	9.7	69	25	6
Unskilled	8.6	80	17	3
Farmers and farmworkers	8.6	76	19	5

Source: *Manpower Challenge of the 1960's*, U.S. Department of Labor, U.S. Govt. Print. Off. 1960.

of its student customers, in firms and industries producing the products for which consumers pay a price and provide employment opportunities. It also is true in large part for scientific research financed by the public, and particularly that financed by commercial firms which provides an important portion of our knowledge for education as well as the basis for development of products desired by consumers.

In this sense, growth in national income and consequent trends or changes in the pattern of consumer preferences are important in determining the structure and emphasis in education and science. As an input or resource used to attain the growth ends, to produce the goods and services desired by consumers and voters in a democracy, the structure and emphasis in education and science needs to be continuously adapted to conform with changes in national income and consumer preferences or values. Adaptations in education need to be in terms of the number of persons trained for the different occupational fields which produce goods and services, in terms of the nature and number of curriculum offered for this training and in terms of the educational methods fitted to both of the foregoing. But since change is continuous, emphasis in adaptation of education should not alone be on the number of persons trained for different fields, but also in developing flexibility of people so they can shift in occupational direction as economic change continues.

Alternatives and Competing Major Ends in Education

If we were to consider education solely from the standpoint of developing humans as resources, one of the numerous alternative ends outlined later, then an optimum procedure would be: to predict the level of national income and pattern of consumer preferences two decades hence. Then we would provide appropriate vocational guidance and curricula developing the proper number of persons to produce goods for these future demands. We would decrease the number of persons trained in

some fields and increase it in others, with courses at secondary and college levels altered accordingly. We would increase numbers of persons and courses or other facilities in some fields, but by different proportions than in other fields. This would be the proper approach, if education were looked upon as an input designed to develop human resources in a manner most consistent with national economic growth and the maximization of consumer welfare. This should be an important basis for educational structure and change. But it does not provide a sufficiently complete framework for structuring education, since development of human resources is only one of the several possible ends to which educational inputs can be directed.

In fact, as national and per capita income grow and expenditure patterns and values of consumers change, it is possible that an increasing proportion of educational resources should be directed in directions other than development of individuals as resources. That is, while total investment in education may increase in the several areas, relatively more should be invested in the individual as a consumer, as compared to the individual as a producer of products and services. The reason is: the individual need not devote such a large portion of his time or exploit such a large portion of his energies for earning a living. He has a larger portion of his time and income for enjoyment, recreation and entertainment of himself.

Along with these changing patterns of allocation of time and income, it also is likely that we need to make relative changes in the educational system. For a very poor nation, it is essential that education be devoted to increasing the productivity of the individual. For a very poor person, the essential in education is that it provide him means for earning a better living. But for a wealthy nation and person, the goal and emphasis of education need not be alone that of developing the individual as a resource and preparing him to earn a living. We wish to explore some of these alternative ends on the pages which follow.

Some of the trends over past decades in allocation of more educational resources to development of the individual as a person or consumer, rather than in developing him solely as a resource, would seem positively consistent with growth in national and per capita income, rather than as a purely negative direction, as some extremists would lead us to believe. The issues being argued over education are partly those of whether we should be devoting efforts only to developing individuals as resources for our production machine, with less or no emphasis devoted to improving their ability to enjoy the rapidly growing per capita quantities of products and services coming forth from an industrial machine which "churns" at an ever increasing speed. Some would drop all courses and educational activities which develop the individual as a decision-making consumer of products, services and leisure which are growing in quantity as time and national income progress.

This is wrong focus for evaluating educational needs under economic growth. The error in allocation of educational resources isn't in this direc-

tion. Recent trends in education probably have been consistent with the needs of a nation which is already wealthy and is rapidly growing more so. Instead, the questions more appropriate for debate in education to develop human resources are as follows: (1) Are we allocating a sufficient amount of our growing national income to education for all purposes? (2) Of that allocated for purposes of developing individuals as resources, is it being used most efficiently, or could the same inputs be rearranged to produce a greater human resource and, hence, industrial product? (Certainly the last question is just as relevant for other ends to which education can be directed.)

Ends for Allocating Educational Resources

We now turn to the basic and broader ends to which educational resources can be allocated. With limited educational resources, these ends are competitive at some level of allocation to each. The important question isn't one of which single end should be included, with all others excluded. Instead, it is one of: What is the proper balance in educational resources, allocated to these several ends? As time progresses and national income increases, greater total investments probably should be made towards all acceptable ends, but relatively more to some than to others. Unfortunately, in this day of debate over education, sufficient attention has not been given to the existence of these alternative ends.

We do not attempt to discuss all possible ends for education. We simply point out some of the major ends which need consideration. Four major ends which might relate to criteria for determining the allocation of educational funds, and even in development of curricula, include using education for (1) developing a resource (2) bringing about a change in the pattern of personal income distribution, (3) using education directly as a consumption activity and (4) molding values of individuals in respect to ethical considerations, social organization, consumption patterns and other uses of resources.

THE END OF EDUCATION FOR RESOURCE DEVELOPMENT

Education could be approached purely from the standpoint of, with labor or the human as the material of relevance, a resource and its development, just as society might invest in the development or production of resources represented by bricks, concrete, animal breeding stock, steel, soil reclamation, manufacturing plants, etc. Education for this purpose is relevant as an end in a slave or dictatorial state just as it is in a democracy. A single dictator, or slave owner, receiving all the product of economic activity, would want to mold people into potential productive power, just as he would want to mold sand and limestone into concrete which has productive power. He would need trained engineers, technicians, herdsmen, doctors and others, if he produced a maximum product from available natural resources. The departure in interests for using education to develop or train human resources in a democracy or a slave

(dictatorial) society is: In the one case, the relevant product and direction of education or training is specified by the community of consumers; in the other by the values of the dictator. But even though there is this difference, education can be viewed as an activity designed to develop people as resources with productive abilities, regardless of what the end may be or who specifies it. The resource development aspect of education is at the extreme in graduate training, where it is generally supposed that other possible attributes of education are already absorbed by the individual.

In using education to develop humans as resources, either in a slave, democratic or dictatorial society, two steps are important. First is measurement of abilities. In technical terms, this is a matter of predicting the production possibilities, not as of now but as the potential after education, which make up the individual. After predicting the type of work for which the individual is potentially most productive, or in predicting which individuals will produce most from a given educational input, the person would be assigned directly to this area in a society concerned only with the individual as a resource, regardless of the individual's preferences. However, in a democracy, predicting the post-education potential which makes up the individual is only one necessary step in vocational guidance. The second important step is determination of the personal preferences and values which characterize the individual, and in guiding him into the educational field leading to the type of industrial activity which will maximize his own lifetime satisfactions and welfare, considering: (1) his productivity in various fields, (2) the price which the consuming society is willing to pay for these various products and (3) the relative value which the individual attaches to money income and what it will purchase, as compared to the nonmoney amenities which attach to different fields of work or production.

Optimum Education With Resource Development as Single End

As mentioned previously, debate in education has been focused on developing humans as resources; to increase the ability of people in producing a greater scientific and industrial product. True, this is desired, but we should not lose sight of the other possible and important ends around which education also can center. In a slave or dictatorial economy only the products specified by some person or group would be relevant in educating people as resources. The impact of education on income and its distribution and on the individual as a human and sovereign consumer would be disregarded. In a democracy we must ask ourselves: To what degree is or should our education be designed to develop people as resources as compared to other ends to which education also can be directed? Are we concerned only in using our educational facilities to produce resources, just as we might produce concrete blocks as resources? If we were to concentrate the same facilities on producing concrete blocks for the industrial purpose in mind, we would do so without flourishes which appeal to art, beauty or direct consumption aspects of the material

resource. Some of the more technical educational institutions, or even technical curricula within less technical institutions, have had as a main or sole focus education for the purpose of resource development only.

If this were the only purpose of education for an agriculturist or engineer, we would try to make him into the best possible concrete block. We would feed him only the courses which mold him into a better concrete block, and take away from him all courses which relate to art, humanities, communications, and others which help him to understand himself and the people around him. We would take away all courses which help him make decisions, which will promote his personal welfare, which help him express his views as a member of society and which increase his ability generally for deriving greater satisfaction from the goods, services, resources and life around him. From the standpoint of education for purposes of resource development only, we thus might produce much better human resources, to serve singularly as concrete blocks in our industrial machine. Historically, education for agriculture, at both high school and college levels, has been prone to lean in this direction with so much technical and laboratory work that the student has had little time for development in the "human" or "consumer" direction.

Undoubtedly, our educational system has not had insufficient attainment in developing human resources. Many people have gone undeveloped as resources because they have not had funds for education, or because given educational resources sometimes may not have been used most effectively. This has been more true in agriculture than in general society. But we can attain greater perfection in furthering this goal, even while we also are furthering other ends to which education can be directed.⁵

Relative Productivity of Investment for Development of Human Resources

Another aspect of education for resource productivity purposes also should be considered. It concerns the relative productivity of, or returns on, capital investment in the human agent as compared to material agents of production such as factories, machines and other forms of capital. Given the empirical evidence available, the returns from capital invested in developing the human resource through education is very high in U.S. society, higher than the average return for capital invested in material resources such as industrial machines and buildings in "more" monopolistic industries. (See Chapters 5 and 12.)

But more important is the fact that our society, composed as it is of private and public sectors functioning partly through the market and partly through government in allocating resources, has had no efficient

⁵ Over an important range, various products or ends which can be produced in the human with education are complementary. To develop awareness as a resource often develops awareness as an individual or consumer. To go to college may provide "fun" as a consumer good as it also produces a better human resource. Greater development as a resource and higher earning power adds to consumption in the household, etc. But we are mainly concerned with other allocations here.

method of allocating scarce capital resources for education into those individuals where it has greatest productivity. At the levels of primary and secondary education, we do and should, particularly because of some of the ends pointed out later, provide some comparability in educational inputs for all individuals. In a purely "productivity and resource returns" context of education, however, we would allocate different quantities, and even kinds, of educational inputs to individuals even at the lower grade levels, not alone in terms of the ability of students to absorb them, but also in terms of the productivity of these inputs relative to the national product. The productivity of variable educational inputs allocated to or used for any one individual would depend upon the fixed collection of capacities (resources) which make up the ability of the individual. This collection of "fixed resources," or basic ability obviously affects the productivity of variable inputs of education which may be invested in the individual.

As an example, we would suppose it to work out in the manner of variables in (5.14). If X is variable capital in education, the marginal productivity of and magnitude of this variable will depend on the "fixed" magnitude of Z , the basic capacity resource of the individual. With a large "basic or fixed" collection of capacities in one individual, we might invest twice as many educational inputs in him, before the marginal productivity of the last input dropped as low as that for a person with less capacity and receiving half as many educational inputs. Too little is known empirically about differentials in productivity of capital in educational form, depending upon the abilities of the individual who is the recipient of education. From the pure resource or productivity pole of education this productivity criterion would be paramount in determining which students receive how much education. It would be the only criterion in a slave or dictatorial society where education might be pursued only for the ends of developing human resources to satisfy preferences of the slave owner or dictator. Even, then, it also has importance in a free society concerned with resource development, economic growth and greater human welfare, but it should not serve as the only gauge for specifying the kinds, quantities and persons for whom investment is made in education.

Some Problems in Allocating Capital

Obtaining an optimum allocation of investment in education is more difficult than obtaining an optimum investment in other forms of capital or resource development in an economy such as that of the United States, for the following reasons. Where undeveloped resources such as mineral deposits, land and factory locations exist, and there is sufficient demand for the product of these resources, private investors can commit capital to their development and realize a return through the pricing system, representing the value which consumers attach to the products of the resources. But this procedure is much less possible for undeveloped human resources which promise high capital returns. Consumers may

reflect a large demand for the services of these undeveloped resources represented by youth who have ability but lack funds for sufficient education and training. Yet the person who has capital cannot invest, through education, in development of resources represented by another individual and conveniently realize a return on his capital. This is true even though capital productivity is high when used for these purposes, higher than when invested in farms or factories. Consequently, he uses his private funds for other forms of capital investment or resource development which have a much lower return. Hence, the opportunities for development of the human resource depend largely upon the funds available to the individual, through his family or through public taxation and investment.

Because of these imperfections in the capital market, particularly in ability of funds to flow into education of persons where capital returns are high, a great disparity in capital returns can exist between (1) that invested in the human factor and that invested in other agents of production, and (2) that representing differential educational investment in different persons. An important need is to improve fiscal and market mechanism so that these disparities can be lessened and improved education can contribute to a greater national product. No major sector stands to gain more from such investment and improvement in educational allocations than people in agriculture. As indicated elsewhere, they have had too little opportunity, or have partaken too lightly, in education.

Yet even within present machinery there is room for improvement in structuring education to meet the productivity or resource criterion, in increasing the national product, while still allowing other ends to have claim in the allocation of educational resources. In the majority, our higher education has been allocated more to those who have a large enough collection of capital assets to allow them to purchase a portion of the total input provided by the public, than to those who have a large enough collection of intellectual assets to cause the same input to have greatest marginal productivity. True, an important quantity of costs of education are publicly subsidized. This is almost entirely true for elementary and secondary education, and opportunity is roughly similar for all children in a given locality—but not among localities such as those of high or low income and rural or urban locations. Even college or university educations are partly subsidized with open opportunity for those who can pass entrance tests to attend tax supported or other public institutions. The opportunity is open, however, only to those who have, or can arrange, the necessary finances for the larger portion of the costs which are not subsidized. From a purely resource or productivity framework of education, there are multitudes of high school graduates who do not have funds for higher education, or who have never been guided in this direction, but whose ability would cause educational inputs to have a greater productivity than for many who now find their way to college. A disproportionate number of the former are to be found on farms where income, spatial and school quality variables serve as barriers to college enrollment.

Public measures such as the National Youth Administration of the 1930's and the postwar G.I. programs helped ease this situation, as also do the National Merit Scholarships and certain other federal aids. However, a mass of human abilities is still not tapped by these programs, and it may become increasingly necessary to apply productivity criteria in determining to whom and by how much shall inputs of higher education be devoted in the future, should extreme international competition in economic and political affairs and the paucity of educational funds continue.

Allocation of Education to Students of Different Abilities

A more stringent application of productivity principles to allocation of education to different persons, depending upon their intellectual ability, generally would not mean that higher level education should be withheld entirely from all persons with low ability. This might be true if the only goal in education were resource development, the production function of education were linear (we would educate only one person then) and funds for education were extremely limited. But where funds are not this limited, productivity criteria, even under the resource development end, would specify allocation of educational facilities to those of less ability, even at the college level.

Certainly educational investment per person is subject to eventual diminishing returns. Suppose that investment in one individual is subject to diminishing returns, and that investment of the first, second, third, fourth and fifth \$1,000 of public funds allocated to education returns, per \$1 of investment, \$20, \$15, \$10, \$5, and \$3 respectively for the person of high ability and \$5, \$4, \$3, \$2 and \$1 respectively for the person of low ability. Then, if society has \$5,000 to invest in education, its return will be greatest if four units of \$1,000 are invested in the first person and one unit of \$1,000 is invested in the second person. Current pressures on education tend to overlook this principle.

Or, if we wanted to retain some simplicity but express our general concept in more refined manner, we could do so as follows. We can do so in consideration of the national outlay for education and specify allocations among regions and communities in a manner to maximize the value of social product from this quantity, in contrast to the current pattern of allocation where funds are in paucity amounts in some states and communities but are in ample quantities in others. Or, we can use the same principle as it applies in allocation of educational resources among individuals. We will follow the latter context, recognizing that the concept and principle applies equally to the former.

We have n individuals whose productivity can be developed through education, with Y_i being the level of resource or product developed in the i th individual and X_i being the quantity of educational inputs or outlay allocated to him. Supposing that a functional relationship $Y_i = f_i(X_i)$ exists, as it certainly does, in developing the product of education in each person, then we have the general condition in (13.1).

$$(13.1) \quad Y_t = \sum_{i=1}^n Y_i = \sum_{i=1}^n f_i(X_i)$$

We wish to maximize Y_t , total educational output (or resource developed in education). It is the sum of that developed in each individual, Y_i , over the n persons. But we must add the restraint represented by

$$\sum_{i=1}^n X_i - X_t = 0$$

where

$$\sum_{i=1}^n X_i$$

is the sum of inputs allocated to the n persons and X_t is the total quantity of inputs or educational resources available. The sum of resources allocated to the n individuals thus cannot exceed X_t , the total amount available.

Substituting the actual production functions $Y_i = f_i(X_i)$ into (13.1) for Y_t , we can take the partial derivatives of Y_t in respect to all X_i and equate them to m as in (13.2) for the n persons.

$$(13.2) \quad \begin{aligned} \frac{\partial Y_1}{\partial X_1} &= m \\ \frac{\partial Y_2}{\partial X_2} &= m \\ &\vdots \\ \frac{\partial Y_i}{\partial X_i} &= m \\ &\vdots \\ \frac{\partial Y_n}{\partial X_n} &= m. \end{aligned}$$

Solving for X_i in each equation, we then would have specified the amount of education to be invested in each person (or community of the nation in the former context). The values of X_i so determined represent the amounts to be allocated to each person (or region) if the marginal productivity of education in individuals is to be equated at level m and the product of education is to be maximized. Recognizing that $Y_i = f_i(X_i)$

varies between individuals depending on their abilities and motivations, the X_i would take on different values for different individuals. They would not be determined to provide *just exactly* four years of high school or four years of college to each of the n individuals. We have oversimplified the problem, particularly in terms of the measurements implied and in summing the Y_i as they relate to time and discounted values. We don't expect the school superintendent and the state or national administrator of education to readily put the principle into empirical application. But we have re-emphasized our point. Thus, in general, the magnitudes $X_1, X_2, \dots, X_i, \dots, X_n$ will not be equal because the productivity of education as input in producing resource or benefit will not be the same for all individuals. From the standpoint of resources and their productivity, the principle is not to provide equal education of each, but to equate marginal productivities of resources allocated to education of the n individuals.

There is nothing magic or unique about 12 years of elementary, secondary and high school and 4 years of college. These are archaic institutions selected with imperfect vision from historic precedent. Institutions in education suppose, for example, that the inputs going into education over time for one individual are technical complements and limitational nature: "Four years of them are necessary and the product is complete exactly." It can be argued, of course, that although students typically obtain a "four-year dosage" at all schools, the input actually differs because high schools, universities and colleges (or different curricula within the same high school or university) are of different quality. But regardless of this situation, education is not discrete in the sense that everyone *must have exactly four years* before it has value. The functional relationship between educational input and its product is continuous, and not discrete. Hence, a better allocation of resources in education might well take place if we educated more students for 2 years, and also more for 5 or 6 years; if we had more junior colleges and technical schools in rural regions. For resource development per se, the application of this allocative principle to students of different abilities, and the structuring of education accordingly, would call for more students receiving differential quantities of college education than we now have.

THE END OF EDUCATION AS A CONSUMPTION GOOD

Education can be viewed from the end of a consumption good or service, or an activity contributing directly to this end. (Again, this end relates especially to higher levels of education.) There are obvious extremes in this regard: the Saturday afternoon football game, the junior prom, the riding course and similar collegian activities appended to educational institutions differ little, if at all, from goods such as beer, potatoes, mountain hiking, doughnuts, the world series and others consumed by the noncollegian. But aside from such unique consumer goods

and services as these, produced only by educational institutions, a college education per se also can take on a consumer characteristic. Students can select a richer mix of resource development relative to consumer development or vice versa, depending on the college or university they attend. The "price" paid for going to some "name" institutions by the wealthy is perhaps mainly for the personal and consumer satisfaction so derived. The pure "goodness" of having gone to college, enjoying the act for itself, is important to some and represents a consumer activity, just as does an afternoon at the art gallery or eating a steak dinner. In some strata of society, one could not say "that in fact he had consumed," unless he possessed a college education. It would be sad, indeed, should college students not enjoy these by-products of the educational plant. But, the main products of public educational plants can hardly be justified as consumer activities. There is no reason why the public should subsidize education as a consumer good, any more than it should subsidize the price of potatoes, beer, fishing or any other consumer goods used directly by the consuming population at large, particularly since the persons who can partake of college as a consumer good ordinarily are not "financially pinched."

This is not to say that education should be withheld as a consumer good. It should be produced for this purpose, just as any other consumer good for which there is a demand by consumers for "enjoyment of the service itself." But for consumption purposes it also should be priced in the market in terms of the demand for and supply of it, as in the case of potatoes and television sets not subsidized by the public. In other words, this type of education (education as a consumption good) best fits the private schools where the full cost of the good can be incorporated into the price the consumers pay for it.

THE END OF EDUCATION FOR DEVELOPING THE INDIVIDUAL AS A CONSUMER AND DECISION MAKER

Another possible end of education relates to the individual as a consumer, but in an entirely different context from that outlined above. Here the purpose is to help the individual better to understand himself and better to unravel his values and wants as a consumer so that he can increase satisfactions and welfare over his lifetime. The purpose also is to allow him to identify his goals and objectives and to provide him with decision-making procedures and methods so that, from the limited resources and income which he possesses over his lifetime, he can raise himself to higher utility or satisfaction levels. But in development of the individual as a consumer, the sovereign unit in a democracy, the responsibility of education transcends a mere understanding of the individual by himself. It requires that he understand himself, in relation to others, and the interactions that take place between the decisions of different individuals and groups. He needs to know, and to be able to apply, choice or decision-

making principles both as an individual and as a member of society if the welfare of the consuming society is to be maximized.

Likely, it is in this area that many of the more technical institutions, including land-grant colleges, have devoted too few resources. One question which might be posed here is: Should education be used to develop the individual only as a resource, or only as a person (consumer)? The answer is quite obvious, and in a different direction. We can increase the individual's welfare by aiding him through education, both on the consumption (human) and on the production (resource) side. Given this fact, curricula should contain courses aimed in both directions. Only if we were concerned with training technicians as pure resources, would we withdraw them from all courses which also develop them as humans and consumers. The optimum pattern of allocation of educational resources between these two important ends still needs further analysis. Both are important in a democracy, a fact that might well be overlooked in a hasty effort to remold the nation's education system. Available evidence, particularly that relating to (1) income elasticities of demand for important groups of products and services and (2) changing patterns of expenditures as incomes progress, would point to a relative need (consumer desire) to have a greater proportion of resources devoted to the "consumer development" aspect of education as national and per capita incomes grow. This may not require an absolute reduction in the "resource development" aspect. Both may be increased as our national income grows. It is not impossible that, as income of our society doubles, we will wish to have more than 12 years of education through high school and more than 4 years for a bachelor's degree in college. Consumers no longer are satisfied with the amount of travel, housing facilities and home furnishings consumed 50 years ago. Why should they be satisfied with the same number of years of elementary, high school and college education?

THE END OF EDUCATION FOR IMPOSING VALUES ON INDIVIDUALS

Education can be used to mold value systems of individuals. Activity related to development of the individual as a consumer or entity with values can tread a slippery path between (1) true education and (2) propaganda or dogma. In the case of the first, the problem is to provide information, knowledge and principles which allow the individual to form his own values, and to understand the consequences of different sets of values and the courses of actions which might attach to them. For educational activity with purposes of propaganda and dogma, the end is the molding or imposing of values on the individual. Certainly higher education in a democracy, even that portion directed at developing the student as an individual, should not have the central end of propanda. Although it is doubtful that some direct effect in shaping values can be entirely

eliminated from educational systems, the emphasis at higher levels of education in a democracy should be, apart from society's interest in developing resources, on the approaches outlined previously for developing the student as a sovereign individual, rather than in imposing values on him.

EDUCATION AS AN END IN AFFECTING INCOME DISTRIBUTION

Education can be used for changing or maintaining the pattern of personal income distribution. Development of a broad system of primary and secondary education quite early in the history of the United States, with relative equality in opportunity of participation by youth, rested importantly on a concept of equity in income distribution. Certainly the pattern of personal income distribution has been, is and can be altered by the types, quantity and quality of education available to different income groups. The poor can be kept in a state of poverty by withholding education from them. The position of the wealthy can be retained by restricting, through price or other rationing schemes, education and closely related information of relevant types for this group. Education can be structured to restrain the number of people entering a field, and hence to enhance the incomes of those who are employed in it.

On a broader basis, the relative differential in per capita incomes between highly developed and underdeveloped nations is partially a function of the amount and availability of education furnished to people by these nations. The same can be said for different regional, occupational and social groups within a nation such as the United States. As mentioned in Chapter 5, we view the lack of social overhead capital for these purposes in the poverty sector of agriculture as the reason for their continued maintenance in this status. If the students of Kentucky mountains had the same educational inputs or services, in course development and in widening the horizons of the individual, as in Palo Alto, California, or Manhattan, Kansas, the local population would soon thin and lessen the poverty problem.

The main resource of the majority of people is their own time and ability. Education can erase income differentials only to the extent that it develops these abilities in people who own few or no capital resources. Over a wide sector of the population, the (1) focus of education on developing the individual as a resource to further the national product or (2) focus of education on improving the opportunity for impoverished groups to obtain more income, are complementary activities. This is true in the sense that there now exist large numbers of persons who have (or whose parents have) low incomes but who have abilities which are not being fully developed by the educational opportunities afforded them. Helping persons to develop these abilities can increase their personal incomes and, at the same time, augment the national product. But the two are not complementary over all ranges of educational resources which might be

directed to them. Some individuals of low income have limited ability, and the productivity of educational investment for them is low in comparison to persons of higher income and ability in whom it also might be invested. Here the two goals of education are competitive and, where educational resources are limited, society must decide (1) over what range the two are complementary and (2) at the point where they become competitive, the portion of resources to be allocated for attainment of either end.

Equality of earning ability and income cannot be guaranteed through education because people possess different amounts of capital and ability. Even if there were no difference in capital, education still could not guarantee equality of earning ability because of differentials in native ability. But even within these constraints, education in the United States is not optimally geared to generation of equal earning ability or opportunity of human resource, differences in capital aside. Data indicate no significant differences in the native abilities of persons born within different income groups. Yet equal opportunity to develop native ability is not generally afforded by the educational facilities and services available to these different groups. Even at the elementary level, equal opportunity to develop talents is not provided. Physical facilities, teaching materials, academic personnel and auxiliary services are generally less adequate in poor as compared to the more wealthy sectors of urban people; they are less adequate in rural areas where income is lower than in urban areas; they are less adequate in farming regions of extremely low income than in the more prosperous agricultural areas.

The contrast is even greater at the level of higher education. Roughly, the ability of the student to claim both public and privately financed education is progressive relative to his, or his parents, income, and retrogressive relative to the extent that his income position can be lifted by education. Two measures have tended, of course, to alter this condition, namely, the extension of college entrance examinations and public and private scholarships. However, these two measures have not been sufficiently intensive to alter the fact that college education is open mainly to those who have the income to buy it. Even if college enrollment were open only to those who might pass highly restrictive qualifying examinations, and even if higher education were provided at no cost to all such persons, country-wide equality of opportunity to improve earning ability through education still would not exist. This is true because education is not equal at the elementary and secondary levels, and students from different occupational groups, income classes and geographic regions would not be provided equal background for passing entrance examinations.

Historically, in democratic nations which have experienced economic growth, the evidence points to a tendency for relatively more of education to be structured towards attainment of greater equality in employment and income opportunities. Perhaps there are nations on Mars so wealthy that they provide college costs free to all citizens. But the

United States, the wealthiest nation on earth, has not been able to muster this quantity of resources for education. Hence, historically it has devoted relatively more to resource development and related ends. Yet we are certainly moving towards a greater proportion allocated to increased equity in income opportunities. We have a long way to go, even at the elementary school levels. However, the evidence does suggest that this end does, and will, receive greater emphasis as national income and wealth progress further.

Fiscal Implication

The income distribution facet of education has somewhat different fiscal implications than do the resource and human development facets. Generally, any sector of society can make decisions in respect to resource and human development aspects of education within its own group and can invest accordingly, given the resource or financial restrictions which it possesses. Yet a low income sector is much less able to push education for the purpose of changing its income position relative to other population segments. For these reasons, elements of an educational program aimed at greater equity in human employment opportunities and the pattern of income distribution depend especially on intersector transfers (equalization) of funds for school finance.

As is well known, the tax base or capital and opportunity to attain scale economies in education by low income and rural communities is not sufficient that they can develop economic opportunities, through education, at the level of wealthier communities. But the practical appeal to wealthier communities, for greater underwriting of education in less favored communities, rests mainly on opportunities for developing unexploited abilities in human resources and for promoting regional or national economic growth. Many wealthy communities or sectors of society may look favorably upon tax funds drawn from their own group for transfer to a school district in a less favored economic or geographic location if the transfer develops more scientists, engineers, etc. from the mass of students in existence. Fortunately, the products of resource development and higher income for persons of economic disadvantage are complementary products under transfer with initial focus on the former. Improvements in the structure of school financing which provide aid to low income communities for these purposes also can promote a more equitable distribution of employment opportunities and income under economic growth.

TYPES OF EDUCATION IN RELATION TO ALLOCATIVE NEEDS AND CHANGE

The analysis to this point has been largely in terms of the major objectives towards which education should or can be oriented under economic growth. The educational ends outlined do, however, have implications in other directions, such as curricula construction. The relevant

curriculum, in the context of this analysis, is not solely a function of the subject-matter field, but depends also on the extent to which scarce educational resources—both public and private funds and the time of the student—are to be allocated to such alternative ends as resource development and human or consumer development, or the extent to which total education inputs for both purposes can be increased, with a growing proportion allocated to one of the other end. However, rather than to go into details of curriculum construction, we turn our attention to problems of allocating educational resources and student time between fundamental and applied courses, as they relate to the development of the production possibilities and flexibility of the individual.

First, of course, it can be questioned whether highly applied education, in the sense of pure memorization of today's facts, qualifies as education. If this were the foundation of education, then the efficient educational method would not include classroom instruction. Rather all relevant facts should be published in a huge encyclopedia, with an efficient index. The user of facts would then have a collection at his command, much greater than his mind could ever absorb from memorization in formal courses. But the utility would be even greater: It would be convenient if education were a discrete phenomenon in the sense that "once it is surrounded, that's it—there isn't more." But science does not come in this finite form. Knowledge must be considered as a continuum whereby (1) technical and economic change is generated and causes incomes to grow accordingly, (2) the relative wants of consumers shift and require a re-direction in the use of people and resources and (3) previous knowledge and skills of people and the material forms of other resources are made obsolete. Thus we can't educate a person "for his life," in 12 or 16 years of school. He can only be given a foundation for learning, upon which he builds further as knowledge changes or increases. At best, he is given a framework for changing his previous knowledge, skills, values and choices.

Farm buildings last over the life of a human. The forms in which they were built became obsolete in the past with technical and price changes. We can destroy a farm building when it becomes obsolete, just as we can discard farm machines which become outdated. We now recognize that it often is better to invest in flexible buildings, whose use is more adaptable, than to build highly inflexible ones. We can't "scrap" an individual as change comes about. But through education we can provide "built-in" flexibility. Even if change in total didn't come about, we would still need flexibility of the individual, since his hope and experience is to start one job and elevate himself or shift to others which require different abilities and concentration. Here, then, we have a problem: What portion of educational resources should be devoted to applied and fundamental training? Generally, it is the fundamental training which provides for flexibility since, while the facts may change, established principles remain the same. Today's facts are soon obsolete. The student who memorizes today's national income, farm real estate values, planting rate, egg

marketings, recommended feed rations or insecticides finds that this knowledge is, because of scientific and economic change, out of date a few years hence, if not before he graduates. Then why have him devote his limited time, for purposes of examination, in committing these facts to memory when the same material could be provided at less cost in the form of an encyclopedia of facts (which might be kept up to date by appropriate inserts)? The highly practical and useful facts could be provided to more people at lower cost by this method than by more complicated classroom paraphernalia.

Flexibility in Abilities and Training

With this qualification, we turn to some propositions about fundamental education as it relates to the production possibilities of the individual over his lifetime. We forward the proposition that broad education in basic principles, in contrast to pure fact memorization in a narrow curriculum, provides for flexibility in production possibilities as the individual ages and the world about him changes.

To place the proposition in sharper focus, we turn to Figure 13.1. We suppose that the potential human resource—the student—starts out with an initial set of possibilities represented by the opportunity curve

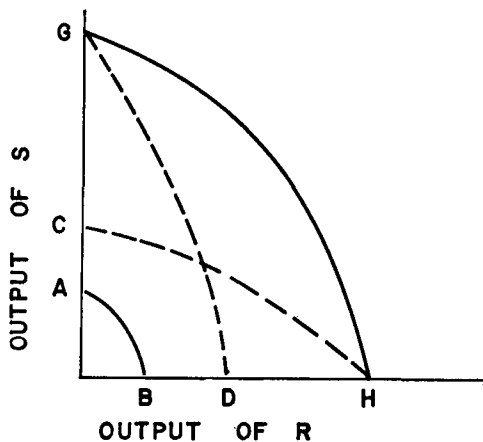


Fig. 13.1. Production Possibilities Under Education.

AB. This curve indicates the output which he can produce per period at the time, in occupations *S* or *R*, if he uses his abilities for either or for various combinations of the two. Opportunity or production-possibility curve *GH* represents his potential, after time progresses and he has received the available amount of education. But it is a long-run production-possibility curve, meaning that this set of opportunities is open only before the skills of the student are committed to specialized training. The

first important function of vocational guidance and counseling is to predict this long-run curve and determine whether its slope is great or small. Unfortunately, guidance infrequently goes this far and, when it does, it too frequently stops with this step. The second important function of guidance should be one in economic forecasting or predicting the relative prices which will exist over a relevant time period for activities R and S when the human resource has been fully developed. The occupational choice, and hence the education which is relevant, then would be prescribed by the slopes of the production possibility and the relevant price for human services in the two occupations, if income were to be maximized in the relevant time period.⁶

Let us say that the appropriate choice for one individual becomes occupation S (technical engineering). Education is completed and the human resource is engaged in producing OG units of the product or service and none of the other. However, the long-run opportunity curve GH no longer exists, since it is only a planning curve representing the possibilities before resources and talents are committed to specialized form for one or more occupations. Opportunities now become defined by short-run production possibility curves such as GD and CH . Now if the individual should decide to shift from specialization S to specialization R in his field (i.e., from technician to production foreman or from engineer to manager), he cannot attain a productivity of OH as suggested by the long-run opportunity curve GB . Instead his output in occupation R will be only OD , if he shifts to it after becoming specialized in S .⁷

If we could predict the future with sufficient certainty, in respect to ability and the relative demand for professional services, we would start the individual on a road of specialization at an early age. The social product and the income to the individual would thus be greatest. But under change, the relative demands, and hence monetary rewards, for the product of different services cannot be predicted with certainty; or the relative values (preferences) which the individual attaches to either occupation or specialization change with time and cannot be predicted with great accuracy at an early age. Hence, there is need to retain flexibility in the opportunity curve up to particular points in time, as the student progresses in education and ability. (Actually, his alternative

⁶ We have employed this model to keep the analysis simple. Actually, the production possibility curve might be converted to dollar units and the work preference of the individual could be represented by his indifference curve: with tangency of the two specifying the appropriate occupational choice. But even more realistically, we should use not a single time span, but a series of future periods with relevant quantities discounted back to the first. However, the simple model allows reflection of most of the relevant data and principles. In education, the production possibility curve also may have slope of decreasing rate; a point which does not alter our analysis in terms of long-run and short-run alternatives and needs in education. For example, see Earl O. Heady, *Economics of Agricultural Production and Resource Use*, Prentice-Hall, New York, 1952, pp. 275-90.

⁷ But the error is just as great if he specializes in occupation R and then shifts over to occupation S ; because, following short-run production possibility curve CH , he then produces only OC of output whereas he could have produced OG had he initially specialized in S .

abilities provide a whole set of short-run production possibility curves, starting from AB and bounded by or tangent to GH in Figure 13.1.)

Given inability to make perfect predictions, we wish to avoid errors and inefficiencies which result from specializing the human resource too early, as having it specialized in S , later shifted over to R and produce only OD (while under ability to predict he would specialize in occupation R and produce OH). To circumscribe errors in prediction and, consequently, inefficient resource uses such as this, flexibility in the production possibilities which represent the individual might better be retained. The optimum would be retention of GH through the individual's life. But while this potential curve exists at an early age, time and resources do not allow the individual to retain this long-run potential as he matures. Hence, broad specialization eventually becomes necessary in his career. However, change requires that he also retain flexibility of degree within his specialization, since scientific discovery and social change will alter the opportunities open to him and the environment which surrounds him.

Flexibility in possibilities is best attained by providing the student with general education and courses in fundamental principle and general science. He is thus better adapted to shift from one realm of specialization to another, if demand and monetary rewards or his preferences change to favor this shift. He is better equipped to change his skills and services as the nature and composition of production changes. He is better able to adapt his work habits, decisions and personal choices as he is confronted with change. We could provide some technical models outlining the possibilities here, but since they are provided elsewhere, we do not do so.⁸

FURTHER IMPLICATIONS IN AGRICULTURE

One needed change in emphasis on education for farm youth is in terms of development of this resource. From the standpoint of resource development per se, we need to make some change in our historic farm youth focus as "an agricultural resource only." This has been, in educational policy specific to agriculture, the main view taken of farm youth: to develop them as an agricultural resource. But with the types of changes outlined previously, stemming particularly from economic growth, we know that patterns of expenditures of consumers change as they grow wealthier. The technical innovations of agriculture and relative prices of capital and labor have caused the former to be substituted for the latter in meeting the nation's food needs.

A declining proportion of youth should be trained directly for agriculture, and educational resources should be shifted accordingly. We need to inventory the number of farm opportunities which will be available in the future and gear youth educational and guidance programs accordingly. An optimum arrangement would exist in identification of youth

⁸ See Heady, *ibid.*

who have the ability, desire and capital to become efficient farmers. They could then be guided into farming, with education in science for agriculture which is more intense and appropriate than at the present. At the same time, we should identify youths who don't have these characteristics but have desires and abilities leading to comparative advantage in other occupations. They should be given vocational guidance accordingly. For those youths who can't or shouldn't become employed in agriculture, there is a relatively greater need than in cities for re-gearing education to needs in human resource development for further economic growth. An important amount of human resources represented by the youth of agriculture has gone undeveloped because schools in rural communities lack facilities for development of talents in science and industry generally.

From the standpoint of equity in income distribution or in economic opportunity, there also is need for improvement of rural schools relative to those of town and city locations. Developments in this direction are taking place through school district consolidation. Still, the fact stands over the nation that youths in many rural communities are handicapped in reaping the premiums from types of employment favored by economic growth because education and vocational training in rural areas focuses so little in these directions.

If education is to be used as a means of bringing about greater equality in economic and employment opportunities, it is best done by funds spread by the state over communities and funds allocated by the nation over states. This should be the case because less wealthy communities and states cannot invest as much in education and its facilities as can more prosperous ones. Here the challenge is to develop the latent capacities of individuals so that they can take advantage of favorable employment opportunities wherever they exist over the nation. The focus of agricultural policy on short-run surplus problems, and of agricultural economic analysis in this same direction, has caused the broader and deeper facet of education in rural areas to go unemphasized. While this may be true because of the long time span involved in increasing income of people from agriculture by this means, time does slip by. After all, more than 30 years have passed (since 1930) since price support and control programs were first initiated, but they are still with us.