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A

Review of the Economic and Social
Impacts of Education at the Micro Level
Upon the Process of Economic Development

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A

Review of the Economic and Social
Impacts of Education at the Micro Level
Upon the Process of Economic Development

Part I

The Literature Review,
Policy Conclusions, and A Research Agenda*

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A. An Introduction and Summary of Policy Conclusions

A.1. The Rising Economic Burden of Educational Expenditures

An effort to examine the impacts of education on economic growth in the context of developing countries is particularly timely. There is an urgent requirement for consideration of how to allocate developmental resources for educational purposes in the face of more critical "needs" in this area than have been identified in the past. There is a great deal of variation among developing countries in terms of the burden of their educational expenditures, but in general, it is both heavy and increasing.¹

Typically, ages 6-14 are defined as ages of compulsory schooling -- if schools are available -- but the relevant ages are 5-11 for many countries and many others have no compulsory education. The 5-14 year age group is 25 percent of the population in developing areas versus 17 percent in developed ones and the projected annual average growth in this age group for 1975 through 1985 is 2.6 percent. However,

¹For data to support this contention and the following points, see Unesco Statistical Yearbook 1974. Paris: Unesco Press, 1975. See, also, Harbison (1974). Where a study is referred to only by author and date, complete bibliographical information may be found in Part II of the project paper, a selected, annotated bibliography on the micro level impacts of education on the process of economic development. Where the date of the study is followed by a place name, that is the source of the data employed in the study to which reference is made.

school enrollments in the past have grown more rapidly than population growth for the school age group. For the years 1965-1972, the average annual increase in total school enrollments in developing areas was 4.7 percent. There is much scope for further growth in enrollments in excess of population increases, since less than 50 percent of the 6-11 year age group is in school, typically, in developing countries and less than 25 percent of the 12-17 year group. These proportionate enrollment figures are substantially below those typical of the developed countries.

Most developing countries devote a substantial portion of GNP to education. Further, educational expenditures in developing countries are a higher percent, typically, of GNP than they were in the now developed countries at a similar stage of development. At a typical 4 percent of GNP, public expenditures on education in developing countries are approximately 20 percent of all public expenditures and perhaps 40 percent or more of developmental public expenditures. The average annual increase in public expenditure on education by developing areas was 10.4 percent for 1965-1972 -- substantially greater than the increases in enrollments or GNP. Continuation of these trends clearly implies a rising burden of educational expenditure.

In the face of this rising burden of educational expenditure, investigation of the ways in which education affects economic development may aid in the formulation of educational resource allocations which are cost-effective in the promotion of economic

development.

A.2. Educational Outputs and Micro Development Impacts -- The Scope of This Survey

This literature review is specifically concerned with that empirical work which illuminates the micro processes by which various types of educational and learning experiences impact economic development. Since those processes may be qualitatively different at different stages of development, the focus is on empirical work conducted in developing countries.

The relationship of education to aggregate measures of economic growth has been carefully examined. The work of Denison is a notable example of this methodology.² However, this approach to examining the impact of education on growth has been severely criticized by Nelson and other authors reflecting, in part, doubts regarding the usefulness of the concept of an aggregate production function.³

In contrast to such macro level studies are micro economic investigations using the human capital theoretical framework.⁴

²Edward F. Denison, Accounting for U.S. Growth 1929-1969, The Brookings Institution, Washington: 1974.

³Richard R. Nelson, "Recent Exercises in Growth Accounting: New Understanding or Dead End?" American Economic Review, Vol. 63, No. 3, June 1973.

⁴Gary S. Becker, Human Capital. New York: Columbia University Press, 1964 and Jacob Mincer "Investment in Human Capital and Personal Income Distribution," Journal of Political Economy, August 1958 were pioneers in the human capital area. For a recent critical survey of the human capital theoretical framework, see Mark Blaug, "The Empirical Status of Human Capital Theory: A Slightly Jaundiced Survey," Journal of Economic Literature, September 1976.

That view is distinguished by the notion that the educational decision maker -- individual or group, private or public -- looks to the future for the justification of present actions. The demand for non-compulsory education is viewed as responsive both to variations in the earnings differentials associated with additional education or different kinds of education. In examining the impact of educational experiences which differ both in form -- institutional education, on-the-job training, learning-by-doing -- and duration, emphasis has been placed upon the earnings and non-pecuniary returns to individuals and the real and pecuniary external effects realized by society.

In the area of educational supply the human capital theoretical framework implies that resources should be allocated so that the marginal social returns on all types of educational investment are equated and so that this common rate of return is equal to that on investment in physical capital or in alternative human capital investments. Empirical rates of return to various educational activities have been calculated for many developed and developing countries.⁵

Considerable variation (across time, space, and educational level) in returns to education have been found. In general, the private rate of return to investment in education exceeds the social rate of return, both rates of return decline with higher levels of education, and the rate of return on educational investment exceeds

⁵For examples see: George Psacharopoulos and Keith Hinchliffe, Returns to Education: An International Comparison, Amsterdam: Elsevier Scientific; an Francisco: Jossey-Bass, 1973, or George Psacharopoulos (1972).

that on investment in physical capital. It is clear from the empirical work that the normative prescription, above, of human capital theory is not satisfied. (This result may reflect the difficulty of including nonpecuniary returns in the rate of return calculations as well as inefficiency of resource allocation.)

There is also some evidence that the less developed a country is, the higher are the returns to educational investment (Psacharopoulos, 1972). This finding indicates that the less developed a country is, the greater are the growth opportunities via educational investment. But, if education is emphasized while its return is lower than that on physical capital, then the economy's capacity to support education may dwindle or fail to grow (Gounder, 1967), in response to inadequate economic growth.⁶ Thus, it is important to identify the mechanisms at the micro level by which economic development is affected, in order to: (1) Formulate cost-effective educational projects, and (2) select among alternative educational projects, as well as other types of development projects. Neither macro-economic assessments of the role of education in economic development nor rate of return analysis for various levels of education establish the micro level mechanisms by which education affects the process of economic development.

Education may be viewed as a process (or several processes) through which educational inputs, e.g., schools, teachers, instructional

⁶The estimates for social returns to physical capital accumulation (Harberger, 1966) and to educational investments (Harberger, 1966; and Chakravarti, 1972) in India underline the importance of this point. Even where an investment in education pays a substantial positive return at official social discount rates, the limitation on developmental resources implies that other more profitable projects may be preferred.

materials, and students with prior existing personal and family background characteristics, are combined and converted into educational outputs. In turn, those educational outputs, e.g., individuals with certain skills, abilities, and attitudes, may have impacts on the process of economic development.

This review is not an attempt to survey the literature on educational production functions, the educational processes through which educational inputs are combined to produce educational outputs.⁷ Rather than attempt the specification of an educational production function, this study adopts, as a working hypothesis, the position that formal, institutional education (general or technical), on-the-job training (general or specific), "learning-by-doing," (media contact and other nonformal modes) are alternative techniques representing different input proportions in a common educational production function. These techniques may produce different final product mixes of productive skills, allocative abilities, attitudes, and sorted classes of individuals with particular character traits. It is likely that these products are joint products from each of the educational processes noted. They may, however, be produced in varying proportions by different processes.

The concern of this survey is with the outputs of educational processes and the impacts which they have on economic development. Surveying those outputs is viewed as a necessary first step in any modeling of educational processes in developing countries, in order

⁷See the following recent reviews of that literature: Alexander and Simmons (1975), Averch (1974), Jamison (1974), Lockheed (1977), and Wells (1976).

to facilitate educational planning to promote development. If different educational techniques produce different output mixes with different impacts on economic development, then the choice of an efficient educational technique will depend upon the desired output mix -- as determined by the expected development impact of that output mix.

The outputs of educational processes may be: (1) cognitive or productive skills, leading to worker effects which increase the worker's output with other inputs in the production process constant; (2) the ability to accumulate and decode information, leading to allocative effects which increase the value of the worker's output through his adjustment, in disequilibrium, of productive input combinations or of output mix, or which increase family well-being through adjustment of family budget allocation (Welch, 1970, and Schultz, 1975); (3) attitudinal change, leading to increases in the productive opportunities of a community by promoting resource mobility, increased productive effort, or acceptance of new technologies; or (4) the screening of participants and identification of prior existing traits, leading to reduced costs of matching workers with their most productive employment (Arrow, 1973, and Taubman, 1973, 1975).

In each case the outputs may be thought of as influencing the growth of per capita income (1) through impacts on agricultural and non-agricultural productivity, (2) through impacts on labor force participation, mobility, and employment, (3) through impacts on the fertility and health of the population. Educational outputs affect

not only the growth of productive capacity and per capita income of a society, but also the distribution of income among the members of that society.

Blaug notes that the schooling model explains the distribution of earnings by the distribution of accumulated human capital and the latter is, in turn, explained by the exogenously determined distribution of abilities and opportunities.⁸ He further observes that these latter variables, reflecting early cognitive ability and parental background effects (socio-economic status) on the demand for schooling, must be endogenous in any inter-generational view of human capital formation.

Such a long run view must be taken in examining the role of education and its outputs on economic development. If the effects of the educational outputs of one generation on its achieved distribution of economic and social status carry on to that achieved by the next generation through the effects of family background variables on the educational achievements of the second generation, then this intergenerational effect must be considered in assessing the development impacts of educational outputs.

⁸Mark Blaug, "The Empirical Status of Human Capital Theory."

A.3. Summary of Policy Conclusions

With respect to attitudinal change:

1. The "external benefits," through attitudinal change, of educational projects should be given very little weight in project selection, in view of the low subjective probability of those benefits materializing.
2. Literacy, whatever the mode of acquisition, may be promoted with some assurance that it will enhance modernity -- but this effect should not be expected to lead necessarily to a favorable impact on economic development.
3. If educational projects are to have a favorable impact on economic development, through attitudinal change, they must be designed to modify economic behavior as well.

With respect to worker and allocative effects:

1. In the interest of promoting economic growth change in the relative emphasis placed on rural versus urban education, in favor of rural education, may be in order -- subject to the qualifications in the other conclusions which follow. This is not necessarily an argument for increasing total resource allocations to education.
2. Rural education projects are likely to promote economic growth only after the transition to modernization of agriculture is underway. So long as traditional techniques dominate agriculture the growth promoting effects of rural education are likely to be negligible.

3. Rural education projects are likely to pay their highest returns when accompanied by: technical progress in and commercialization of agriculture, programs to provide cultivators with access to modern inputs, growing employment opportunities outside of agriculture, and general modernization of rural society.
4. In view of the high private returns to education in the non-agricultural sector and the consequent demands for it, if total resource allocations to education are not to rise in response to number one above, some form of rationing of educational opportunities must be imposed in the nonagricultural sector.
5. Whether total or relative resource allocations to education in a particular country should be changed in order to promote growth depends upon the social returns there to noneducational projects as well as to educational ones.
6. Schooling, extension services, demonstration projects, and nonformal modes of education can all be expected to have positive impacts on labor productivity in agriculture if the appropriate objective conditions (described in number three above) are present.

With respect to employment and labor mobility:

1. Educational policy, alone, is likely to be ineffective in dealing with either of these problems. Misallocations of educational expenditures, which may be associated with

graduate unemployment, may well be efficient allocations at a higher level of macroeconomic efficiency. This should not be construed as an argument against reexamining the level of public subsidy to education, but as stressing of the importance of macroeconomic policy in this regard.

2. Expanding rural education, alone, should be expected to increase rural-urban migration.
3. Clearly rural education prepares migrants for the move to urban areas. This movement is appropriate at some point in the process of economic growth, as employment opportunities grow outside of agriculture and as agricultural productivity rises.

With respect to health and fertility:

1. In analysis of the benefits of educational projects in developing countries, arguments for an impact through reduced fertility should be carefully scrutinized, in view of the uncertain empirical support for such an effect, in developing countries.

With respect to income distribution:

1. Educational programs must be designed to avoid or to overcome early educational disability.
2. The role of socio-economic status as a determinant of school attendance must be reduced.
3. Educational projects which provide learning opportunities early in the individual life cycle are likely to have greater inequality reducing consequences than those projects which provide learning opportunities later in the life cycle.

B. Educational Outputs

B.1. Attitudinal Change

Attitudinal variables are often thought to play an important role in the process of economic development. In some theoretical formulations of the development process they are crucial.⁹ Specific attitudes, labeled achievement motivation, have been identified by some authors as being of particularly great importance in affecting the willingness to innovate.¹⁰

⁹The supply of entrepreneurship is central to Joseph Schumpeter's theory of economic growth as presented in Theory of Economic Development (Harvard Univ. Press, Cambridge, Mass.: 1934) and in Business Cycles (McGraw-Hill Book Co.; New York: 1939). But the supply of entrepreneurship is determined by the social climate which reflects the social, political, and social-psychological atmosphere and certainly includes social attitudes toward innovation. At one point he argued: "It [Capitalism] means a scheme of values, an attitude toward life, a civilization --..." (American Economic Review Papers and Proceedings, Vol. 40, 1950, p. 450).

J.H. Boeke, also developed a theoretical framework in which social attitudes were crucial determinants of economic change (or lack thereof). See: "Western Influence on the Growth of Eastern Population," Economia Internazionale, Vol. 8, No. 2, May 1914; "Three Forms of Disintegration in Dual Societies," Indonesie, Vol. 7, No. 4, April 1954; or Economics and Economic Policy of Dual Societies, (New York: 1954).

Although Gunnar Myrdal (Asian Drama, Pantheon, New York: 1968) does not formulate a general theory of development he assigns a central role to attitudinal variables. The latest work in this vein is by Allen M. Sievers, The Mystical World of Indonesia (Johns Hopkins Press, Baltimore: 1974).

¹⁰See: D.C. McClelland, The Achievement Motive (Appleton-Century-Crofts, Inc., New York: 1953), The Achieving Society (D. Van Nostrand Co., Princeton, N.J.: 1961), and (McClelland, et.al., 1969); as well as E.E. Hagen, On the Theory of Social Change (Dorsey Press, Homewood, Ill.: 1962).

Although there appears in the literature reviewed here frequent comment on the role of education in affecting the attitudes of participants, the evidence is equivocal on what that role is. Modern attitudes, favorable to economic development, may be produced by education, but so too may attitudes supportive of traditional society. It is not clear that educational processes produce attitudes at all, in general. They may simply respond to prior existing ones held by the participants.

Some of the empirical work reviewed here casts doubt on whether modern, development attitudes have much impact on the development process, relative to other educational outputs, e.g., cognitive skills. In only one case is there clear evidence that attitudinal change, in response to educational experience, resulted in favorable development impacts.

It may be argued that educational experiences do much more than to just impart cognitive skills to students. A recognized impact of educational processes is that on the attitudes of participants. Among the attitudes of importance to economic growth are those toward mobility, cultural integration, cooperation, and education itself (Leibenstein, 1966). Gintis (1971-U.S.) finds evidence through regression analysis that non-cognitive personality characteristics have a direct bearing on workers' productivity and earnings. He cites the importance of schooling in developing attitudes-cum-behavior which have a positive impact on earnings -- subordination, discipline, acceptable modes of response and motivation according to external rewards.

Schools are credited with establishment of the dominance of the national language in Tanzania (Odia, 1971), thus promoting cultural integration. Schools may also establish attitudes of obedience, discipline, and docility -- attitudes which may suit graduates only for government employment (Shaath, 1965-Egypt). Beyond literacy, in Latin America, schooling seems to reinforce traditional attitudes and is elitist oriented (LaBelle, 1972 and 1975a).

Thus schools may serve either progressive or conservative purposes, with regard to their effects on attitudes of participants.

Literacy training adult education programs have led to increased awareness of national issues, media exposure, modern oriented community activity, and modernity of life style (Herzog, 1975-Brazil). It is of interest in this regard that Wilder (1971-Laos) could find no clear differences in the attitudes of literates in response to formal or nonformal modes of acquisition of literacy, although his findings regarding the relationship between literacy and modernity support Herzog. Questions about the direction of causation between participation in non-formal education and modernity are raised by the findings of Waisenen (1971). Those villagers who already showed relatively high levels of innovativeness and information seeking increased their knowledge more than did other villagers when exposed to radio and pamphleting.

Khin (1973-Burma) found little impact of radio on the knowledge villagers had of the world outside their locality -- although it did seem to increase their awareness of that world. Sheffield (1974a)

notes that among villagers in Ethiopia education appeared to raise awareness and expectations and to increase dependence on government action -- as distinct from local self-help. It is not clear that a higher level of awareness, even if induced by education, is favorable to the development process.

Schooling has been identified as urban oriented even in rural areas (Singleton, 1973-Philippines and Thailand) along with non-formal education, i.e., radio programming (Khin, 1973-Burma). An important role for schools to play may be to promote attitudes appreciative of rural society where the majority of students must find employment in that sector (Norbye, 1967-Kenya) but urban dominance of the rural school system may make such a policy change unlikely.

Even if practical/vocational skills are emphasized for rural areas, the organization of education may itself affect attitudes with the practical/vocational vs academic distinction dividing the urban and rural sectors of society (Skorov, 1972), or fostering aversion to technical training (Shaath, 1965-Egypt). Apparently this is a continuing problem in Cuba (Paulston-1974) in spite of a conscious policy effort to change student attitudes. It is a problem which, in China, there has been some success in overcoming through mandatory agricultural education programs in rural areas (Lee, J.H., 1974). The Chinese, however, have done far more than to simply change the educational environment. Moos (1973) suggests that the educational environment is only catalytic, anyway, in its impact on attitudinal outcomes of education; thus, a focus on

vocational education may not have much impact on attitudes toward rural employment.

In attacking the "vocational school fallacy" Foster (1966) observes that interviews with rural students in developing countries indicate it is not faulty information or unrealistic vocational aspirations, as a result of formal education, which lead to rural-urban migration but the traditional rural structure. Moock (1973-Kenya) supports that position observing that the attitude among rural people, favoring off-farm wage employment, exists prior to schooling and that the schooling is adjusted to that desire. This situation, if general, would not seem to favor the use of schooling to promote attitudinal change.

Specific educational programs might still be expected to foster developmental attitudes. McClelland (1969) reports success in increasing innovative behavior through achievement motivation training in India. The participants increased risk taking, expanded businesses, and increased employment. Frits (1972) reports similar activity leading to social innovation in Ecuador. Participants became less authoritative, more future oriented, and more cooperative. The impact on social and economic development of those changes in attitude is not established in that case. If schooling is used actively to promote attitudinal change, Bock (1972-Malaysia) warns of the possible loss of legitimacy of the educational system as a consequence of the dissatisfaction resulting when the attitudinal change role of schools is perceived as serving specific groups in society.

Beyond the effects of literacy in promoting modernity it appears that schooling may very well support traditional attitudes, and that where it results in attitudinal changes the consequences may not promote development. In spite of the conventional wisdom crediting education with producing attitudinal change favorable to economic development, there is lacking empirical support indicating what kind of educational experiences produce that result or even relating education beyond literacy with that result. Macridis (1970-Guatemala) casts doubt on even the relative importance of attitudinal variables, finding cognitive skills to be more effective indicators of occupational achievement and community participation than are developmental attitudes. This is not to conclude, of course, that educational programs could not be designed to promote attitudinal change which would in turn promote development. The successful example of such a program, reported by McClelland, establishes that such a possibility exists.

In the absence of an educational project designed specifically to promote development attitudes which are behaviorally oriented, support is lacking for the proposition that education (beyond literacy) produces attitudinal changes which have a favorable impact on economic development.

The equivocal nature of the literature, on educationally induced attitudes and their development impacts, makes it difficult to draw policy conclusions, or to view those conclusions with certainty. However, on the basis of the literature surveyed here certain tentative points can be made:

1. The "external benefits," through attitudinal change, of educational projects should be given very little weight in project selection, in view of the low subjective probability of those benefits materializing.
2. Literacy, whatever the mode of acquisition, may be promoted with some assurance that it will enhance modernity -- but this effect should not be expected to lead necessarily to a favorable impact on economic development.
3. If educational projects are to have a favorable impact on economic development, through attitudinal change, they must be designed to modify economic behavior as well.

B.2. Worker and Allocative Effects

Schultz (1975) argued recently that focusing on the contribution made to economic growth by the productive skills acquired by individual investors in education underestimates the private and social returns to education. He draws upon a distinction made by Welch (1970) between the worker effects and the allocative effects of education as an input in the production function, the sum of which constitutes the returns to education. The worker effect of education permits a worker to accomplish more with fixed amounts of other resource inputs. The allocative effect permits a worker to acquire and understand information about costs and

productivity characteristics of other inputs, resulting in a change in other inputs through selection of appropriate input combinations and allocation of resource inputs efficiently among alternative uses. Schultz suggests that allocative ability may be acquired through education and that its increased supply may be a major force for promoting economic development in developing countries. He views allocative ability as the ability to deal with disequilibria -- yielding both private and social returns to rapid adjustment.¹¹

¹¹ The concept of allocative ability is closely related to that of entrepreneurship and may include the latter concept as a special category. There is a history of concern, in the literature of economic development with augmenting the supply of entrepreneurship.

The literature on entrepreneurship in less developed countries is not clear on the role of education in producing entrepreneurship. The predominance in South-east Asia of its exercise by previously illiterate, peasant, rice farmers from South China, as noted by Victor Purcell (The Chinese in Southeast Asia, Oxford University Press, London: 1965) argues against the role of education in producing that special class of allocative ability. But, Albert O. Hirschman (The Strategy of Economic Development, Yale University Press, New Haven: 1958) in his strategy for development through surplus social overhead capital presumes that entrepreneurship is a learned ability which can be increased through learning by doing, as does Frank Golay (Frank H. Golay, Ralph Anspach, M. Ruth Pfanner, Eliezer B. Ayal, Underdevelopment and Economic Nationalism in Southeast Asia, Cornell University Press, Ithaca: 1969) in his treatment of the development of Filipino entrepreneurship. Robert E. Baldwin (Economic Development and Export Growth: A Study of Northern Rhodesia, 1920-1960, University of California Press, Berkeley: 1966) too, in a similar vein, argues that native entrepreneurship develops as a result of technological spillovers and learning through association with modern organization of production. Without specification of the process, Peter T. Bauer and Basil S. Yamey (The Economics of Underdeveloped Countries, The University of Chicago Press, Chicago: 1957) argue that this ability is developed in the most backward areas in response to the opening of economic opportunity. J.H. Boeke ("Three Forms of Disintegration in Dual Societies," Indonesia, April 1954) however, views this as an innate ability developed over generations and not amenable to policy manipulation. However, Clifford Geertz (Agricultural Involution, The Process of Ecological Change in Indonesia, University of California Press, Berkeley: 1970) argues that Dutch colonial policy taught the Javanese not to exercise it.

With respect to worker and allocative effects, the literature reviewed provides support, on balance, for the role of education in producing these outputs, which affect economic development by raising labor productivity. The evidence from agriculture establishes, more clearly than that from industry, the developmental impacts of these educational outputs. The relative strength and clarity of the support from agriculture is striking, given the emphasis in the theoretical literature, of development economics, on the role of education in preparing workers for industrial employment and similar views expressed by proponents of a manpower requirements approach to educational planning (Cherin, 1970).

B.2.a. Non Agricultural Employment

There is some tendency for earnings differentials to be less sensitive to educational variables the more homogeneous the work situation in which those differentials are measured. This may simply reflect problems of measuring the impact of education, in response to the reduced variation in educational variables, following from the selection of a homogeneous work situation in which all workers meet common educational standards.

Although experience related (age and seniority) variables seem to dominate earnings differentials to the detriment of educational ones in the industrial environment, education raises the value of experience. Further, there is evidence that more educated workers learn

more rapidly than less educated ones -- justifying the selection of the former for additional intra-firm training. Such production related educational experiences clearly raise earnings -- at least in the sense of qualifying for employment. There is clear evidence of a worker effect of education on output -- income -- but little to indicate the presence of an allocative effect of education, in the non-agricultural environment.

Turning to the evidence on educational impacts on development, Simmons (1972^b - Tunisia) finds work experience to be more important than cognitive skills from primary education, in predicting earnings. Similarly, Troster, (1970-Tunisia) does not find the average level of schooling of the work force to be closely related to differences in labor productivity among shoe producing firms. Education level (literacy) does seem to be important to get a high wage job -- thereafter seniority and work experiences are more important in explaining wage differentials. Hoerr's (1973-Malaysia) finding of schooling as an important determinant of incomes, as well as an important determinant of later on-the-job training, reestablishes the role of formal education in determining wage differentials even as his finding, that a year of experience is worth more than a year of schooling in terms of additional income (in later years of employment), supports Troster.

With regard to the interaction of schooling with experience and on-the-job training, the studies of Clark (1970-Singapore) and Shortlidge (1976^a-India) reinforce Hoerr's observation of the

importance of schooling as a determinant of income. Clark finds higher returns to job training programs associated with secondary schooling background. The complementary relationship between schooling and experience is emphasized by Shortlidge. Higher levels of education raise the earnings associated with successive levels of experience, both general and firm specific. There are substantial returns to formal education for the workers in his sample, drawn from a broad range of small scale manufacturing and retail firms.

Hoerr's data from a household sample survey includes a wide range of employment categories and both urban and rural households, in contrast to Troster's industry study of shoe manufacturing workers. Johnson (1972-Nairobi) also uses broad census data, finding hourly earnings strongly influenced by education and increasingly so as its level rises (although not for the self-employed).

Restricting her sample to manufacturing workers Goldfarb (1972-Santiago, Chile) found workers earnings significantly positively associated with experience, age, seniority, and, to a lesser extent, firm size and marital status, but with years of education only for male, white collar workers. LaBelle (1975-Venezuela) in another study restricted to manufacturing workers, found for both manual and salaried workers, monthly earnings were significantly related only to age and to company course work related to production -- but not to other formal and nonformal education variables.

An even more restrictive sample of Nigerian textile firms stratified by labor category indicated years of experience with the firm

to be the strongest determinant of earnings variations across and within firms (Hinchliffe - 1976). Age and years of education were also significantly related to earnings, with primary education easily substituted for by experience. To substitute for secondary education through experience would, however, require a long waiting period. Apparently learning by doing is most effective for relatively low skill levels within each occupational category.¹²

Lukomski (1975-Sao Paulo) found the wages of lathe operators related to firm and work situation variables but not to educational or training ones -- even indirectly through determination of their work situation. Formal education, beyond the minimum required years, was negatively and significantly related to how long it took for a worker to reach the skilled operator level. Mathematics training in formal schooling may account for that result, given the nature of lathe operators work requirements.

Lukomski's findings in regard to the relationship between the length of time required to acquire a complex skill and formal education are corroborated by Soll's (1973-Guadalajara, Mexico) interviews with high level managers of 41 industrial firms. The latter believed educated workers to master complex skills more rapidly than less educated workers. Similarly, Fuller (1976-India) finds that secondary education may improve a worker's ability to learn on the job.

With regard to the productive behavior of managers, Pack's (1974)

¹²In regard to learning by doing and skill levels, Monson (1972-Turks in Germany) reports that the most favorable environment for learning by doing by unskilled workers is a semi-skilled one. Their success is positively affected by work experience but uninfluenced by any type of education.

study of employment and productivity in Kenyan manufacturing is instructive. Labor productivity has been raised through reorganization and simple innovation in a labor intensive context -- in those firms where managers have technical knowledge of the production process, either from formal education or experience -- but not where they lack that knowledge. Formal education, or lack thereof, is not crucial in Pack's observations on industrial innovators' characteristics. However, there is no clear role for education in developing what Harris (1970-Nigeria) has identified, through interviewing 269 industrial entrepreneurs, as specific personality characteristics necessary for entrepreneurship. Those characteristics, a willingness to forego immediate satisfaction for future gains, a degree of thrift, a desire to succeed, and a capacity for hard and continuing work, are closely related to achievement motivation attitudes discussed in the previous section. It does not appear that they are outcomes of educational experiences in the sense that is meant here.

The studies reviewed in this section have used earnings of workers as the measure of their productivity. Education is viewed as producing outputs (worker and allocative effects) which enhance labor productivity and thus raise earnings since in competitive labor and product markets, without externalities, labor is paid the value of its marginal product. The association between education and earnings may be viewed as representing that between education and productivity only under particular specifications regarding the organization of labor and product markets.

Carnoy (1972^a) argues that elites dominate the school systems of developing countries determining the relative returns to different levels of education and extracting monopoly rents. This view need not be inconsistent with the position that through the segmentation of labor markets, made possible by social control, the link between productivity and earnings is broken (Carnoy-1975). If this were the case examination of the effects of education on earnings would reveal nothing about the impact on productivity. In an effort to support his thesis, Carnoy (1975-Latin America) presents some data on the distributions of income and of education, which illustrate that the distributions have moved independently. The data is not well suited to his objective, however, since it fails to account for changes in the distribution of physical wealth, an important determinant of the distribution of income. In spite of Carnoy's failure to establish the applicability of the labor market segmentation model, the weakness of the methodology of correlation of education and earnings in an effort to establish, indirectly, the productivity impacts of education should be clear. An alternative approach to examining the effects of education on productivity is to do so directly, using measures of actual output or ability.

The above studies have measured worker productivity effects of education indirectly through the impact on earnings. Martin Godfrey (Keyna) measures those effects directly through scores on government standardized tests of craft skills. Those participants in fulltime training courses do worse on all grades of tests than nonparticipants. Other variables may need to be controlled for but the result is not

supportive of education's effect on productivity.

None of the evidence presented here negates the labor market segmentation hypothesis - which is itself, certainly, unproven. However, on the basis of the evidence surveyed here certain cautious (because productivity changes as a consequence of education have not been shown directly) general points may be made. The evidence on these points, it must be remembered, is mixed.

There appears to be some tendency for earnings differentials among workers to be less sensitive to education, the more homogeneous are their work situations. This may, however, reflect reduced variation in educational variables as a consequence of the stratification of the statistical sample. The more diverse data samples lent support to the association between education and earnings.

Experience related variables dominate the earnings differentials, not educational variables. This may be merely a reflection of the previously noted statistical problem. Even if it is not, educational variables still play a major role in the determination of earnings. Apparently education may open the door to employment, determine later on-the-job training opportunities -- while raising their value raise the returns to experience, and reduce the costs of other learning experiences -- at least in some cases. These conclusions are consistent with the theory of internal labor markets.¹³

Worker effects of education on labor productivity are well

¹³ Peter Doeringer and Michael Piore, Internal Labor Markets and Manpower Analysis, Heath-Lexington Books, Lexington, Mass.: 1971.

established. Allocative effects are not, although Pack's observations on managers of small firms are suggestive of scope for such effects. There seems to be considerable substitutability among the various educational modes of acquisition of labor skills.¹⁴

B.2.b. Agricultural Employment

in contrast to the survey of the literature on worker and allocative effects in nonagricultural employment, the findings for agricultural employment are unequivocal. There are worker and allocative effects on labor productivity in agriculture. In contrast with the previous section, the presence of allocative effects is better established than that of worker effects. The developmental impacts of allocative effects depend upon the opportunities available for employing those skills. As in the case of nonagricultural employment, there appears to be considerable substitutability among educational experiences in producing worker and allocative effects.

The relationship between technical knowledge and income for farm operators is well established (Bhati, 1973-Malaysia). Formal education is but one way of disseminating that knowledge. Harker (1974-Japan) notes adoption of new agricultural methods is associated with extension education, radio, and TV but the more educated operators

¹⁴ Policy conclusions for this section will be treated after consideration of worker and allocative effects in agricultural employment and together with policy conclusions for that section.

made greater use of institutionalized sources of information. More educated farmers have been found to have better information on costs and to operate more closely to the theoretical minimum cost input combination than those with average levels of education (Fane, 1975-U.S.). Similar conclusions have been reached regarding optimum use of purchased inputs, by more educated farmers.¹⁵ Apparently more educated farmers not only have more knowledge than their less educated counterparts, but also put it to better use in the production process.

Chaudhri's (1968-India) study is the first to make a clear distinction between education's worker and allocative effects on agriculture. He focused attention on a separate allocative effect of education, in the adjustment to change in agriculture. He fails in his attempts to show statistically significant impacts of education on agricultural production in estimates of a gross agricultural revenue production function, at the state level of aggregation. However, he goes on to show that the proportions of nonland, nonlabor inputs, the composition of the bundle of "other inputs," varies with the extent of secondary schooling in the labor force. Schooling appears from his data for 1960-61 to have played an important role in the early adoption of chemical fertilizers.

Welch's (1970-U.S.) micro-production function study of education in agriculture attributes 1/3 of the income differential accruing to college educated farmers to superior allocation of non-educational

¹⁵On this point see Huffman (1972). See, also, W.E. Huffman "Decision Making: The Role of Education," American Journal of Agricultural Economics, Vol. 56, No. 1, Feb. 1974, pp. 85-97.

inputs. He notes that where education is treated as an input to a production function the effects attributed to it may include, not only the increase in physical output with other inputs constant (the marginal product of education), but also the effects of education on the combination of other inputs employed and on the mix of products, if gross revenue or value added measures of output are employed. Several studies similar to that of Welch, viewing education as an input in an agricultural production function, have been undertaken for developing countries. Those studies have found worker or allocative effects of education, or both, exhibiting substantial impacts on agricultural production.

We turn first to those studies which have estimated a particular form of the agricultural production function (Cobb-Douglas). Chaudhri's (1968-India) results have already been examined. Yotopoulos (1967-Greece) finds education to have a significant and substantial, relative to other inputs, impact on the gross value of the output. He does not attempt to separate worker and allocative effects and their impacts. Schooling is the educational variable used. Chaudhri (1974^a-India) also uses schooling as the education variable. Not only are the effects significant at all levels of education on the production function when worker effects were isolated, but allocative effects are found to be associated with secondary schooling of cultivators and laborers, also.

Wu (1971-Taiwan), using schooling as the education variable, estimates several models in an attempt to separate the educational

effects in production for laborers and managers. Regardless of the model used, substantial (and similar in all models) impacts on production are found. Coefficients for the education variables are lower when agricultural region variables are included in the estimation models and are lower for those regions in which rice is the principal crop. Wu argues that the impact of regional variables on the education coefficients reflects a tendency for cultivators to learn from their neighbors, reducing the importance of education. Chaudhri (1974^b-India) also finds a decline in the education coefficients in an explanation of agricultural income when the geographic scope of the sample is reduced. This phenomena may reflect the lesser scope for utilizing allocative abilities, and thus difficulty in identifying their impacts in a more homogeneous region in addition to, or instead of, the spill-over effects of education through nonformal modes, to which Wu refers.¹⁶

A related conclusion, with respect to the scope for exercise of allocative ability, is that drawn by Haller (1972-Colombia). In an effort to evaluate the effects of primary schooling on income he uses an agricultural production function model. His data are drawn from four districts, three dominated by traditional techniques and one beginning to modernize. Only in the latter district was any impact of education on production identified. Even in that district there were no worker effects, only allocative ones in the use of farm inputs.

¹⁶ It is unlikely that a reduction in the variance of education, across rural regions, is itself the explanation of this phenomena -- as it may be in the stratified nonagricultural samples discussed in the previous section. Welch (1970) suggests that the lower coefficients on education in U.S. agricultural production function studies, restricted to smaller areas, may reflect reduced scope for the exercise of allocative ability.

But they result in a social rate of return to the first five years of schooling of 38 percent. Haller concludes that the impact of education on income varies with the type of production activity and modern technology; the extent of schooling's allocative effects depends upon the number and complexity of input alternatives which must be considered and about which decisions must be made.¹⁷

The development impacts of allocative abilities, produced by education, are greater where opportunities to exercise that ability are abundant. The presence of market disequilibrium and allocative inefficiencies characteristic of the transition from a subsistence oriented to a commercially oriented agricultural sector should be favorable to development impacts of education through allocative effects (Huang, 1971-Malaysia).

The studies cited thus far have used only schooling as an educational variable. Other forms of education, however, may produce worker and allocative effects, raising labor productivity in agriculture. Welch (1970-U.S.) found substitutability among different types of education in generating favorable impacts on production. J.H. Lee (1970-Korea) also argues that formal education, on-the-job training, and agricultural extension education all have similar effects on farm operator's incomes. The studies of Hopcraft (1974-Kenya) and Moock

¹⁷ Patrick (1973-Brazil) arrives at conclusions similar to those of Haller. He, however, finds a weaker link between education and agricultural productivity than does Haller, even in the most modern of five districts surveyed.

(1973-Kenya) in addition to providing further evidence, through micro production function analysis, on the impact of schooling on agricultural production, also explore the effects of nonformal education on agricultural production.

The two studies, although both conducted in Kenya, use different data bases and arrive at somewhat different conclusions (regarding the role of formal schooling). Although Hopcraft finds that formal schooling does not increase farm productivity, Moock sees some positive impact on the managerial ability of farm managers. Hopcraft concedes that formal education does increase awareness of modern farming techniques and of information sources. With regard to the production impacts of nonformal educational modes the two studies are consistent.

Both studies find positive impacts of extension services on managerial ability, at least for agent visits to farmers, but Hopcraft notes rapidly declining marginal effects on output for extension agent visits.¹⁸ Both studies also show attendance at field demonstrations to have a greater impact on agricultural output and managerial ability than either extension services or formal education.¹⁹

¹⁸ Hopcraft (1974) also fails to find any effect of extension on the introduction of new farming methods although it raises productivity later once the methods are adopted. Relevant in this regard is Swenson's (1974) observation that the actual activities undertaken by extension agents depend upon the nature of their own formal education. Thus he indicates yet another indirect impact of education on productivity.

¹⁹ Evenson (1974) notes that while extension and schooling are substitutes in their impacts on micro region agricultural productivity, many factors outside of the micro region of cultivation affect that product, too. He emphasizes the importance of micro region agricultural research.

Hopcraft emphasizes the visual nature of the demonstration and motivational characteristics of the attendants in explaining the greater relative effectiveness of demonstrations. Moock gives greater weight in his explanation to the demonstrations being highly structured and narrowly focused. Both of these studies show strong support for the favorable productivity impacts of nonformal education.²⁰

Harker's (1971-Japan) study supports the notion of complementarity between schooling and later nonformal educational experiences in their effects on production.²¹ Farmers with more formal education are more likely to avail themselves of extension services. However, gross farm sales, with farm size and location controlled for, are more closely related to nonformal educational variables than to schooling. Harker (1971-Japan; 1973-Japan and India) does report agricultural innovation, which might be viewed as a special case of allocative effect, to be closely related to literacy and schooling, as well as to nonformal modes of education. He finds the cosmopolitan nature of the community to positively affect the responsiveness of farmers to new methods of farming.

Community characteristics apparently interact in a very complex fashion with family background variables, such as the culture of the cultivator, as well as with the education of the innovator in deter-

²⁰ See Lockheed (1977) for a careful comparison with respect to their output and costs of formal and nonformal modes of education.

²¹ See the discussion of Hoerr's (1973-Malaysia) findings and that of Shortlidge's (1976^a) findings, as well, in the section on nonagricultural impacts of the worker and allocative effects of education.

mining individual innovation. Although income of farmers in Israel has been shown to be responsive to their cultural background (oriental versus occidental, first versus second generation), as well as to their education level, the income superiority of occidentals (especially second generation ones) is eroded in heterogeneous communities, perhaps through the emulation of occidentals by orientals (Sadan, 1976). The phenomena of the spread of innovation through a community is also observed by Thomas (1974-Pakistan) in the spread of literacy, an innovation, throughout a community to people who have not had contact with either formal or nonformal educational programs. The success of agricultural education in the introduction of new farm practices, also is greater where it is unconstrained by traditional community attitudes (Vanzetti, 1974-Zambia). The community dynamics involved in innovation and diffusion appear particularly important in view of Herzog's (1968-Brazil) finding that innovators, who first adopt new methods and serve as demonstration models, are not, in general, opinion leaders whose approval of new methods leads to their widespread adoption.

Inadequate attention to the role of community social dynamics may account for the equivocal nature of the literature reviewed here on the effect of education on innovation. Michael (1972-Brazil) finds no relationship between education and agricultural innovation when motivational factors are considered, however the innovation and motivational variables are so similar as to leave the results suspect. Gafsi (1975-Tunesia) finds little relation between educational level and adoption of high yielding varieties of wheat. But Nesman and Rich

(1975-Guatemala) found nonformal education through radio to lead to agricultural innovation in fertilizer application, relative to a control area. They credit both knowledge and attitudinal change as leading to that result. As previously noted, Chaudhri (1968, 1974^a, 1974^b-India) also found educational variables important in the adoption of the use of chemical fertilizer. He, however, considered no motivational-attitudinal variables. In contrast to the lack of association with attitudinal variables, Sexton (1972-Guatemala), for a rural community, found external contact (military service, travel, mass media), formal education, and economic status strongly associated with an index of innovation -- not in production but in living patterns.

The importance of educational levels in distinguishing innovators in agriculture and community development is supported by Hoath (1966-Thailand) who finds their wealth position to be little different from non-innovators. Harker (1974-Japan and India) and Sadan (1976-Israel) find innovation strongly related to education and exposure variables but both emphasize the importance of community attitudes. The weight of these findings favors a role for education in determining innovation, a type of allocative effect, in agricultural economic and rural community development. But the nature of the interactions with other social variables is not clear.

The relation of educational outputs, worker and allocative effects, to development through impacts on agricultural innovation and labor productivity has been explored largely in terms of the effects on earnings of cultivators. The link between productivity and earnings is less open to question in this context than in the nonagricultural one,

since earnings are from sales in what are usually conceded to be our most competitive markets. Some of the same questions raised previously in this regard, however, could be raised now, as the incomes of agricultural laborers and the effects of education on earnings differentials of agricultural workers are explored.

Not only are agricultural incomes associated with the educational levels of independent operators, but Valdis (1970/71-Chile) found agricultural wages and salaries positively associated with completed years of schooling and seniority in a sample segmented (by tasks and required training of workers) into five occupational categories of agricultural workers. Chaudhri (1974^b-India) also found the wage differentials of agricultural laborers to reflect differences in education levels. That education levels of laborers also entered positively and significantly in the production function confirms the presence of worker-allocative effects from the education of laborers as well as from that of manager-cultivators.

In contrast to the nonagricultural sector, there is unequivocal evidence that education -- schooling, extension and demonstrations -- produces worker and allocative effects which can raise substantially labor productivity in agricultural employment,²² contributing to economic development. These effects are best established for manager-cultivators but appear to be present for laborers as well.

In contrast to the findings for the nonagricultural sector, the presence of allocative effects from education in agriculture is better

²² However, both Wu (1971-Taiwan) and Chaudhri (1974^b-India) observe that there are rapidly decreasing returns to education when employment is confined to agriculture.

established than the presence of worker effects. Allocative effects from education in the agricultural sector depend not only upon the educational process but also upon the environment in which those abilities are to be exercised. They do not manifest themselves in a stage of development dominated by traditional techniques. Their exercise is inhibited by lack of access to modern inputs (Watts, 1974) The exercise of the ability to adjust to disequilibria -- especially to innovate -- appears to be conditioned by the social environment.

The clearer relationship in agriculture than in industry between education and development through worker and allocative (including innovative) effects is impressive given the much greater access to education and higher general levels of education in urban areas. This greater clarity of the relationship between education and economic development in the agricultural sector may reflect lower technical and social constraints on individual response to disequilibria in the agricultural work environment than in the industrial one. Alternatively this result may have been obtained because education continues to be very scarce in rural areas, so that the greater allocative ability associated with having a very small amount of education may pay substantial rewards.

This survey of allocative and worker effects, outputs of educational processes, and their impact on labor productivity in agricultural and nonagricultural employment leads to the following policy conclusions:

1. In the interest of promoting economic growth change in the relative emphasis placed on rural versus urban education,

in favor of rural education, may be in order -- subject to the qualifications in the other conclusions which follow. This is not necessarily an argument for increasing total resource allocations to education.

2. Rural education projects are likely to promote economic growth only after the transition to modernization of agriculture is underway. So long as traditional techniques dominate agriculture the growth promoting effects of rural education are likely to be negligible.
3. Rural education projects are likely to pay their highest returns when accompanied by: technical progress in and commercialization of agriculture, programs to provide cultivators with access to modern inputs, growing employment opportunities outside of agriculture, and general modernization of rural society.
4. In view of the high private returns to education in the non-agricultural sector and the consequent demands for it, if total resource allocations to education are not to rise in response to number one above, some form of rationing of educational opportunities must be imposed in the nonagricultural sector.
5. Whether total or relative resource allocations to education in a particular country should be changed in order to promote growth depends upon the social returns there to noneducational projects as well as to educational ones.

6. Schooling, extension services, demonstration projects, and nonformal modes of education can all be expected to have positive impacts on labor productivity in agriculture if the appropriate objective conditions (described in number three above) are present.

C. Development Impacts

C.1. Employment and Mobility

The problem of graduate unemployment is, in general, one of underemployment of graduates and unemployment of the less educated in response to inadequate employment opportunities, reflecting macroeconomic policy. That unemployment may involve the misallocation of educational resources as well.

Lack of employment opportunities in rural areas may be responsible for the choice, by rural people who are educated, to exercise their allocative ability through migration. The traditional nature of rural society may also spur that decision. Education level, achieved, does have a positive impact on migration.

If students, upon completion of their education, are unable to find employment then the impacts on growth, of educational expenditures for those unemployed graduates, are negative -- since other investment

opportunities were foregone in educating the now unemployed. But, human capital theory assumes the demand for education is as an investment. If so, the question arises: Why is education still sought if the more educated workers face higher levels of unemployment at all ages (Emmerij, 1973-Ceylon; Turnham, 1971)? In a direct test of the primary assumption of human capital theory, Conroy (1970-New Guinea) supports the view that students demand education as an investment good. Their information may be very imperfect, however, with unrealistic views of occupational opportunities, while in school, leading to disillusionment on completion (Smith, 1960-Jamaica). Several studies, Blaug, (1969-India), Shortlidge (1974^a and 1975-India) and Selowsky (1968-Colombia) suggest that educated unemployment is a transient phenomena of new entrants to the labor market, with lower life-time unemployment and higher life-time earnings experienced by the more educated. However, underemployment of graduates is an important outcome of education in at least some developing countries accompanied by unemployment at low levels of educational achievement.

Krueger (1972-Turkey) arriving at much the same conclusions attributes part of the problem to the government's role as monopoly producer -- monopsony buyer of graduates. Edwards and Todaro (1973) construct a model of education and unemployment in which overestimation of private returns to education leads to excess demand for the same (and in an environment where more education is seen as the individual's way out) to cumulative overinvestment in higher education.

The employment problem of graduates is a macro-economic problem

of inadequate opportunities, which is not amenable to solution primarily through educational processes and programs; it may signal the misallocation of educational expenditures. One approach to such an unemployment problem which involves multi-sector programs is described by Blaug (1974-Ethopia) and involves expansion of total employment opportunities. Where underemployment of graduates is a common phenomena, overinvestment in education may be extant -- perhaps accompanied by substantial subsidies to higher education as in Turkey. Although the phenomena of educated unemployment may be a serious one and certainly is exacerbated by inappropriate educational programs, its root causes lie outside of the scope of this review. That is true, also, of two related phenomena: the migration across international boundaries of educated workers, permanently -- the "brain drain" -- or temporarily, as guest workers. Although concern might be expressed about the loss of educational investments, as a consequence of migration, policy toward migration is more directly involved than is educational policy.

A related phenomena which must be addressed here is the migration from rural to urban areas, especially of young males. T.P. Schultz (1971-Colombia) finds male, rural to urban migration (in the presence of economic, demographic, and political variables) to be strongly, positively associated with schooling in the 10 - 14 year age bracket but negatively associated with schooling in the 5 - 9 year age bracket. Availability of rural schools postpones migration of school age children and their families, but increases that of more educated older youth 10 - 14. D. Adams (1968/1969), also concerned with migration

in Colombia, emphasizes the opportunity to obtain more education as a factor motivating migration in addition to the attracting force of opportunities for employment. This view of the effect of education on employment is supported by N. Adams' (1969) results for Jamaica which account for migration on the basis of wage differentials and distance, with a smaller positive association with educational level in the destination area. But, since urban areas in general have higher educational levels than rural ones, that result is questionable. And E.H. Godfrey's (1973-Ghana) inclusion of educational change variables in an equation for Ghanaian migration does not improve the explanatory power, casting doubt on the role in migration of the desire to improve education opportunities.

Levy and Wadyek (1973-Venezuela) argue that the stock of past migrants is an important determinant of current flows and their statistical work supports that hypothesis, as well as indicating the significance and positive impact of the literacy of the migrant on his migration. Essang (1974-Nigeria) conducts a similar study on the basis of interviews, finding schooling along with other demographic and economic variables to be a statistically significant, and positively related determinant of migration.

Bowles' (1970-U.S.) work suggests the explanation of that relationship. He found the change in the migration rate with respect to the earnings differential to be a positive function of years of schooling. This result indicates an allocative effect of education, part of the individual returns to education are a return to adapting to economic

disequilibria.

It appears that rural education increases the willingness and ability to respond to differential economic opportunity. Certainly it may also prepare a participant for further investment in -- or possibly whet the appetite for further consumption of -- education. It also appears that additional rural education, unaccompanied by additional opportunities for productive employment and expansion of income, is likely to lead to greater, not less rural-urban migration.

Singleton (1974-Thailand and Philippines) having established the urban dominance of rural school systems, argues that if rural schools are an extension of the urban sector, then students will receive skills which are of little value in the rural sector, but which prepare them for urban employment and thus encourage them to migrate to urban areas. However, the literature reviewed in connection with schooling in agricultural production functions suggests that even formal nonvocational training imparts a skill of considerable value in agriculture -- allocative ability.

Why, one might ask, do recipients of this allocative ability exercise it through migration to urban areas rather than in agriculture? Foster (1966) argues it is not faulty information nor unrealistic vocational aspirations, as a consequence of formal education, which lead to migration from rural areas but the social constraints of the traditional rural structure. Mook (1973-Kenya) provides partial support to Foster by observing that the desire to migrate precedes education and that the schools adjust their programs to accommodate

that desire. Anderson (1974-Kenya) reviewing the experience of special educational programs designed to overcome the disdain of rural youth for vocationally oriented agricultural programs, notes the persistence of the urban orientation of youth, in spite of major efforts to dissuade them. Nowachek (1966-Rhodesia) observes that some aspects of traditional society itself reinforce the urban bound mobility of men, in particular the custom of some traditional societies that men do not do agricultural work.

In contrast to sociological explanations of the desire to migrate, Watts (1974-Kenya and Uganda) cites the importance of providing graduates with access to some land and capital as well as markets for their products if graduates of even vocationally oriented rural schools are to be employed in agriculture, rather than to migrate. Honey (1975-Colombia) emphasizes, also, the importance of the absence of rural employment opportunities, along with the structure of the labor market, in limiting the opportunities of even educated rural youth.

One development impact associated with education is the creation of a substantial number of educated unemployed. It appears, however, that education enhances the employment and earnings prospects of graduates, maintaining a high demand for education, especially in the face of public subsidy to education. Education determines who will be unemployed -- in general the less educated will be. Graduate unemployment is generally on initial entry to the labor force. Inadequate employment opportunities, resulting in underemployment of the educated and unemployment of the less educated, reflect both macroeconomic policies and the misallocation of social investments.

Rural to urban migration is positively associated with completed education, but may be delayed by the availability of rural education opportunities. Migration in response to differential opportunity is an exercise of allocative ability, an output of an educational process. The choice to migrate, rather than to exercise that ability in agriculture, may reflect inadequate employment opportunities or an aversion to the traditional structure of rural society. It is not clear, in the literature, what the relative roles of sociological and economic variables are in motivating migration.

A few policy conclusions can be drawn regarding educational outputs and developmental impacts on employment and labor mobility:

1. Educational policy, alone, is likely to be ineffective in dealing with either of these problems. Misallocations of educational expenditures, which may be associated with graduate unemployment, may well be efficient allocations at a higher level of macroeconomic efficiency. This should not be construed as an argument against reexamining the level of public subsidy to education, but as stressing of the importance of macroeconomic policy in this regard.
2. Expanding rural education, alone, should be expected to increase rural-urban migration.
3. Clearly rural education prepares migrants for the move to urban areas. This movement is appropriate at some point in the process of economic growth, as employment opportunities grow outside of agriculture and as agricultural productivity rises.

4. Rural education programs are likely to cause the minimum of economic dislocation through migratory effects if they are accompanied by: growing employment opportunities outside of agriculture, general modernization of rural society, and rising agricultural productivity; in this regard expansion of nonagricultural, rural employment opportunities are especially beneficial.
5. Rural education projects, accompanied by complementary programs (as noted previously) and undertaken once the transition to modern agriculture is already underway, will contribute to raising agricultural productivity and meeting the conditions in point four, above.

C.2. Health and Fertility

The evidence reviewed here is inadequate to establish any impact of general education on hygiene. Nor is it clear that the conventional view, that there is a negative impact of at least female education on fertility, is correct. Certainly the mechanisms relating general education to family health and fertility practices are not well understood.

Some weak links between hygiene and general education are established by Sexton (1972-Guatemala). He finds formal and non-formal educational experiences as well as economic status (less strongly)

significantly related to an innovational index which includes such variables as having running water in the home, an outdoor toilet, or a cement floor. It is not clear whether these are the variables in the index which account for the association with education. Also, Herzog (1975-Brazil) found, among participants in a literacy program for illiterates of low socio-economic class, an association between education and sanitary garbage disposal.

This evidence is clearly not sufficient to establish any impact of general education on hygiene. We should expect a positive relationship between education and health through income and socio-economic status but the direction of causation may easily run both ways. Indeed, the impact of health on the learning process is a matter of consensus (Selowsky-1976).

The negative impact of educational attainment on completed fertility is generally agreed upon and is supported by a large number of empirical studies. The focus of this treatment of the literature will be on studies using micro economic data and allowing for the influence of variables such as urban domicile, as well as multiple education categories, through multiple regression analysis. This technique is more likely to illuminate the mechanisms by which educational experiences reduce completed fertility, than is the use of macro data or cross tabulation techniques for manipulating data.

Although macro data frequently show a negative impact of education on fertility, a few examples will suffice to show that macro studies may reveal mixed results on that relationship. Since child rearing is

time intensive, it is thought that the cost of child rearing rises with the educational level of the parents, through the education-income connection. The rising opportunity cost of child rearing is expected to lead to lower completed fertility associated with higher levels of education. Farooq (1974-Turkey) confirms such an empirical relationship using census data aggregated at the province level. However, the result is attributed to changing attitudes and tastes rather than to the role of opportunity cost.

Maverer, Ratapzah, and Schultz (1973-Thailand) also use census data, 1960, aggregated by 71 administrative units, and analyzed through multiple regression techniques. Men's schooling is associated with greater child bearing by female age 30, while women's schooling is linked to higher fertility in the 25-29 cohort, but to lower fertility for older cohorts. Both impacts of education on fertility of older women are substantial. These results may be explained in part by some tendency for education to reduce marriage, as well as to delay it. But, several significant direct relationships of fertility with education are found. In a similar study for Taiwan T.P. Schultz (1973) finds the schooling coefficient to be consistently negative for males and positive for females.

When micro data is used the results regarding the relationships between fertility and education are mixed also. Stykos (1968-Latin America), for example, finds education to have little impact on fertility. Several studies show a curvilinear relationship between these variables, with fertility falling at higher educational levels and then rising

again at still higher ones (Carleton, 1965-Puerto Rico; Khalifa, 1973-Egypt; Palmore, 1969-Malaysia; and Srinivasen, 1967-India).

Micro studies using multiple regression analysis are the kind most likely to illuminate the mechanisms by which educational experiences reduce completed fertility. Ben Porath (1973-Israel) using an urban sample found a statistically significant and negative relationship between female education level and fertility. The relationship for males, however, was not statistically significant. Kogurt (Brazil) using national data found both female and male education levels to be inversely related to completed fertility, and significantly so.²³ Both of these studies support the consensus view.

Failing to support it is the study of Harmon (1970-Philippines) which finds a negative impact of female education on family size but a statistically insignificant one. This may be due to the inclusion of other variables which are associated with education. Harmon's study included female work status and length of marriage, variables commonly associated with income as well as migration (discussed above) as explanatory variables along with female education. Education's impact on fertility may not be fully represented. Knowles and Anker (Kenya) in a predominately rural sample also obtained a positive -- but statistically insignificant -- impact of female education on fertility.²⁴

²³E.L. Kogurt, "The Economic Analysis of Fertility: A Study of Brazil," ILO Population and Employment Working Paper No. 7, Sept. 1974.

²⁴J.C. Knowles and R. Anker, "Economic Determinants of Demographic Behavior in Kenya," ILO Population and Employment Working Paper No. 28, Dec. 1975.

Iutaka, Beck, and Varnes (1971--Brazil) examining the effects of migration on fertility in urban centers found a positive and statistically significant impact of educational level on family size. This result is, of course, contrary to the conventional expectations. The data sample was composed of native and migrant urban males with eight other socio-economic explanatory variables (age, age at marriage, size of city, migratory status, color, social status, father-in-law's social status, and father's social status) of fertility included, along with education. Only father's social status was not significant. The results on the education variable became insignificant when stratified by migratory status.

If the conventional view of the negative impact of education on fertility is correct -- and it is not clear that it is, even for female education -- certainly the mechanisms relating general education to family planning are not well understood.

It is difficult, certainly, to draw policy conclusions regarding general education and its impacts on family health and fertility practices. One comment in this regard may be ventured -- in analysis of the benefits of educational projects in developing countries, arguments for an impact through reduced fertility should be carefully scrutinized, in view of the uncertain empirical support for such an effect, in developing countries.

C.3. Income Distribution

The impact of education on income distribution is the culmination of all the other development impacts of educational outputs and of their distributions as well as being a consequence of how the educational system is financed. The cumulative nature of investment in education and the role of socio economic background as a determinant of education both lead to the conclusion that an educational handicap received early in life will grow over time.

The public finance of educational programs may either promote equality of income distribution or reinforce inequality. Jallade (1973) finds in Colombia that the public finance of education serves to redistribute income from the rich to the poor but that result is stronger in urban areas. Lower income groups are found to get a higher proportion of their tax payments returned in educational benefits, than do higher income groups, at least for primary education. Redistribution is toward the middle income groups for secondary education. In contrast, Fields (1972-Kenya) finds (for 1968-71) the educational system to be financed by regressive taxation with heavy subsidization of higher education -- the principal beneficiaries of which are the higher income groups. Harbison (1974) suggests that Jallade's conclusions should not be thought typical of developing countries since Colombia does not subsidize education as extensively as do many developing countries.

Looking only at the distribution of the benefits of education,

and certainly it may be appropriate to analyze government expenditures and receipts separately, Bhagwati (1973) argues that in India and Ceylon the lowest income groups have disproportionately less access to education at each successively higher level -- and thus to the income associated with education. Bhagwati's view, of the educational system's impact on income distribution in India, is supported by Sundaram (1973), in the contention that the poor face relatively greater indebtedness and higher costs of borrowing reducing their access to primary education. Further, Bhagwati and Sundaram find absolutely higher state subsidies to the education of higher income groups than to that of poor ones -- due to educational participation rates being linked to income at all levels. Also children of more prosperous families get better paying jobs, faster, for qualifications equivalent to those of the children of less prosperous families (Blaug, Layard, and Woodhall, 1969). Shortlidge (1976-India) finds child school attendance to be strongly affected by family ability to purchase labor saving equipment and by the amount of land owned by the family, supporting Bhagwati's position.

In regard to the role of family background in determining school attendance, studies from both developed and developing countries indicate that pre-school cognitive ability is a significant determinant of the amount of schooling which an individual completes but socio-economic background is the main determinant (LaBelle, 1975^a; Alexander and Simmons, 1975).

Socio-economic background acts as a determinant of educational

achievement which is itself a determinant of socio-economic status and thus of the educational achievement of the next generation.

The role of socioeconomic background in the determination of the distribution of educational outputs may be even greater than the above observations suggest. Simmons (1972-Tunisia) reports also that family background is a significant determinant of the loss of cognitive skills after leaving school. Further, socio-economic background has been found to be a significant determinant of early cognitive ability in a cross-cultural study of four year olds stratified by socio-economic status -- although cultural background had no effect on ability (Brooks, 1976-New Zealand). Therefore, socio-economic background plays a major role in determining preschool ability to benefit from educational experience, in determining who has access to that experience, and in determining how much is forgotten after the educational experience.

The distribution of educational achievement plays a major role in determining the distribution of earnings. Studies by Weisbrod (1968-U.S.) and Hause (1971-U.S.) suggest that the role of ability, relative to that of schooling, grows over the life cycle in determining earnings. Although Hansen (1970-U.S.) argues schooling is relatively unimportant when included with job training, experience, ability, and family background, Griliches (1972-U.S.) and Hause (1972-U.S.) find the relationship to be a complementary one.

Socio-economic background as an important determinant of precognitive ability, of access to schooling, and of retention of schooling acquired

cognitive ability is also a major determinant of achieved education. It is clear that through the effects of education on income, socio-economic status of a family will tend to be self-perpetuating.

Hoerr's (1973-Malaysia) finding that later on-the-job educational opportunities depend upon previous schooling prompts him to observe that if ability and motivation are not perfectly correlated with schooling they do not overcome early educational deprivation. A.V. Adams (U.S.) provides further support for this point, noting that investment in human capital over the life cycle is highly dependent upon early investment and that any early educational and training disadvantages are likely to continue throughout the life cycle.²⁵

In view of the possibility that education may serve to reinforce socio-economic inequality, several authors (Alexander and Simmons, 1975; Pinera and Selowsky, 1976; and Selowsky, 1976) argue the importance of providing equality of access to education in developing countries. It is noted as well (Pinera and Selowsky) that selection of students on the basis of ability could be expected to raise income as well as to overcome the self-reinforcing distribution of socio-economic status. Selowsky (1976) argues, as well, the importance of encouraging early school attendance since children from low income families frequently enter school much later than those from higher income families. However, Carnoy (1975-Latin America) argues from

²⁵ Arvil V. Adams, "The Stock of Human Capital and Differences in Post School Formal Occupational Training for Middle-Age Men," Southern Economic Journal (forthcoming).

the position of labor market segmentation theory that redistribution of education cannot be expected to redistribute income and shows that historically in several cases the distributions of income and of education have moved independently, in Latin America.

Adelman (1971) notes that equality of access to middle level and university education is, across countries, the socio-economic variable most closely associated with differences in income distribution. Adelman (1975) also observes that where policies of growth accompanied by improvements for the poor have been successful they have involved first, radical asset redistribution; second, massive accumulation of human capital, it being distributed more equally; and third, rapid human resource intensive growth.

In a macro sense Adelman's comments set the stage for understanding the importance of education with regard to income distribution in the development process. They do not explicate the mechanisms by which education impacts the income distribution. There are, of course, alternative theories of the determination of earnings, of the neo-classical, human capital type or of segmented labor markets. The latter, as yet, can not claim nearly the degree of empirical support as the former. The former has not come to grips with the intergenerational mechanism of distribution.

Bhagwati and Jallade have examined the impact of the way in which education is financed. That is certainly part of the effect of education on income distribution, but only part. Understanding the impact of education on income distribution must await a better understanding than we now have of the other routes through which education

affects development.

What we do know is that socio-economic background is an important determinant of early ability and thus directly and indirectly of educational attainment. We know further that an educational handicap received early in life will grow over time.

If inequality of access to education is not to reinforce income inequality, a few policy conclusions are, perhaps, obvious:

1. Educational programs must be designed to avoid or to overcome early educational disadvantage.
2. The role of socio-economic status as a determinant of school attendance must be reduced.
3. Educational projects which provide learning opportunities early in the individual life cycle are likely to have greater inequality reducing consequences than those projects which provide learning opportunities later in the life cycle.

D. Research Agenda

The following topics of research are proposed in areas where existing literature, as revealed by this survey, is inadequate to allow firm conclusions to be drawn regarding the micro relationships in developing countries between education and economic development impacts. In order to design educational programs to promote economic

development in a cost-effective manner:

1. There is a need to identify the kinds of learning experiences which produce attitudinal changes favorable to the acceptance of economic innovation by others and which are associated (if they are) with innovation in economic behavior by the participant.
2. There is a need to establish directly, rather than through earnings, the link between educational experiences and increased productivity. And, further, to identify the kinds of learning experiences, and substitutability among them which result in worker and allocative effects -- especially in nonagricultural employment.
3. There is a need to identify the scope for individual versus group response in adjustment to disequilibrium both in agriculture and in industry. Particular attention needs to be given to the roles of technological, socio-psychological, and political-economic forces which impinge on and condition the adjustment process. There is a need, as well, to know which learning experiences are favorable to individual versus group response to disequilibrium.
4. There is a need to identify the characteristics of rural community organization and social interaction which make communities tolerant of individual innovation and receptive to its spread. Further, ways in which educational programs can sculpt those characteristics need to be identified.

5. There is a need to identify those factors which motivate rural recipients (through education) of allocative ability to exercise it through urban migration. Further, there is a need to identify what role (if any) educational experiences play in that motivation.
6. There is a need to identify those mechanisms relating general education and completed fertility. The whole nexus of inter-relationships among educational investments, family formation, child spacing, completed fertility, migration, labor force participation, and occupational mobility needs to be explored in a development context if educational programs are to be designed to influence population growth. It is likely that longitudinal data will be necessary to discern the interrelationships involved. In that regard there is a need to establish a longitudinal data base drawn from developing countries.
7. There is a need to identify alternative educational production -- delivery systems and the mix of allocative effects, worker effects, attitudinal change, and innovative effects which each produces -- as well as to identify the combinations of inputs necessary for each process, in order to select cost effective educational delivery systems. Of particular concern in this regard is the identification of educational processes which facilitate reaching persons with early educational disabilities.

8. There is a need to identify the relative impacts and social values of various educational outputs at different stages of the development process. Furthermore identification of appropriate educational production processes to produce the mix of outputs desired is needed. The focus of these efforts should be on "value-added" in education.

A

**Review of the Economic and Social
Impacts of Education at the Micro Level
Upon the Process of Economic Development**

Part II

A Selected, Annotated Bibliography

Rex Fuller

W. Dayle Nattress

Stephen Reynolds

The authors are greatly indebted to Don Riechel for conducting the computerized literature search and for computerization and manipulation of the bibliographic file.

The following annotated bibliography is the result of a literature search that was specifically concerned with that empirical work which illuminates the micro processes by which various types of educational and learning experiences impact economic development. Since these processes may be qualitatively different at different stages of development, the focus is on empirical work conducted in developing countries.

A computerized literature search was conducted under an eclectic selection process -- from the disciplines of economics, psychology, and sociology -- over 700 hundred articles, books, dissertations, and monographs were reviewed, 450 abstracted, and 191 chosen for inclusion in the bibliography. Since the review was specifically concerned with empirical work, each annotation contains not only the principle conclusions of the author's analysis, but also a discussion of the methodology by which these conclusions were derived.

Each annotation was classified with respect to twenty-eight aspects of the relationship between education and the economic development process. The numbers in the upper right margin of the annotations indicate this classification (keywords). These classifications are also aggregated into seven supra-classifications in order to facilitate an identification of the annotations under more broadly defined areas. For example, an annotation pertaining to allocative effects, attitudinal change, entrepreneurial ability, and adjustment to disequilibrium is classified under "Allocative Effects and Entrepreneurship."

LIST OF KEYWORDS FOR ANNOTATION OF BIBLIOGRAPHICAL REFERENCES

<u>Keyword Number</u>	<u>Description</u>
01	On-the-job Training: Firm Specific
02	On-the-job Training: General
03	Vocational-technical Training
04	General Training
05	Learning by Doing
06	Formal Education: General
07	Non-formal Education: General
11	Worker Effects
12	Allocative Effects
13	Attitudinal Change
14	Sorted Population
15	Productivity Effects
16	Entrepreneurial Ability
17	Adjustment to Disequilibrium
18	Earnings
21	Cognitive Ability
22	Achievement Motivation
23	Family Characteristics
24	Personality Characteristics
30	Labor Force Participation
31	Consumption Effects
32	Income Distribution
33	Population Growth
34	Hygiene
35	Labor Mobility
36	Dualism
40	Screening Hypothesis
41	Instructional Technology

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WORKER EFFECTS AND EARNINGS

(Keywords #11, 14, 15, 18, 40)

Adams, A.V.		Harbison	1970	Pinera	1976
Adams, N.	1969	Harbison	1967	Psacharopoulos	1972
Arrow, K.	1973	Harker	1971	Rogers	1959
Barka	1973	Harker	1974	Sadan	1976
Bhagwati	1973	Harmon	1970	Sandoval	1973
Bhati	1973	Hause	1971	Sanyal	1976
Blaug	1969	Hause	1972	Schultz, T.P.	1968
Brooks	1976	Hershoqitz	1971	Schultz, T.W.	1975
Buripakdi	1971	Herzog	1968	Schultz, T.W.	1974
Carnoy	1975	Hinchliffe	1976	Selowsky	1973
Carnoy	1972 ^a	Hoerr	1973	Selowsky	1968
Carnoy	1972 ^b	Hoerr	1972	Shortlidge	1976
Chakravarti	1972	Hopcraft	1974	Shortlidge	1975
Chaudhri	1974 ^a	I.L.O.	1964	Shortlidge	1974
Chaudhri	1974 ^b	Jamison	—	Simmons	1972 ^b
Clark	1970	Johnson	1972	Slighton	1968 ^b
Coombs	1972	Kiros	1975	Sundaram	1973
Duncan	1968	Klevmarken	1976	Swenson	1974
Edwards	1972	Krueger	1972	Taubman	1975
Edwards	1973	Kuznets	1973	Taubman	1973
Evenson	1974	LaBelle	1975 ^a	Trosper	1970
Fields	1972	LaBelle	1975 ^b	Turnham	1971
Fields	1973	Lee, J.	1970	Valdis	1970/71
Gafsi	1975	Macridis	1970	Vanzetti	1974
Gintis	1971	Martin	1960	Waisenen	1971
Godfrey, M.	—	Michael	1972	Weisbrod	1968
Grilicher	1969	Mincer	1975	Welch	1966
Grilicher	1976	Nesman	1975	Wu	1971
Grilicher	1972	Norbye	1967		
Haller	1972	Patrick	1973		
Hansen	1970	Peaslee	1969		

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ALLOCATIVE EFFECTS AND ENTREPRENEURSHIP

(Keywords #12, 13, 16, 17)

Bell	1976	Levy	1973
Blaug	1973	Macridis	1970
Blaug	1974	Martin	1960
Bock	1972	McClelland	1969
Carnoy	1967	Michael	1972
Chaudhri	1968	Moock	1973
Chaudhri	1974 ^a	Moos	1973
Emmerij	1973	Nelson	1966
Essang	1974	Norbye	1967
Fane	1975	Odia	1971
Fields	1974	Pack	1974
Frits	1975	Peaslee	1969
Gafsi	1975	Rogers	1959
Gounder	1967	Sadan	1976
Haller	1972	Sandoval	1973
Harker	1971	Schultz, T.W.	1975
Harris	1970	Schultz, T.W.	1974
Herzog	1975	Selowsky	1968
Hoath	1966	Shaath	1965
Huang	1971	Sheffield	1974
Huffman	1972	Singh	1975
Khin	1973	Smith	1960
Klevmarken	1976	Trosper	1970
Kuznets	1973	Watts	1974
Lee, H.P.	1974	Welch	1970
Lee, J.E.	1960	Wu	1971
Leibenstein	1966	Yotopoulos	1967

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PARTICIPANT BACKGROUND VARIABLES

Keywords #21, 23, 24)

Adelman,	1971	Moss	1973
Arrow	1973	Morgenstern	1973
Averch	1974	Nowacek	1966
Bhagwati	1973	Piñera	1976
Brooks	1976	Sadan	1976
Duncan	1968	Schilfilbein	1970
Epstein	1972	Selowsky	1976
Gintis	1971	Sexton	1972
Godfrey, M.	--	Shortlidge	1976
Goldfarb	1972	Shortlidge	1975
Griliches	1976	Shortlidge	1974
Griliches	1972	Simmons	1972 ^a
Hansen	1970	Sundaram	1973
Harris	1970	Taubman	1973
Hause	1972	Trosper	1970
Hause	1971	Vanzetti	1974
Herzog	1968	Weisbrod	1968
Hoerr	1973	Wilder	1971
Honey	1975	Wolf	1966
Kiros	1975		
LaBelle	1975 ^a		
Levy	1973		
Lukomski	1975		
Macridis	1970		
Maverer	1973		
Michael	1972		

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ATTITUDINAL CHANGE

(Keywords #13,22)

Alexander	1975
Averch	1974
Bock	1972
Epstein	1972
Frits	1975
Harris	1970
Hoerr	1973
Khin	1973
Kiros	1975
Lee, H.P.	1974
Leibenstein	1966
Macridis	1970
McClelland	1969
Moos	1973
Norbye	1967
Odia	1971
Peaslee	1969
Schilfelbein	1970
Sexton	1972
Shaath	1965
Sheffield	1974
Smith	1960
Trosper	1970
Weisbrod	1968
Wilder	1971
Wolf	1966

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EMPLOYMENT AND LABOR MOBILITY

(Keywords #30, 31, 35, 36)

Adams, D.W.	1968/69
Adams, N.	1969
Bertram	1966
Blaug	1969 & 1974
Bock	1972
Conroy	1970
Essang	1974
Galtung	1972
Godfrey, E.M.	1973
Harbison	1967
Kinyanjui	1974
LaBelle	1975 ^b
Levy	1973
Maverer	1973
Naik	1972
Nowacek	1966
O'Neill	1970
Sandoval	1973
Schultz, T.P.	1971
Selowsky	1973
Singleton	1974
Slighton	1968 ^a
Valdis	1970/71
Waisenen	1971
Wilson	1972

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HEALTH AND FERTILITY

(Keywords #33, 34)

Abu-Lughod	1964
Ben-Porath	1973
Bjork	1971
Carleton	1965
Farooq	1974
Harmon	1970
Iutaka	1971
Khalifa	1973
Maverer	1973
Palmore	1969
Schultz, T.P.	1973
Sexton	1972
Srinivasan	1967
Stycos	1968

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INCOME DISTRIBUTION

(Keyword #32)

Adams, A.V.	
Adelman	1975 ^a
Adelman	1975 ^b
Bertram	1966
Bhagwhati	1973
Bowles	1970
Carnoy	1975
Fields	1972
Harbison	1974
Hoerr	1973
Jallade	1974
Maldonado	1976
Morgenstern	1973
Schultz, T.W.	1974
Selowsky	1968
Slighton	1968 ^a
Sundaram	1973

Abu-Lughod, J., "Urban-Rural Differences as a Function of the Demographic Transition: Egyptian Data and an Analytical Model," Amer. J. Sociology, Vol. 69, No. 5, 1964, pp. 476-490.

Traditional theory suggests that urban areas have lower fertility rates than rural areas and the urban fertility declines with the size of the metropolitan area. The evidence for Egypt suggests that the fertility patterns between urban and rural areas are essentially the same. The rural fertility ratio for 1952 was 599 as compared to a range of 592 to 610 for urban center fertility ratio. Although, there were some differences for number of live children ever born to Christian women between rural and urban residence, for the Muslim (90 percent of the population) the difference between rural and urban was too small to be statistically significant.

Considering mortality rates, the evidence for Egypt suggests a new pattern. It is generally believed that rural death rates are lower than urban death rates, however, the Egyptian case shows the opposite results. Some of this might be explained by increases in public health and the decline in infant mortality rates. Since 1946, the gap between urban and rural mortality rates has widened thus suggesting some permanence of this trend.

As a consequence of the normal assumptions about birth and death rates for urban and rural areas, viz., rural birth rates exceed urban rates and urban death rates exceed rural rates, it is usually the case that urban growth must come by rural to urban migration. The Egyptian case provides conflicting evidence with respect to the growth of the urban areas. Growth has come primarily from an excess of births over deaths, that is, the growth has been primarily natural and not migration induced.

Further, concerning age and sex composition of rural and urban areas, the Egyptian evidence indicates a male shortage for rural areas. In the U.S., evidence has shown the opposite case for rural areas, with females dominating the city and males dominating the country.

In an effort to explain these divergences from traditional theory, the author wishes to examine rural-urban characteristics in light of the demographic transition from preindustrial equilibrium to postindustrial equilibrium. In the framework, differences can be explained with regard to the temporal sequence of development.

In the only stage of transition, the death rates are the prime factor in increasing the population. As death rates fall, the population rises with roughly constant birth rates. It is only in the latter stages of industrialization that birth rates decline with the use of birth control methods. However, it is the distribution of birth control that attributes to variances in urban-rural demographic characteristics.

It is primarily the middle class which adopts birth control initially. The older upper class will eventually adjust to this new direction as will the lower class. Hence, the process begins with urban subgroups and then is adopted by the rural population. It is this process which explains the variance in demographic characteristics between urban and rural areas.

Adams, A. V., "The Stock of Human Capital and Differences in Post-School Formal Occupational Training for Middle-Age Men," Southern Econ. J., forthcoming issue.

The data base for this study is from the National Longitudinal Surveys of men aged 50 to 64 years in 1971. Respondents were asked questions which covered areas such as economic, social, and attitudinal characteristics. The first interview was in 1966 with follow-up interviews in 1967, 1969, and 1971. This analysis is limited to those men who were interviewed in all four surveys and who were wage and salary earners during each survey period.

The purpose of this study was to explain the likelihood of participation in formal occupational training during middle age (TR). In the model, TR was thought to be a function of the highest year of school attended, participation in formal occupational training prior to 1966, age, region of residence and occupation of current or last job in 1966.

Least squares regression analysis for the independent variables showed that approximately 14 percent of the variance in TR was explained by the model. Middle aged men with 12 years of schooling had greater participation in occupational training than did those men with 8 or fewer years of schooling. In general, it was shown that those men with higher levels of education had a greater likelihood of having participated in formal occupational training. Both age and residence in the non-South decreased the likelihood of participating in formal occupational training. It was also found that those men in professional occupations had the greatest likelihood of participating in formal training for all levels of education when compared to craftsmen, and farm laborers.

This study showed that participation in formal occupational training was strongly correlated with previous education and training. This indicates that investment over the life cycle is highly dependent upon early investment. Further without this early investment, there are fewer incentives for later investment, thus, any early educational and training disadvantages are likely to continue over the life cycle.

Adams, Dale W., "Rural Migration and Agricultural Development in Colombia,"
in Econ. Develop. and Cult. Change, Vol. 17, No. 4, 1968/69, pp. 527-539.

The data for this study were gathered in 700 interviews with rural families for 1963-65 in a number of geographic regions in Colombia. These geographic regions were categorized on the basis of distance to an industrial area measured by travel time to these urban areas -- 1 hour, 4 hours, 8 hours or more.

Five of the seven areas studied had 37 to 45 percent of the people enumerated living outside their general areas of residence at birth. This indicates a high degree of mobility among rural residents without any apparent relationship to distance, whereas theory would suggest that migration decreases with distance from origin.

A high proportion of this migration was rural-rural as opposed to rural-urban. This seems to imply that local opportunities rather than distance to urban center was a more important determinant of migration. The findings also showed that the average level of education for "movers" was higher than the average educational level of non-migrants yet no causal relationship could be asserted because of uncertainty associated with the initial educational level. In many cases the move led to the attainment of higher education due to the fact that post-primary educational facilities are usually located in urban areas.

Evidence indicated some support for the impression that children from families with relatively high incomes tended to have an easier time leaving rural areas and that migrants are usually young and single at the time of migration. In general, the study supports the hypothesis that the "best" leave

the rural areas implying that those with the most ability to manage farms are migrating to urban areas. This has caused a transfer of human capital out of the agricultural sector into other sectors.

Policies of expanding rural educational facilities could slow this process of rural out-migration. Without these programs, accelerated rural out-migration would aggravate Colombia's principal agricultural export. Through government investment in rural educational facilities, rural employment opportunities, and birth control rural-urban migration can be slowed. While future generations would be better prepared to adjust to the urban setting.

Adams, Nassau, "Internal Migration in Jamaica: An Economic Analysis," Soc. Econ. Stud., Vol. 18, No. 2, June 1969, pp. 137-152.

This paper attempts to formulate and test a model designed to provide an explanation of internal migration in Jamaica. Using 1960 Census of Population data, a regression model was specified. The results were that distance and wage income differentials between regions were the two most important factors influencing migration, or explaining the pattern of migration. The following variables were also important as factors affecting the pattern of migration: (1) the level of education in the destination region, (2) the rate of unemployment from the origin region, (3) the degree of industrialization of the origin region, and (4) the average size of land holdings. These variables, however, contributed only marginally to the explanatory power of the migration function, and therefore do not seem to be important in themselves.

Adelman, Irma, "Development Economics -- A Reassessment of Goals," Amer. Econ. Rev., Vol. 65, No. 2, 1975^a, pp. 302-309.

Cross-sectional data for 1950-1963 in 43 underdeveloped countries showed that the impact of development on income distribution was to decrease both absolute and relative incomes of the poor (poorest 60 percent). Development leads to a trickle-up of benefits. That is, there is a conflict between growth and the welfare of the poor. This supports the view that the structure of the economy is the most important determinant of income distribution.

Strategies for growth and improvements in the incomes of the poor (in nations where this has been successful) have followed the following sequence: stage I: radical asset redistribution -- primarily land, stage II: massive accumulation of human capital -- ownership of human capital is redistributed, and stage III: rapid, human resource intensive growth, this requires increased growth rates. Ultimately nations can grow first and then educate and redistribute or educate and redistribute and then grow. The author feels that educate-redistribute and then grow is the better strategy.

Adelman, Irma, "Growth, Income Distribution and Equity-oriented Development Strategies," World Develop., Vol. 3, Nos. 2 & 3, 1975^b, pp. 67-76.

Greater political participation does not appear to redistribute income to the poor, if it is effective it redistributes from the upper towards the middle income groups. Greater government ownership also does not appear to improve the poor's position. Finally, there exists a trade-off between freedom of action and equitable income distribution. Growth strategies have emphasized human-resource-intensive ones.

"All countries whose development process has automatically combined equity with growth have thus followed a similar dynamic sequence: a redistribution of assets (primarily but not exclusively land), followed by a massive build-up (or acquisition) of human capital, followed by an accelerated human-resource-intensive industrialization and growth strategy." (p. 71). Equitable growth can be achieved by either concentrating on growth and then redistribute and educate or vice versa.

Adelman, Irma, and Dalton, George, "A Factor Analysis of Modernization in Village India," in The Econ. J., Vol. 81, No. 323, September 1971, pp. 563-580.

This study employs factor analysis to isolate some of the important variables operating for village modernization in India. Data are from 108 villages in all fifteen states, taken from the Government of India's 1961 Census. Variable types include demographic, technological, politico-economic, educational, occupational, and socio-economic.

The analysis produced five factors which had high loadings on distinct categories of variables: (1) Social and economic characteristics (population, number of castes, commercialization, agricultural technology, transport and location, political awareness, and education); (2) family practices (family type, percentage female children married); (3) percentage low caste and cooperative membership; (4) village poverty (income, land per capita, and community development activities); and (5) degree of comparative advantage and specialization in agriculture (percentage employment in agriculture, percentage land owners, percentage tenant farmers). Regression equations are derived simultaneously for each of the 17 variables on the five factors.

The effects on individual variables and relations among factors are discussed. Factors (1) and (4) were important in accounting for improvements in agricultural technology and higher incomes. Factor (1) accounted for most of the inter-village variance. Education was most closely associated with economic variables and attitudinal modernization.

In view of these results it is recommended that rural development policy should be concerned with conventional economic programs.

Alexander, Leigh, and Simmons, John, "The Determinants of School Achievement in Developing Countries: The Educational Production Function," International Bank for Reconstruction and Development, Staff Working Paper, No. 201, March 1975.

This paper reviews the literature on educational production functions for developing countries and suggests policy implications. It attempts to identify those schooling inputs which might be recommended to policymakers as having a significant impact on schooling outcomes (specifically, cognitive achievement of students) in developing countries. The educational production function is considered as an analytical tool for this purpose.

The consensus of findings from both developed and developing countries is that the students' socio-economic background is the major determinant of his academic achievement throughout all levels of schooling except the upper secondary grades.

There are a few inputs which have a positive impact on student performance in all studies. The policies which reflect them are employing highly motivated teachers, providing a minimum number of textbooks and providing access to general reading materials to all students, and promoting the use of homework as a teaching method. Providing a minimum number of textbooks encourages the use of libraries. There is a positive and perfect correlation between pre-school ability and the amount of schooling. The existence of an educational system where the amount of education an individual receives (or the "selection" process of the system) is determined by factors other than that ability (such as family income) induces a misallocation of the existing educational resources.

Alexander, L. (cont.)

Page 2

The economic cost of this "internal brain drain" is defined as the value added lost by the existing educational system relative to a fully reformed system, under which students at all levels are selected according to that concept of preschool ability.

An analytical framework is specified which measures the gains in value added that would accrue from such "full reforms" as well as from partial reforms. The capacity of the educational system is assumed constant for this exercise, so as to isolate the pure qualitative effects of such reforms. The quantitative effects of the reforms appear substantial: a full reform would double the net value added of the educational system. For a range of very diverse countries, a fully reformed educational system would increase the long-run contribution of labor to the economy by 11 percent; if labor's share in GNP is 0.5, this implies a long-run gain in output equal to 5.5 percent. This value is substantial if compared with estimates of the welfare cost of resource misallocation in other sectors of the economy in LDC's.

Anderson, J. E., "The Formalization of Non-formal Education: Village Polytechnics and Prevocational Youth Training in Kenya," in Education and Rural Development, edited by P. Foster and J. R. Sheffield, World Year Book of Education, 1974, pp. 283-301.

The organization of youth training programs was designed to link the formal education process with realities of day-to-day life. Further, they were intended to provide youth with opportunities for recreation and education alternatives incidental to their normal activity. For those youth who did not attend school, it was designed as a substitute for schooling. These were intended to offer a rural oriented education.

The youth polytechnics were introduced in an effort to break the lower class status of attending rurally oriented schools. These institutions offered courses in applied vocations as well as some traditional academic subjects, yet emphasis was directed toward those vocations which were rural in nature and application. Much of the variation in support of different subjects depended upon the resources that were available. Of the polytechnic leavers, 53 percent of the males and 35 percent of the females have a regular wage-earning job. However, approximately 30 percent of the leavers are employed in urban areas. Much of the success of these local-rural polytechnical leavers depends upon the local demands for manpower.

Youth school leavers (age 14) had severe problems in obtaining employment. In 1970 of 290,000 youth entering the employment market, only 37,000 found full-time work (roughly 14 percent found employment). This type of result set in motion the need for the youth polytechnical programs. Despite

Anderson, J. E. (cont.)
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all the effort, rural youth maintain the view that rural-oriented employment is second class. The author offers some hope for training programs for the young if the government is able to design an integrated system that is adequately supported both politically and financially.

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Arrow, Kenneth J., "Higher Education or a Filter," J. of Pub. Econ., Vol. 2, No. 3, July 1973, pp. 193-216.

This article develops a theoretical model that views education as an (imperfect) measure of performance ability rather than evidence of acquired skills. It is argued that higher education contributes in no way to superior economic performance; it increases neither cognition nor socialization. Instead, higher education acts as a screening device, in that it sorts out individuals of differing abilities, thereby conveying information to the purchase of labor. No empirical analysis is performed.

Averch, Harvey A., et. al., How Effective is Schooling? A Critical Review of Research, Rand Corp., Ed. Tech. Publ., Englewood Cliffs, New Jersey, 1974, 255 pp.

There are basically five aims of education in the United States:

(1) socialization, (2) sorting, (3) custody, (4) knowledge and skills training, and (5) creativity and self-reliance.

This study reviews research on educational effectiveness and presents a critical survey of this research for the educational policy-maker. Five research approaches are discussed at length:

- (1) Input/Output: varying resources are utilized.
- (2) Process approach: resources are fixed but processes vary.
- (3) Organizational: focus is on the social entity and operation within the socio-politico context.
- (4) Evaluation: specific projects or target groups are examined with education as an intervening mechanism.
- (5) Experiential: focus is on what students experience in schools, i.e., behavior-modification.

The review focuses on internal validity and consistency, and inter-approach relations. Educational outcomes are mentioned only where necessary, and include intelligence and achievement test results. Other outcomes mentioned are education as an agent of change or stability, and the balance between the various goals mentioned above.

A review of all approaches reveals very little consistency, and therefore, no clear recommendations may be synthesized for policy-makers.

The major conclusions and implications are as follows:

- (1) Research has not identified a variant of the existing system consistently related to outcomes.
- (2) Increased expenditures do not necessarily lead to increased outcome.
- (3) The implication of the above is that less money could be spent for equal results.
- (4) Innovation, responsiveness and adaptation decrease with school size and depend upon exogenous shocks.
- (5) Research is lacking in size, scope, focus and integration of research results.
- (6) Research suggests the need for broad changes before outcomes may be altered substantially.

Barka, Haim, and Levhari, David, "The Impact of Experience on Kibbutz Farming,"
Rev. Econ. Stat., Vol. LV, No. 1, February 1973, pp. 56-64.

This analysis is concerned with measuring the effect of "learning" or experience on Kibbutz farm production. It is argued that the Kibbutzim is a good approximation to the identical technology constraint that has hindered empirical analyses of the learning hypothesis. The proxy for experience is the age of settlement -- the oldest Kibbutzim were established in the 1920's, the youngest in the 1950's and 1960's.

The data consists of figures on output, gross and net product, labor input, capital stock by type of asset, and land classified as irrigated and dry. These figures were compiled from the annual financial reports of the Kibbutzim, and were available for each of roughly 200 Kibbutzim for each of the years 1945-1965. Output is measured in (constant) 1958 Israeli pounds. Gross and net product are estimated from the product side on the basis of data in output and the cost of raw materials. The stock of capital is a perpetual inventory estimate.

A Cobb-Douglas Production function which involved labor, total capital stock, and age of settlement is the basic form of the single equation model used to study the effect of experience on Kibbutz farm production, for the years 1954-1965. The results suggest that the learning hypotheses cannot be rejected, that experience has contributed significantly to the growth of productivity in Kibbutz farming, although this contribution was probably diminishing over time.

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Bell, D.; Bikson, T. K.; Rich, P. J.; and Wachitech, J. M.; "The Role of Education in Facilitating Adaption to Technological Change: An Analytical Framework and Review of the Literature," Rand Corp., R-1821-NSF, June 1976.

This article was a study of the role of postsecondary education, especially continuing and adult education, in assisting individuals to adapt to changes in technology. The study's objective was to develop a theoretical model to define the problem. The analytical framework of the model could be characterized as a formal treatment of role -- theoretical concepts in social psychology, using the welfare maximization techniques of microeconomic theory. The usefulness of the model was explored in terms of the problems of adaption to technological change faced by engineers, physicians, married women, and the elderly. A review of the literature revealed that little research has been conducted on the nature of adaption problems of the various groups, the resources at their disposal, and the effectiveness of educational interventions.

Bennett, Nicholas, "Primary Education in Rural Communities: An Investment In Ignorance?" J. Devel. Stud., Vol. 6, No. 4, July 1970, pp. 92-103.

This is a non-empirical analysis of primary education in rural communities. It criticizes the transference of conventional thinking (in educational policy) from one set of social circumstances to another; specifically, the desirability of literacy not necessarily in and for itself, but as a means to achievement of high priority economic development goals for the local community. The article challenges arguments for the necessity of such literacy "gained" through primary schooling in low-income rural communities, and points out the poverty of research on the subject that would permit definitive policy decisions.

Ben-Porath, Yoram, "Economic Analysis of Fertility in Israel: Point and Counterpoint," J. Polit. Econ., Vol. 81, No. 2, Supplement, 1973, pp. S202-S233.

This paper uses cross-section data on Israel from the Family Expenditure Survey. The economic analysis assumes that households maximize some utility function in which children are considered with respect to some constraint. Fertility is considered in this basic framework with the hypothesis being that the demand for children depends on full income of the household and the full prices of other goods and children. Since child rearing is time intensive, it is thought that the cost of rearing a child moves with the cost of mother's time. The theoretical basis for this analysis is generally attributed to Becker (1965), the theory of the allocation of time.

Dividing the sample into those couples who were married abroad (MAB) and those married in Israel (MIS), shows that for MAB the husband's educational level does not play an important role in fertility. Yet for MIS, those women whose husbands had no schooling, reported more children than women whose husbands had attained some level of schooling. Dividing the group by place of immigration, Africa and Asia (AA) and Europe and America (EA), showed that the AA group had higher fertility than the EA group. The impact of husband's earnings on number of children was found to be negative but not significantly different from zero.

Applying a fertility model developed by Willis, the educational level of the wife has a significant negative value which indicates lower fertility among educated women. Further, the coefficient for husband's earnings is

negative and significant. This implies that couples who are educated tend to have lower fertility than those couples who are not educated.

Assuming that the presence of children shifts the density function for the shadow price of time in non-market activities to the right, the wage of the educated exceeds the wage of uneducated women resulting in a larger effect (shadow price of time) for the educated women.

In sum, using the price of time for educated women does explain a large part of the variation in fertility. However, much of the variation among lower educated women is not explained by this approach and the factors explaining this phenomenon must be left to speculation.

Bertram, Gordon W., The Contribution of Education to Economic Growth, Staff Study #12, Economic Council of Canada, Ottawa, Canada, 1966, 149 pp.

This study is in two parts: (1) Statistical Analysis of changes in education over fifty years with reference to Canadian progress and changes in U.S. educational attainment, (2) Growth computations and comparisons of education's contribution to growth in Canada versus the U.S. Data collected includes real GNP, education by age and occupation, estimates of school enrollments, labor force by age and schooling, volumes of students, migration statistics, median years of schooling, daily attendance with relatives (percent) and distribution of income. Data comes from U.S. and Canadian surveys/census, and other published works. This study attempts to explain the economic progress of Canada in recent history using educational variables, then to compare this explanatory device with one for the U.S. In so doing, income measures and rates of return are used to evaluate benefit to individuals and society. Dynamics -- manpower needs, equality of education, etc. -- are not addressed. Increased productivity is referenced only through enhanced earnings. Virtually all measures are in the aggregate.

Conclusions: Pre-WWI -- emphasis was on increased elementary education, tapering off by 1920 without attention to broadening of secondary education. Although rising, educational attainments of the labor force lag those of the U.S. since WWI. Between 1911 and 1961, education appears to have "raised" earnings by 30 percent in Canada, or about one-fourth of output growth per person. Education seemed to hold back Canadian growth relative to U.S., but this was reduced by faster capital intensification and extensive natural resources.

Bertram, G. (cont.)
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Private rates of return to education in Canada are slightly higher than similar rates in the U.S., but estimates are from work of different authors quoted in this study.

Bhagwati, Jagdish, "Education, Class Structure, and Income Equality," World Devel., Vol. 1, No. 5, May 1973, pp. 21-37.

This paper analyzes the relationship between education and income equality in India. The author advances the following hypothesis on the interaction of class structures with educational expenditures: For each class of education, the State (in capitalist LDC's) will subsidize the cost of education; the benefits of these subsidies will accrue disproportionately less to the poorer groups at each level of education; the higher the educational level being considered, the higher will be the average income-level of the groups to which the students belong; and the rate of governmental subsidization to higher education will be greater than that to primary education. Empirical evidence is then offered which corroborates parts of this hypothesis.

Concerning primary education, the sociological and empirical evidence supports the notion that the lowest income groups typically haven't been able to have the same effective access to primary education as the higher income groups. This is because, for lower-income groups: (1) the opportunity cost (of labor) of primary education is higher; (2) the benefit of primary education is lower (probability of finding such jobs as post office, primary school teaching, etc., is lower because these groups are in rural areas); (3) the private rate of return is lower; and at the same time, (4) the cost of capital is higher (the lower income groups have indebtedness at high rates of interest compared to the higher income groups). Various tables are constructed which underline these conclusions. The data is from surveys and census inquiries. Bhagwati also concludes that the economic reasons far outweigh the non-economic



reasons (social caste, social barriers, etc.) in accounting for the low involvement and attendance ratios among the low income groups, although the data and evidence are scarce.

Concerning higher education, Bhagwati argues that the state subsidies meted out in this educational area are also differentially accruing to income groups depending on their economic status. He argues that not only is the college participation rate likely to be lower for lower income groups than for higher income groups, but that for higher income groups, the participation rates are likely to be linked to the income level. This is because the opportunity costs would tend to be higher and the benefits lower, the lower the income groups. He argues that the return to lower income groups would be lower for two main reasons: (1) for equivalent qualifications, the children of the more prosperous families tend to get better paid jobs and to get jobs quicker. He cites evidence from Blaug, 1954 (The Census of Graduate Unemployment in India), and some Ceylonese and Indian data (from OECD, 1971, and CIDCO, 1971). He also cites the corroborative evidence of Panchamukhi and Panchamukhi ("Socio-economic Variables and Urban Incomes," in Pandit, P. H., Measurement of Cost, Productivity, and Efficiency of Education) National Council of Educational Research and Training, 1969.

Bhagwati concludes by considering certain policies that would produce some equalization of educational opportunity (the costs and benefits from any level of education), as well as the limitations of these policies.

Bhati, U. N., "Farmers' Technical Knowledge and Income -- A Case Study of Padi Farmers of West Malaysia," Malayan Econ. Rev., Vol. 18, No. 1, 1973, pp. 36-47.

This paper tests the hypothesis that Padi farmers with greater technical knowledge have higher incomes or the positive relationship between technical knowledge and income. The data are samples of padi farms drawn from West Malaysia, specifically, the Tanjong Karang area ($n = 178$). Further the sample was stratified by income level into low, middle, and high income farms.

The sample was observed for two farm seasons and a questionnaire designed based on these observations. This was given during 1969. The questions pertaining to technical knowledge were weighted according to their importance. The regression analysis showed that farmer's technical knowledge was significant at the 5 percent level and positive for both gross farm income and family labor income with coefficients of 0.553 and 0.765 respectively.

Bjork, Robert M., "Population, Education, and Modernization," in Education in National Development, ed, Dan Adams, David McKay Company, Inc., N.Y., 1971.

This is a study of the relationship between population and education within the context of modernization. Using various data sources for both developing and developed countries, and reviewing various other studies, the author concludes that (1) the differentials in fertility associated with people with no schooling as compared with those with only a few years (one to four or one to six) in elementary school indicates little or no relation of education to the degree of fertility; (2) the level of education which probably has to be reached to reduce fertility sharply when compared with those with little or no education is relatively high (ten to fourteen years of schooling).

Blaug, M., Layard, R., and Woodhall, M., Causes of Graduate Unemployment in India, Allen Lane, The Penguin Press, 1969.

This book is an analysis of the causes of graduate unemployment in India, where the graduate unemployment rate greatly exceeds anything normally experienced in advanced countries. Given the fact that technical education has been deliberately restricted in light of the anticipated demand for technically qualified people, secondary and general higher education have been allowed to grow at a pace determined by the pressures of admission. In order to analyze the cause of this growth in demand for education, the authors do cost-benefit analysis, calculating private and social rates of returns for seven levels of education, from primary to engineering degree. These returns were calculated under alternative assumptions concerning ability, and were adjusted for the probability of unemployment associated with each educational qualification. It was found that the high demand for graduate degrees, in spite of the high incidence of unemployment within graduates, can be explained by the fact that a B.A. can earn more than a matriculate, although much less than a B. Eng., even after allowing for the possibility of unemployment. The conclusion is that the causes of educated unemployment in India run deep in the functioning of Indian labour markets, the hiring practices of the government, and the attitudes of educated Indians; the private rate of return is no less vital a statistic for educational planning than the social rate of return.

Blaug, Mark, Education and the Employment Problem in Developing Countries,
International Labour Office, Geneva, Switzerland, 1973, 87 pp.

This is a discussion of the ability of education to relieve development related "growing pains." The focus is mainly micro and uses rates of return data from 18 countries (10 LDC's). Analysis represents a synthesis of previous research, specifically ILO program evaluations and progress reports. Blaug characterizes the dilemma facing LDC's as one of capital deficiency causing unemployment and under-employment. Application of intermediate technology would cause increased employment but with drastically falling wage levels. The question is, then, "what can educators do?"

Education may either aggravate or alleviate the employment problems, depending on educational structures. The ability of education to relieve strain depends on the Target Group selected and the time horizon (long or short run).

Due to difficulties in reliable manpower forecasts, Rate of Return analysis is more appropriate. Data discussed indicates a need for increased effort in delivering primary education. The Vocational School fallacy is discussed and reinforces the argument for increased investment in primary education.

The value of education is broken into three interrelated components:

1. Economic (increased vocational skills)
2. Sociological (instilling social values)
3. Psychological (as with screening)

so that the purely 'economic' value is hard to pin down.

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Solutions to these problems are broken into two parts:

I. Traditional

- A. Quantitative controls (quotas)
 - B. Shifting costs to parents (with subsidies, etc.)
 - C. Ruralization of education
 - D. Vocational courses for urban schools
 - E. Training for self-employment
 - F. Adult literacy campaigns
 - G. Out-of-school (recurrent) education
- } requiring a dual
nature of educa-
tional institutions

II. Radical

- A. Intervention in labor markets
 - B. Abolishing exams
 - C. Selection by quotas
 - D. Recurrent education
 - E. Deschooling
- } similar to above

In conclusion, Blaug discusses implementation of these reforms.

Blaug, Mark, "Employment and Unemployment in Ethiopia," Int. Lab. Rev.,
Vol. 110, No. 2, 1974, pp. 117-144.

The primary problem for LDC's is to keep labor in agriculture by a reduction of rural unemployment through agricultural development. These efforts must be greater than emphasis on agricultural growth. This requires an educational shift from secondary and higher education to primary and non-formal types. Secondary and higher education enrollments have expanded by 20 percent in the last decade as compared to a 5 percent rate of growth in gross domestic product.

Agriculture in Ethiopia employs 90 percent of the population, produces 93 percent of exports and contributes 60 percent of GNP.

Macro economic policies to re-allocate labor include: (1) increase the import duties on agricultural machinery (except water pumps), (2) increased revenue from removing import duties should be used to develop labor-intensive small industry, and (3) income tax relief should be extended to small industry. These and a reformulated monetary policy would serve to increase agricultural growth and provide necessary incentives to keep labor in agriculture.

Bock, John C., Education & Social Integration: A Case Study of Institutional Effect in Malaysia. SEADAG Research Paper presented May 25-27, 1972, Santa Fe, New Mexico, 39 pp.

This report focuses on the impact of secondary education on institutional structures outside the school, viewing schools as social exchange systems. Availability of too much education may lead to frustrated efforts at improvement rather than useful social integration thereby causing social instability. Malaysia is used as a case study due to its transitional status and political orientation toward educational advances. Sample schools are stratified by ethnic composition and medium of instruction.

Conclusions: Malayan educational policy has been directed at (1) socializing agencies transmitting "proper" values, (2) sponsoring mobility of indigenous Malay population. Analysis shows direct relation of dissatisfaction with schools' exchange role and students' perception of schools serving interests of specific ethnic groups. This implies that government efforts at social redistribution have resulted in the loss of legitimacy by schools among students of all ethnic groups.

Bowles, Samuel, "Migration as Investment: Empirical Tests of the Human Investment Approach to Geographical Mobility," Rev. Econ. Stat., Vol. LIII, No. 4, November 1970, pp. 356-362.

In this analysis, a model of migration in response to economic incentives is specified. Two hypotheses are formulated: (1) the net migration rate will be positively associated with the present value of the stream of income differences between origin and destination, summed over the working life of the prospective immigrant, (2) the effect of the migration rate of the present value of the expected income gain associated with moving is a positive function of the level of schooling.

The technique consisted of linear regression analysis; it was demonstrated that net migration was positively related to the expected increase in the present value of lifetime income associated with out-migration and the number of years of schooling defining each population subgroup, while negatively related to the age which defines the population subgroup.

The migration rates used were based on U.S. Census data on mobility between census divisions for the period 1955-1960. The observations were for males in the 96 population subgroups, classed by eight age categories, six schooling categories, and race (white-black). Migration rates for each of the three southern regions were included as separate observations. The estimation of the income gains were classified as south and non-south, and assumed a working life extending to age 65 and were mean earnings for each subgroup. The present value of expected earnings were computed under different time preference assumptions (a six percent rate of time preference gave the best results).

Income streams were adjusted upward by one percent to take account of productivity increases not due to schooling. The years of schooling and the age variables were the mid-point of the years of schooling and ages in each particular population subgroup. The basic data used in the analysis are presented in an appendix available upon request.

Two conclusions seem relevant: (1) the change in the net migration rate with respect to the present value of the income gain from moving is a positive function of years of schooling. This suggests that part of the monetary return to schooling arises because people with more education adapt successfully to economic disequilibria. Therefore, studies of the monetary returns to schooling which hold constant the region of employment are likely to underestimate the full impact of schooling upon earnings; (2) the fact that blacks appear less responsive to the income gain associated with moving than whites is consistent with the notion that the stability of an unequal income distribution may be explained in part by socially generated attitudes risk aversion and high rates of time preference, for example, which inhibit blacks from taking advantage of those avenues for higher incomes, such as education and geographical mobility.

Brooks, I. R., "Cognitive Ability Assessment with Two New Zealand Ethnic Groups," J. Cross-Cultural Psychology, Vol. 7, No. 3, September 1976, pp. 347-356.

This article is concerned with socio-economic status and cognitive ability. To test for this relationship, a battery of verbal and non-verbal tests of cognitive ability was administered to 110 four-year old Maori and Pakcho children in New Zealand. Five cognitive abilities were selected for study: memory, spatial relations, abstract reasoning, classification, and language. Socio-economic status was controlled by means of a six category scale, based upon the primary wage-earners levels of education and income. By using this scale the sample was selected in such a manner that each cultural group had the same number of subjects in each of the categories.

The empirical results (based upon two-way analysis of variance F - values and t - values) indicated that under such a controlled experiment, few significant differences emerged between the two groups. Socio-economic status was found to be related to test performance, with high SES subjects scoring significantly higher on five of the nine tests, indicating that socio-economic status was a factor in ability development.

Brownstein, Lewis, Education and Development in Rural Kenya, A Study of Primary School Graduates, Praeger Publishers, N.Y., Washington, 1972.

This is a study of primary school graduates in Kenya. The results of the study indicate that Kenya's educational strategy is patterned on a model of economic development which places its main emphasis on the manpower needs of the modern urban sector while effectively ignoring the rural sector. The failure to plan for the utilization of the rural educational output has created a real potential for major dislocation in the educational system which may be felt in the economic and political systems as well.

Buripakdi, Chalio, Education for Agricultural Development: An Attempt to Plan Education to Improve the Productivity of Rice Farmers in Thailand, Stanford University, Ph.D. dissertation, 1971, 222 pp.

This project focuses on the education's impact upon labor productivity in farming. Data was gathered by interviews with two hundred families where the primary emphasis of the farm was rice. Two sites were selected where the rice farming was primarily traditional for one site while the other site practiced agricultural diversification. A total of 345 interviews were conducted for the entire project.

Labor productivity index was estimated by the return in cash value to one year of the respondent's labor. The highest average labor productivity was found for farmers who farmed self-owned land plus rented land (3,320 baht* as compared to 2,900 for the entire sample). The index of progressiveness contains measures of the individual's desire (to improve farm yield), rationality (ability and willingness to reason), innovativeness (interest to know and early adaption of new but known farm techniques), diligence (practice of working hard), and, abilities (in arithmetic, functional literacy, physical strength, farm technology and farm management). This index of progressiveness was found to correlate with labor productivity. In this case, 55 percent of the variation in labor productivity was dependent upon the variation in this index of progressiveness. An important implication is that the index lends itself to manipulation by variations in the educational effort.

Labor productivity varied positively with the following: size of farmed land, size of farmed land per working family member, yield per acre, and with

* U.S. \$1 = 20 baht

the estimated size of land which the respondent thinks he could farm in one year. Also the following background characteristics were found to be associated with labor productivity: participation in adult education, early entry to school, visits to agricultural fairs or experimental stations, level of general education, age below 45 years, and, having studied agricultural subjects in primary school.

Carleton, R. O., "Labor Force Participation: A Stimulus to Fertility in Puerto Rico?" Demography, Vol. 2, 1965, pp. 233-239.

In examining data gathered by the Puerto Rico Planning Board in cooperation with the U.S. Bureau of Census, for 1960, it shows that more economically active married women have higher levels of education. This implies that married women of a higher level of educational background are able to find work that is satisfying to themselves and their spouses. One explanation for this phenomenon is that it is necessary that women attain a certain level of education prior to obtaining satisfactory work options. Further, women with higher levels of education have fewer children and have fewer traditional household responsibilities.

With regard to fertility, it is usually thought that economic activity reduces the number of children. However, in this case, it was found that women with college education have more children and higher rates of economic activity than women with high school diplomas. One possible explanation is that the distribution of children among college educated women is more widely distributed. That is, there may be more women in this category with many children and more having very few children. Another explanation offered is that college educated women have their children at younger ages thus enabling them to enter the work force in later years. This study offers no conclusive evidence as to which line of reasoning explains most of the fertility differential.

Carnoy, Martin, "Can Educational Policy Equalize Income Distribution in Latin America," Mimeo, Center for Economic Studies, Palo Alto, California, August 1975, 50 pp.

The author notes that examination of distribution of earnings misses much income. He examines the functional and personal distribution of earnings; reviews human capital and institutional (sorting and job competition) models of earnings distribution; and notes the dominance of technological determinism.

Job competition models view education as determining who gets the jobs which productivity is an aspect of -- rather than producing more human capital (Lester, Thurow and Robt. Lucas). The author presents an alternative "labor market segmentation" model in which groups or classes face different market situations which condition and restrict their choices. Their behavior then conditions development of technology, job structures, and institutions as a result of interactions of groups with different interests determined by prior development of institutions. This view sees rewards distributed, not according to marginal productivity differences but for political and social reasons. Earnings distribution will be affected not by changes in the structure of the economy nor distribution of education except through change of the balance of political power of various segments -- particularly the power of wage earners in one segment to raise their wages relative to other segments -- and of all labors to work together to raise the size of the wages bill.

Segmentation is explained by (1) technology, an inner logic, or (2) social control; productivity may be viewed as a technical or social relation. Productivity and earnings may be divorced both between and within segments.

Carnoy, M. (cont.)

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Correlation of education and experience with earnings does not establish that they contribute to higher productivity. The earnings distribution might be unchanged by equalizing productivity through equalizing education. Focus must be on State intervention rather than on changes in the distribution of personal traits. Bargaining power increases for the educated only if a few people get education.

The author reviews some empirical work, aggregate -- Gini coefficients, for Mexico, Chile, and Cuba, noting that the distribution of income became more unequal in the first two, even as distribution of education became more equal and under socialist governments in the latter two it has become more equal even as equality of distribution of education lagged behind. The author concludes that the distribution of income and the function and distribution of education are primarily politically determined.

Carnoy, Martin, "Political Economy of Education" in Education and Social Development: Latin America and the Caribbean, ed. by Thom. J. LaBelle, Latin American Center, UCLA, 1972^a, pp. 177-218.

This is a theoretical model of rates of return to different levels of education at different stages of development. This is based on the elitist formation of school systems. When one level of education is dominated by elites, monopoly rents are extracted from this education, and rates of return are high. As development occurs, education becomes more widespread and the next level is in greater demand by and in turn dominated by the elite. Monopoly rents disappear as the educational base is expanded.

Carnoy discusses schools from three points of view, (1) rates of return, (2) school production functions, and (3) educational planning.

The model is used to estimate rates of return for primary, secondary, and University students. The model displays consistency, but the length of development periods (phases) fluctuates due to differences in (1) stock of physical capital, (2) investment in physical capital, and (3) rates of increase of output of educated people.

Rates of return are related to enrollment rates, per capita, GDP, and GDP in 27 countries. The countries place in phases 1-4 accordingly, at least partially validating the model. Data is from other works.

Carnoy, Martin, "Rates of Return to Schooling in Latin America," J. Human Res., Vol. 2, No. 3, Summer 1967, pp. 359-374.

Data for Mexico is used in a sample of 4,000 male urban-wage earners taken over a period of 4 months. Questionnaires provided information on wages and salaries of employees, number of years of schooling, and father's occupation (whether he attended school). Regression analysis is used on this data base.

The findings show that schooling alone explains 43 percent of the income variance. When age is added as an independent variable schooling explains 36 percent of the income variance. When age, city, father's occupation, industry and attendance are added, schooling explains 29 percent of the income variance. Mexican rates of return decline with increased levels of education beyond primary, except for university level which shows a jump in the rates of return equal to that of 7-8 years of schooling. In general, the study showed a positive correlation between rates of growth of GDP and rate of return to investment in schooling.

Mexican private rates of return exceed social rates of return for all educational levels. Countries with the highest rates of growth seem to have under-invested in university training relative to the secondary level. "The profitability of educational investment and the rate of growth of the economy are intimately intertwined and the amount of resources devoted by the public sector to schooling must depend on the past and present rate of investment in physical capital." Overall-growth rates are most closely associated with returns to primary and university levels of education.

Carnoy, Martin, "The Rate of Return to Schooling, and the Increase in Human Resources in Puerto Rico," Comp. Educ. Rev., Vol. 16, No. 1, February 1972^b, pp. 68-87.

This article is concerned with deriving the private rates of return to investment in schooling and the private present value of additional schooling for Puerto Rico in 1959. Both the rates and the present value to the increase in schooling apply to male workers in broad occupational categories over the years 1940-1960. The results of the study show that the increase in per capita stock of schooling has been rapid during the 20 year period covered, and that this increase is positively and significantly correlated (using regression analysis) with the economic pay-off to taking more schooling, and that the private rate of return and present values have probably risen in the last 20 years because of lower employment rates among young Puerto Ricans, and a corresponding decrease in the income foregone component of schooling cost.

Chakravarti, A., "The Social Profitability of Training Unskilled Workers in the Public Sector in India," Oxford Econ. Pap., Vol. 24, No. 1, March 1972, pp. 111-124.

This is an analysis of the social profitability of training unskilled workers. The data related to an Indian training school of Heavy which trained graduate apprentices, low grade engineers, and skill articles. The analysis was for the years of 1963-1964. The basic method used was that set out by the Little-Mirrlees Manual of Industrial Project Analysis. The internal rates of return to the training of unskilled workers was possible by taking into account: (1) the life-cycle of production and consumption of the workers, (2) the shadow wage evaluated in terms of consumption, (3) training costs, and (4) the value of output of a skilled worker.

Under two different sets of assumptions, domestic versus world prices, the rate of return was found to be 6 and 7 percent, respectively. Given the marginal social rate of return on investment in India of 6 percent (calculated from data from Annual Survey of Industries, 1964), the training school was found to be profitable from a social point of view.

Chaudhri, D. P., "Education and Agricultural Productivity in India," Ph.D. Dissertation, Univ. of Delhi, 1968.

The author attempts to assess the impact of education on Indian agriculture. Census data for 1960 are employed. An agricultural production function of gross revenue, at the state level of aggregation, is estimated using the Cobb-Douglas form. He fails to demonstrate by this procedure that education is an important source of productivity.

Emphasizing the allocative effects of education on production, Chaudhri provides evidence that the composition of the non-land, non-labor, "other inputs" to production is associated with the incidence of secondary schooling in the farm labor force. This is particularly so with respect to the adoption of chemical fertilizers.

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Chaudhri, D. P., Effect of Farmers' Education on Agricultural Productivity and Employment: A Case Study of Punjab and Haryana States of India, ILO, Work Employment Programme Research, Working Paper, Univ. of New England, Armidale, Australia, 1974^a.

This study is designed to investigate the relationship between education, productivity and rural employment. For the purpose of this study, persons are educated if they are literate. This enables one to determine if more literacy has any impact on productivity and/or rural employment. A second definition is used for this as well, under the second form, it is required that respondents be able to write, read, and keep financial records, as well as being able to obtain market news from various sources. Much of the data for this report is Indian government data, such as Census data.

The role of education in the agricultural sector is examined in the following ways:

1. farmer's education in influencing the level and growth of agricultural productivity,
2. farmer's education in the use of yield-raising cost-reducing inputs,
3. farmer's education in the growth of agricultural institutions (cooperative market, cooperative credit, etc.)
4. wage labor's education in influencing the wages and conditions of employment.

The actual analysis is based on three equations:

1. the agricultural production function -- $Y_1 = f(Y_2, Y_3, X_1, X_2, X_3)$

2. modern input production function -- $Y_2 = f(Y_1, Y_3, X_4, X_5)$
3. cultivator's education function -- $Y_3 = f(Y_1, X_6)$ where Y_1 = gross value of agricultural products, Y_2 = chemical fertilizers used, X_1 = total cropped area, X_2 = number of cultivators, X_3 = number of agricultural laborers, X_4 = proportion of total area under high yielding variety of seed, X_5 = number of tubewells, and X_6 = enrollment ratios in secondary education.

Standard regression analysis is performed on these three functions in order to generate coefficient estimates.

Using multiple regression, 86 percent of the growth in agricultural output is explained by the growth of various inputs while 6 to 7 percent of the growth in agricultural output is explained by the growth of education. However, multiple regression analysis assumes independence among the independent variables and this may not always be true.

Adding the use of chemical fertilizers as a substitute for the use of high yielding seed variants, and examining if education had any impact on the use of fertilizers produced the following results. The coefficient for Ed_2 (proportion of agricultural workers who had completed elementary education) was positive and significant for all years from 1961-1966, but it then becomes insignificant thereafter. Ed_3 (proportion of agricultural workers who had completed secondary education) is positive and significant for all years between 1961-1971 with Ed_6 (proportion of cultivators who had completed secondary education) following this same pattern. These results seem

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to indicate that secondary education is an important factor determining the use of chemical fertilizers in agriculture.

The relationship between education and the adoption of high yielding variants of seed showed that both Ed_3 and Ed_6 were significant and positive. This further supports the importance of secondary education in promoting innovations in agriculture.

An analysis of a Cobb-Douglas production function using household data must be segregated by income level in order to eliminate the interrelationships between education and income. This analysis suggests that income differences among households do not significantly affect the production function. The impact of caste system also does not alter the production function. However, one important result was that all education coefficients were positive and significant with respect to the production function. This impact measures the "worker" effect of education since climate and agricultural innovations are held constant in this particular form of the production function. A further finding of a positive and significant coefficient of education for laborers suggests that quality differences are reflected in the wages of the agricultural laborers.

This study has pointed to the importance of education but it is not clear as to the causal chain. Indeed, many factors are interdependent and their separate impacts are often difficult to identify. Given these problems and the evidence from this study, it seems that education is an important factor in determining agricultural productivity.

Chaudhri, D. P., "Rural Education and Agricultural Development -- Some Empirical Results from Indian Agriculture," in Education and Rural Development, edited by P. Foster and J. R. Sheffield, World Year Book of Education, 1974^b, pp. 372-386.

The author argues that the experience of advanced countries is at best suggestive of what developing countries will experience in the process of modernization. A primary distinction is that LDC's are trying to achieve development in a few decades while it took developed countries over a century to reach their present status.

The impact of education on farmers can be seen in the allocative effect, the innovative effect, and the worker effect. These are changed by education's influence on the ability to obtain and use new sources of information, for example, the ability to evaluate costs and benefits of alternative sources of information. Information about farming methods will travel faster with greater numbers of educated farmers who can act as transmitters of useful information.

Indian data for 1960-1961 was analyzed to determine whether education of farmers was positively related to agricultural output and to the adoption of new farming techniques. Regression analysis showed that 65 to 70 percent of the variation in output could be explained by literacy, secondary education, and years of schooling for state-level data, i.e., national data aggregated by states. However, at the district level these same variables only explained 34 to 36 percent of the variation in output. It should be noted that elementary education only explained 25 percent of variation in output for district level

Chaudhri, D. P. (cont.)
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data and only 46 percent in the state level data case. In order to estimate the adoption of new farming techniques, the use of chemical fertilizers were used. The results show that, in general, the better educated use larger amounts of chemical fertilizers. These findings support the hypothesis that education is positively related to both agricultural output and the adoption of modern farming methods.

Cherin, Gabriel; Hattwick, Richard E.; Liebhafsky, E. E.; "Latin America: Education and Manpower," Growth Change, Vol. No. 1, October 1970.

This article explores the question of whether or not Latin American educational efforts have been adequate in terms of the manpower requirements of economic development. Using data obtained from a NSF study, various tables were constructed: shares of employment by major industry groups, annual changes in their shares, annual changes in employment shares by occupation, and enrollment ratios in primary, secondary, and higher education. Employment tables were for the census years 1950 and 1960; educational tables were for the year 1960.

It was demonstrated that industrialization and urbanization produced changes in the industry structure of employment, and a relative decline in the importance of agriculture. This suggests additional investment should be made in primary education, because non-agricultural occupations have employed the highest proportion of working individuals with primary education.

The enrollment ratios suggested that Latin America's educational systems responded to the demands suggested by the employment patterns: the enrollment ratios were high at the primary level but low at the secondary and higher levels.

Clark, David H., and Pang, Eng Fong, "Returns to Schooling and Training in Singapore," in Malayan Econ. Rev., Vol. XV, No. 2, October 1970.

This article uses data from the Sample Household Survey of 1966 as well as mortality data from 1962 and tax rates from 1966. These data are combined to generate returns to expenditures in primary, secondary, and university education and returns to training programs in conjunction with various educational backgrounds. Two methods of estimating returns are employed: (1) internal rates of return, and (2) present value formula for several discounting factors. Rates for English-medium and Chinese-medium instruction are also generated, as are rates by sex.

Training programs are defined as any six or more hours per week effort over six or more months, directed at improving job skills. Because of the unclear definition and difficulties with the survey data, this analysis is preceded by a list of assumptions and warnings.

Results of the study show that secondary education has the highest rates of return, then university, then primary. Rates for men are slightly higher than those for women and English-medium classes are much higher than Chinese-medium classes.

Training programs do yield substantial rates of return, especially in conjunction with secondary educational background. Clark and Pang conclude suggesting that the goal of universal primary education be pursued due to social and political factors, but that special attention be paid to expansion of secondary and tertiary education. Also, efforts by government should be made to stimulate job training programs through subsidies to employers. Although training programs are rare, the returns indicated in this paper are high enough to warrant serious expansion.

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Conroy, J. D., "The Private Demand for Education in New Guinea: Consumption or Investment?" Econ. Rec., Vol. 46, No. 116, 1970, pp. 497-516.

The paper examines the motives for educational expenditures by (1) asking parents and children, (2) testing a hypothesis about student's expectations by observing behavior after leaving school.

The findings showed that the Enga people considered educational expenditure as investment and that formal education is a road to advancement. The stated reasons for entering a vocational center showed, "It will help me to get a job," as the most frequent response with 57.3 percent followed by "I will learn to do useful things," with 39.2 percent (these results are based on interviews with students). The results indicate that investment motives are primary among New Guinea students. Only partial employment data was available to address the second phase of the paper viz. testing a hypotheses.

This evidence favors the hypothesis that the primary motive for educational expenditures is investment. Rural school leavers were found to migrate to urban areas in an effort to seek employment. This study also found that by 1976, fully three-fourths of primary school graduates would not be able to enter secondary or technical schools. This implies that there is an increasing probability that there will be many more young literate migrants seeking employment in the urban centers.

Coombs, Phillip H., "Opportunities in Nonformal Education for Rural Development," Education and Development Reconsidered, sponsored by the Rockefeller Foundation and the Ford Foundation, 1972.

An assessment of nonformal education and its role for development is offered. The author holds the position that distinctions between formal and nonformal education should be eroded to produce a hybrid form that blends the best features of both. Priority areas include: (1) agricultural extension services and farmer training programs, (2) training services for small entrepreneurs and nonfarm rural enterprises, (3) enlargement of skill training and upgrading programs for rural artisans, craftsmen and small industry workers, (4) building multi-purpose programs for out-of-school rural adolescents, and (5) building broad integrated local programs for the enrichment of family and community life.

Nonformal education has potential cost advantages in that results are suitable to the developing area. Recommended policies in agricultural education include: (1) examine the agricultural education system as a whole and then fashion combinations to effect various components of the system, and (2) importance of strengthening the bottom or the portion of the system that deals directly with the client-farmers.

In general, one should strive for flexible systems that can adjust to meet the specific needs of the particular community. Moreover, to examine the role of education in relation to the social milieu and utilize all aspects of education through innovation.

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Cornehls, James V., "Forecasting Manpower and Education Requirements for Economic and Social Development in Peru" in Education and Development: Latin America and the Caribbean, ed. by Tho. J. LaBelle, Latin American Center, UCLA, 1972, pp. 151-176.

Forecast model goals: (1) Manpower approach, (2) Education planning is to be linked to projected economic growth by sector, (3) Minimum 15 year forecast is necessary, (4) Broad focus, not just formal education, (5) Educational development effort should be related to independently established priorities, not immediate impacts (6) Socially desirable goals (e.g., primary education for all) should be incorporated, (7) Estimates of ALL needs be made so complete planning can be accomplished (facilities, etc.).

General forecast needs and requirements: (1) Estimated GDP, (2) Long-range estimate of economic active population and sectoral distribution, (3) Present occupation, and industrial distribution of the labor force, (4) Implying the postulated improved Occupational Educational structure and manpower requirements by 1980.

Data is from INP/OECD Desarrollo economico y social and includes: labor force statistics, grads needed by level and branch, enrollment requirements, estimated school completion ratios, estimated education budget, and net teacher requirements.

Cornehls analyzes the projected trends as delineated above with this data yielding forecasts of rough needs for Peru, but does not present an educational plan. Rather, he provides a broad framework for general priorities within which the planning process may be accomplished.

Major function: Identify specific problem areas where policy decisions must be made.

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Duncan, Otis Dudley, "Ability and Achievement," Eugenics Q, 15, March 1968, pp. 1-11.

This study is concerned with the relationship between income and ability. The data are from a sample of post World War II veterans of the U.S. military, men in the age range of 16-34 years. The measure of ability that was used was the score on the Air Force Qualification Test, which includes questions on vocabulary, arithmetic and spatial relations, but also contains a section on tool knowledge.

Using linear regression analysis, with expected income as the dependent variable and parental status, number of siblings, early intelligence, ability and total schooling as the independent variables, Duncan found that the coefficient of total schooling declines about 31 percent when parental status, number of siblings and early intelligence variables are introduced into the equation with only total schooling.

Edwards, Edgar O., and Todero, Michael P., "Education Demand and Supply in the Context of Growing Unemployment in the Less Developed Nations," in Education and Development Reconsidered, Vol. 2, sponsored by the Rockefeller Foundation and the Ford Foundation, 1972.

A survey format for the 1950's and 1960's showed that LDC's concern was with supply, that is, providing educational services to meet manpower needs. The 1970's and 1980's are likely to focus attention on demand. Education is viewed as passport for entry into the modern, urban, industrialized economy. In this sense, education can be viewed as a derived demand for high income earning employment opportunities. Individuals' perceptions of link between employment and education and their views that the private benefits of education to far exceed private costs of education have led to increased demand for education. This coupled with a situation where social costs of education exceed social returns, indicates that there will be powerful political forces pressing the society to misallocate its human and financial resources to overexpansion of education.

Each worsening employment condition leads to an increased demand for educational services, as each individual perceives this as the passport to the easy life. This commonly results in the increase of educated unemployed which sets in motion a bumping process. It results in the educated taking jobs requiring less skill -- or under-employment, e.g., drivers with master's degrees. The wage structure acts to increase the private demand for education as the wages of the highly trained are usually artificially high (urban/rural wage differentials are exorbitant). As aggregate levels of education

increase, employers upgrade their demand for labor, that is, they demand workers with higher levels of education. Government policies that are designed to temper the demand for education should include: (1) make the beneficiary bear a larger and rising proportion of his educational cost as he proceeds through the system as the most effective means of rationing available places, (2) reducing income differentials between the modern and traditional sectors and within the modern sector to ensure a more realistic appraisal of the prospective benefits of education, (3) ensuring that wages are related to jobs and not to educational attainments, and (4) ensuring that minimum job specifications do not overvalue education.

Government policies to temper supply of modern sector job opportunities should include: (1) reduce wages relative to the price of capital as these enter into employment decisions in both the public and private sectors, (2) give careful consideration to improving rural infra-structure, and to the possible location of new modern sector activities in areas where wages have not yet reached the distorted levels typical of established urban centers, and (3) allocate a larger share of development budgets to productive employment-creating activities, as opposed to education, than has been the pattern in the last decade.

Edwards, Edgar O., and Todaro, Michael P., "Educational Demand and Supply in the Context of Growing Unemployment in Ten Developed Countries," World Devel., Vol. 1, Nos. 3 and 4, March/April 1973, pp. 107-118.

This is a non-empirical article that deals with the phenomenon of high demand for education, along with high rates of unemployment in LDC's. They argue that the excess demand for education results from an ex ante rational, though ex post inflated, private calculation of the excess of benefits over costs of further schooling even as the number of educated unemployed rises.

They agree that employment opportunities in the modern sector are artificially restricted because: (1) factor prices are distorted, capital underpriced, labor overpriced; (2) technology is often borrowed from advanced countries where labor is a relatively scarce resource; (3) job specifications require excessive education; and (4) excessive resources are devoted to education.

Demand for post-literacy education is inflated because: (1) the income differential between the modern and traditional sectors is artificially high; (2) employers give preference to the better-educated; and (3) the proportion of the costs of education which are borne privately is usually nominal.

Emmerij, L., "Education and Employment: Some Preliminary Findings and Thoughts," Int. Lab. Rev., Vol. 107, No. 1, 1973, pp. 31-42.

Education is seen as a method to reduce structural unemployment by providing the workers with necessary skills and giving proper view of job expectations. This second phase should be aimed at reducing partial surplus conditions in the economy, that is, to improve the labor allocation to all jobs. Data for Ceylon, 1969-1970, indicate higher unemployment rates for the educated in all age groups, which seems to imply that a misallocation of educational resources exists. Further the skills obtained in education are not those which are necessary to obtain work and wage scales tend to encourage long job search efforts. Government alternatives include: (1) emphasis upon the school in connection with community development, e.g., rural development centers; (2) government policies to narrow wage differentials (e.g., encourage technical positions); and, (3) increase on-the-job and off-the-job training opportunities.

Epstein, Erwin H., "Social Class, Ethnicity and Academic Achievement: A Cross-Cultural Approach," in J. Negro Education, Vol. XLI, No. 3, Summer 1972, pp. 202-215.

Epstein discusses the impacts of social class and ethnic "discrimination" on academic achievement, and the ramification each has on social equity and viability of democratic institutions. Because adequate data on social class, ethnicity and achievement are difficult to obtain, analysis is confined to studies made in the U.S. and the author's observations in the Peruvian highlands.

This weakens the conclusions, but general consistencies are noted.

It appears that in societies where ethnic differences are pronounced or easily visible such as the U.S., they will have greater impact on achievement. In Peru, however, where there also exist deep ethnic cleavages, social class, religion, customs, etc., bear a stronger impact on achievement than does the less visible ethnicity. Epstein does not address the role of education as an agent of equity or distribution of opportunity.

Essang, Sunday M., and Mabawonku, Adewale, Determinants and Impact of Rural Urban Migration: A Case Study of Selected Communities in Western Nigeria. Dept. of Agricultural Economics, Michigan State U., East Lansing, Michigan, 1974, 34 pp.

Data was collected by interview from 480 rural-urban migrants, and estimates of the strength of the following variables on the rate of rural-urban migration were made using linear function and log linear function equations: (1) mean age of rural family members, (2) years of schooling, (3) distance from the rural area to the urban center, (4) rural-urban earnings differential, (5) presence of relatives of migrants in urban areas, and (6) an index of urban attractiveness.

A series of estimates are presented, all containing variables one through four, and combinations of these from with variables five and six. Predictive accuracy of the linear functions is slightly higher than the log functions (average R^2 for linear equations is .835, for log functions is .77). Positive regression coefficients are associated with all variables except distance, and all are significant at the 5 percent level except urban attractiveness which is not significant in any of the four equations where present.

Impacts of rural-urban migration on the rural economy are discussed, including effects on outlays for hired labor, farm size, earnings, and the transfer of capital.

Because migration is associated with average age of the family and education, increased expenditures for education seem likely to promote migration. These findings imply that younger family members would leave, requiring

Essang, S. (cont.)
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management of farms by older people and hired help. These conditions will cause farm productivity to fall, and costs to increase, further destabilizing rural economic relations.

Evenson, P., "Research, Extension, and Schooling in Agricultural Development," in Education and Rural Development, edited by P. Foster and J. R. Sheffield, World Year Book of Education, 1974, pp. 163-184.

Eleven major crop-producing regions are defined geographically and these are then broken down further into micro-regions. Each micro-region can identify a production function of a single crop where the output is related to the farming technique used and the vector of inputs (i.e., land, fertilizer, labor). At any point in time, there exist some maximum states of technology which may or may not be used to its full extent. Schooling or human capital investment has a major impact on the type of farming technique that each individual farmer is using. Further, it has an impact on borrowing production methods from other micro-regions.

Inter-regional comparisons for the year 1965, show that most agricultural research has been focused on extension. Other studies have shown, using a Cobb-Douglas specification, that extension and schooling are substitutes. The growth in a micro-region is determined by: (1) micro-region extension, (2) micro-region schooling, (3) extension and schooling in other micro-regions, (4) sub-region research, (5) technology gains in other sub-regions, (6) research in the region, and (7) research in other regions. This indicates that a micro-region can only control two of these factors. For LDC's, extension should be coupled with sub-region research in order to attain higher productivity.

Fane, George, "Education and the Managerial Efficiency of Farmers," Rev. Econ. Stat., Vol. LVII, No. 4, November 1975, pp. 452-462.

This analysis is concerned with measuring the influence of education on the cost-efficiency with which farmers combine various broadly defined inputs. The data (U.S. Census of Agriculture, 1959) refer to counties in Indiana, Illinois, Iowa, and Missouri.

The basic model assumes that each farmer is a price-taker in the market for his factor inputs, and attempts to select these inputs so as to produce any given level of output at minimum average cost. If perfect information about technology and factor prices were available, it would be possible to achieve full cost minimization; however, in practice, managerial decisions must be taken on the basis of uncertain forecasts of prices and imperfectly understood technology. Therefore, actual cost will usually exceed the theoretical minimum. This study uses estimates of the production function parameters and of the prices of farm factor inputs to estimate the theoretical minimum cost of achieving a given level of production, and compares this with the actual cost of using observed inputs. The ratio of the excess cost of the actual inputs to the theoretical minimum is a measure of managerial failure.

The author develops a connection between the mathematical expression for managerial failure and information theory; specifically, he demonstrates that the natural logarithm of the ratio of actual variable cost to the theoretical minimum is the measure of inaccuracy of predicting the optimum share of expenditure to devote to each factor. There is, therefore, a simple direct relationship between the conventional measure of the information provided

Fane, G. (cont.)

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by different sets of predictions and their values to the farmer in terms of cost savings. The model that is estimated postulates that education may help to reduce information inaccuracy.

The most important finding is that, at a given scale of production, farmers with above average levels of education manage to operate significantly nearer than average to the theoretically estimated point of minimum cost. These results are consistent with Huffman, W., "The Contribution of Education and Extension to Differential Rates of Change," unpublished Ph.D. dissertation, University of Chicago, 1972. Another result is that there are economies of scale in the uses of information, in the sense that the return to education, as an aid to decision making, is an increasing function of scale.

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Farooq, S., and Tuncer, B., "Fertility and Economic and Social Development in Turkey: A Cross Sectional and Time-Series Study," Pop. Stud., Vol. 28, No. 2, 1974, pp. 263-276.

This paper is concerned with the impact of modernization on the fertility levels in Turkey, which started deliberate efforts at economic, social, and political transformation in the early 1970's. Using the "province" as the unit of observation, and from 1940 census data, the technique of reverse projection was used to estimate the provincial crude birth rates. Since 1955 there was shown to be a consistent decline in the fertility level.

A chain-relationship model was estimated using both cross-sectional and panel data. The major finding of the study was that in Turkey, continuing modernization and the concomitant spread of female education will result in a continuing decline in the fertility rate. The authors argue that this negative relationship is largely due to factors other than the usual association between education and the opportunity cost of female employment, such as changing attitudes and tastes.

Fields, Gary S., Private Returns to Investment in Higher Levels of Education in Kenya, Discussion Paper 19; Center for Research on Economic Development, University of Michigan, Ann Arbor, March 1972.

The author used rate of return analysis using government salary scale to determine the private benefit streams. Since a majority of students with post-secondary schooling are employed by the government, little bias is expected.

The author found a positive relationship between schooling completed (years) and starting government salaries. Unemployment was not serious for individuals with post-secondary education, for those with secondary education, unemployment ranged from a level of 0.8 percent to 14.3 percent during the years 1965-1968. This large increase was partly due to the increased job search time. Unemployment was determined by coding the predominant activity for the year in question and this procedural change implies that unemployment was underestimated in earlier years.

Average annual costs (recurrent expenditures and amortization of current development minus expenditures and depreciation on existing capital stock) have declined for all levels of education between 1969-1971 (note these are special costs of education). This has led to higher private rates of return and a consistent demand for education. Under the present full subsidy program private rates of return for 1971 range between 30.7 percent and 31.3 percent but with "pay as you go" rates drop to 18.6 percent and 18.7 percent. Kenya's educational system is financed by a regressive tax system and those attending post secondary education are from a relatively economically advantageous

Fields, G. S. (cont.)
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group. By initiating a full-cost percentage of income loan program for financing, there would be less redistribution of income from poor to rich, and it would provide an incentive for more dedicated students who would seek educational efficiency (since lower annual costs would lead to lower repayment rates). Alternatively, a progressive tax structure could be introduced.

Fields, G. S., "The Private Demand for Education in Relation to Labour Market Conditions in Less-Developed Countries," Econ. J., Vol. 84, No. 336, 1974, pp. 906-925.

This article is based on the author's doctoral dissertation (1972). The purpose is to give an economic explanation of the strong continuing demand for education in developing countries when many LDC's have a surplus of educated labor. The primary motive for private educational demand is to improve personal, social, and economic status. Demand may depend upon the expected rate of return to a given level of schooling.

These rates of return are determined by the present value method. Three models of labor market behavior are developed to explain the high demand for education: (1) bumping model, (2) labor market stratification model, (3) pooling model. From these models, three explanations for a high educational demand were identified: (1) the demand for education may be inelastic with regard to private returns, (2) the present value may be large enough such that education is a sound financial investment, and, (3) the present value of educational investment may be relatively inelastic with regard to supply of educated workers. One suggested recommendation is that government policies should be designed to reduce the present value and thus slow the over-investment in education.

Foster, P. J., "The Vocational School Falacy in Development Planning," in Education and Economic Development edited by C. A. Anderson and M. J. Bowman, Aldine Publishing Co., Chicago, 1966, pp. 142-166.

The important difference between LDC's educational system and developed countries is that LDC's have limited alternatives outside formal education. The author identifies a major unemployment problem because of the "educated" person's reluctance to enter into manual occupations as being a fallacious argument. Recent findings indicate that the curriculum has little influence on vocational aspirations (this was supported by a survey of 210 school children who were asked their vocational preference if they were completely "free" to choose and their vocational expectations). A major constraint to farming as a vocation was the traditional rural structure and the lack of amenities not the perceived income or the prestige associated with the job.

Essentially, vocational aspirations are largely influenced by factors which lie outside the schools. The student's perceptions of reality (actual opportunities) were found to be highly realistic. This implies that formal, technical, vocational in agricultural instruction alone will not check the movement out of rural areas, or necessarily impact the rate of economic development. Rather incentives within the structure of economic system and the degree to which entrepreneurial activity is supported in the social environment have a greater impact on development. Without such an environment no amount of education can be effective regardless of its focus: technical or general.

Freeman, Harold, The Role of Agricultural Education in the Economic Development of Thailand, Stanford University, Ed.D. Dissertation, 1965.

This study hopes to establish the extent to which formal agricultural education is contributing to the development of the agricultural sector. Between 1960 and 1964 the percentage of government expenditure on education remained near 15 percent. The Thai government has identified the need for emphasis on vocational education such that the base for technological progress can be laid (1962).

Vocational schools are divided into three levels, juniors (grades 8 - 10), senior (grades 11 - 13), technical institutes (grades 14 - 15). The major obstacle confronting this program is the lack of adequate supplies and facilities. A survey of institutions which hire agricultural school graduates shows that the demand for graduates exceeds the supply and is expected to continue for the near future whereas the demand is less than supply for graduates of the technical schools. The three employment lines open to agricultural school graduates are teaching, farming or government work. The study shows that most of the entering students have no previous agricultural background and the school provides little practical experience. It is heavily oriented towards formal education and graduates have little understanding of agriculture.

Frits, James C., "The Results of Motivational Training in Ecuador: A Search for a New Development Equation," Appendix A to Final Report Personal Services Contract AID-518-322-5, 15 October 1972 - 15 December 1975.

Assessment of training by an independent Ecuadorian corporation CEMA (Center for Motivation and Advisory Services). A four-year program to contribute to national development through motivational training, research and counseling services. Study, followed a format suggested by McClelland's (1969) on achievement motivation in which effectiveness was measured by activities actually performed. Activities were compared to a control group.

Skills or Benefits from CEMA were divided into two categories:

- (1) internal -- used for personal benefit not in action for group, e.g., becoming more self-confident
- (2) external -- applied to ones environment, e.g., applying new skills to ones job or participating actively in community affairs.

The project took into account time (different for change to take place in different people) and several domains:

cognitive -- knowledge and intellectual thought processes.

affective -- feelings, attitudes and emotions.

psychomotor -- learning a muscular or motor skill.

Rejection of innovation could take place at any level.

The sample was well educated relative to the average Ecuadorian population: 15 percent school supervisors, 19 percent school teachers, 35 percent health workers, 16 percent professional change agents, 15 percent non-profit change agents. Training significantly increased awareness (openness to new experiences).

Frits, J. C. (cont.)
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Ex-trainees became more future oriented, more openly critical of their organizations, more likely to use informal address, less likely to use or accept authoritarian methods of resolving conflict, more inclined to work through groups. Change agents scored higher than the control group earning 90 percent of points to be allocated for changed behavior. The author could not pinpoint evidence that this leads to more rapid social and economic change.

Fuller, William P., "More Evidence Supporting the Demise of Pre-Employment Vocational Trade Training: A Case Study of a Factory in India," Comp. Educ. Rev., Vol. 20, No. 1, February 1976, pp. 30-42.

This study examines the relationship of vocational training and performance in specific jobs. It explores the relative effects of alternative types of job training on the performance and promotion of tradesmen in a large, modern factory in South India. Using linear regression analysis, it was found that additional years of secondary performance add to worker performance, and may improve a worker's ability to learn on the job. It was also shown that the type of training is related to job performance: workers who mastered their trade in a firm are more productive than workers who graduated from a vocational institute, but workers trained in a vocational institute are promoted more rapidly within a trade than other workers (trained in a firm).

Gafsi, Salem, Green Revolution: The Tunisian Experience, Ph.D. dissertation, 1975, University of Minnesota, 271 pp.

In order to explain use of high yield durum and bread wheats in Tunisia, two regression models are developed: (1) "Behavioral" -- assuming superiority of high yield seeds; (2) production function. Data was collected from 375 farms in two regions in north Tunisia with different average rainfall values during the years 1972-73.

Conclusions: Degree of adoption of high yield grains is best explained by:

Case 1: (a) price of ordinary yield grains, (b) resource endowments, (c) rainfall, (d) term of use. Significance and sign of parameters differ for durum and bread grains. Family size and education bear small relation to use.

Case 2: Application of high yield durum is neutral; application of bread wheat is non-neutral: farm size is important.

Educational, attitudinal, and socio-economic variables are generally ignored.

Galtung, Johan, "On the Relationship Between Human Resources and Development: Theory, Methods, and Data," J. Devel. Stud., Vol. 8, No. 3, April 1972, pp. 137-154.

This article is a critique of simple linear regression analyses of the relationship between education and economic development. It is argued that investigations are incorrect which assume human resources (education) as the independent variable, that such analyses do not make any assumption about the process of how education contributes to development or vice versa. Also such analyses make one miss the insight that can be derived from the study of transition points, i.e., points where there is a change from predominance in growth of human resources (education) to predominance of growth of development (or vice versa).

Using data from a study by Prof. F. Harbison of Princeton, 38 LDC's are studied for the years 1950, 1955, 1962, and 1965. The empirical methodology employed in this paper is bivariate diachronic analysis (BDA). This analysis is concerned with "shapes of trajectories"; the author took human resources data (primary, secondary, and tertiary school enrollment ratios) together with development data (GNP per capita and/or energy per capita) and developed "trajectories" for distribution of less developed and developed countries. That is, the author combined countries into groups (Mexico, Ecuador, Costa Rica, Columbia, Brazil, Cuba as one group; Panama and Chile as another, etc.) and plotted (by the method of BDA) the relationship between development and education. Six basic shapes of these relationships or "trajectories" were identified.

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Galtung, Johan (cont.)
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The author then concludes that from these shapes, the assumption of linearity employed in synchronic (linear regression) analysis is unwarranted. Specifically, the linearity assumption avoids any critical investigation of the underlying process by assuming human resources as the independent variable. The diachronic analysis allows the investigator to see society as a market where human resources and development are both inputs and outputs, and allows the study of transition points.

Gintis, Herbert, "Education, Technology, and the Characteristics of Worker Productivity," Amer. Econ. Rev., Vol. 41, No. 2, May 1971, pp. 266-279.

This article is a critique of the view that the main effect of schooling is to raise the level of cognitive development (and thereby explaining the relationship between schooling and earnings). It is argued that the contribution of schooling to worker earnings cannot be explained by the relationship between schooling and the level of cognitive achievement.

The author reviews various studies, and specifies two regression models that indicate that, from the results of the studies, noncognitive personality characteristics have a direct bearing on workers' productivity and earnings, while the link between schooling, cognitive ability, and earnings is incorrect. The author then reviews a list of personality traits that (he argues) are developed through schooling, and therefore effect earnings -- "subordinating, Discipline, Modes of Response, and Motivation according to external rewards."

Godfrey, E. M., "Economic Variables and Rural-Urban Migration: Some Thoughts on the Todoru Hypothesis," J. Devel. Stud., Vol. 10, No. 11, October 1973, pp. 66-78.

This article criticizes the Todoru approach to net urban-rural migration because it does not include specifically a variable for educational change. Using data for Ghana for the years 1955-1965, a migration model is specified allowing for an education variable, and the results are compared with results using Todoru's model. The model that included the education variable did not explain migration any better than the Todoru model, but the author's argued that this could be due to poor data.

03, 21, 18

Godfrey, Martin, "Education, Training, Productivity and Income: A Kenyan Core Study," Institute of Development Studies Discussion Paper, University of Sussex, Brighton, England.

This paper reports an attempt to measure the effects of education, training, and other factors on productivity and income, using as a proxy for productivity the performance in government trades tests of craft skills. The sample is interviews made in Kenya, January 1973. The survey suggests: those who have undergone full-time training courses do worse at all grades of tests than those who have not; schooling appears to be of small significance in explaining that performance, and the market for skilled and semi-skilled labor may be one where schooling and training background may not be particularly important determinants of rewards.

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Goldfarb, Marsha, Some Evidence on Educational Relationships in Chile,
Economic Growth Center, Yale Univ., 1972.

The report provides two exploratory analyses to improve knowledge of costs, benefits and production technology in education in Chile. The first study tries to predict the dropout rate of students in the private sector. This is important in correlating a link between input costs of education to outputs of education. If \$X are spent on 10 students and 6 dropout, the result is much different than spending \$X's and only 1 dropping out. This analysis shows that one may be able to manipulate some variables in order to reduce the dropout rate (dropout rate = f (school characteristics, teacher characteristics, administrative and financial characteristics, income and cost characteristics of student body, economic situation of the area of the school)). The survey covered 1,908 schools and 11,111 teachers and regression analysis was used on small subsamples of independent variables.

Results of regressions are:

1. school facilities are significant in explaining dropout rates in urban schools.
2. regressions are far less satisfactory for rural schools than urban.
3. financial variables (such as percent of student's receiving scholarships) are significant.
4. formal educational attainments of teachers did not influence dropout rates.

The second study considered what factors affect worker's incomes in Santiago manufacturing. It compares the effects of years of education to effects of a number of other human capital variables on workers earnings in Santiago. The workers basic earnings plus fringe benefits were regressed against (1) years of formal education, (2) diploma effects, (3) educational tracking, (4) whether worker has had special training programs, (5) age, (6) years at firm, (7) union membership, (8) marital status, (9) health, (10) industry of employment, and (11) size of firm variables. A sample of 2,877 was used and stratified into subsamples of white collar male, blue collar male, white collar female, and blue collar female.

The results of regression analysis are:

- (1) worker's incomes are reliably associated with worker experience, age, and years at the firm.
- (2) education variables have mixed effects. Years of education have a major impact only on earnings of male white collar workers, but there are diploma effects. Educational track is significant for the other three subsamples.
- (3) marital status and firm size affect income positively.
- (4) special training programs often raise income
- (5) if education is used to explain income without controlling for age, seniority, and other differences than the return to education will appear much higher than it is.

A further result of the research showed that private educational costs are but a fraction of total costs, thus private rates of return are higher than social. The calculation of rates of return ignores income distribution

effects of subsidizing secondary and university education and rates of return to education may be overstated if the co-variance of other labor market variables to education are not netted out. Also, rates of returns are allegedly too low because they ignore important externalities of education. It is noted that rate of return calculations may be in error unless adjusted to the probability that the worker will be unemployed. In general, the lockstep between formal education and growth generation skills has never been fully demonstrated.

Gounder, A. M Nalla, "Investment in Education in India," J. Human Res.,
Vol. 2, No. 3, Summer 1967, pp. 347-358.

Internal rates of return are estimated for 1960-1961 using age-earnings profits. The author found that rates of return decline with the level of education and that rates of return to physical capital exceed rates of return to education at all levels except primary schooling. It was shown that educational capital grew at 48 percent as opposed to 60 to 70 percent for physical capital despite the belief that physical capital is thought to depreciate over time while human capital appreciates via experience.

Emphasis should be placed on primary education facilities to improve the level of schooling completed and greater emphasis on primary education would be desirable. The higher rate of return on physical capital may lead to accelerated economic growth which would lead to expanded capability to support education. If education is emphasized while its return is lower, then the economy's capacity to support education and the resources available for education may dwindle.

Griliches, Zvi, "Capital-skill Complimentarity," Rev. Econ. Statist., Vol. LI, No. 4, November 1969, pp. 465-468.

This analysis draws upon the author's previous work, "Notes on the Role of Education in Production Functions and Growth Accounting." The following three input demand model is used for testing the possibility that "skills" or "education" is more complimentary with physical capital than "unskilled" or "raw labor":

$$(1) \ln S/N = a_1 + (N_{sn} - N_{nn}) \ln W/Z + (N_{sk} - N_{nk}) \ln R/Z$$

$$(2) \ln S/K = a_2 + (N_{sn} - N_{kn}) \ln W/Z + (N_{sk} - N_{kk}) \ln R/Z$$

where $N \equiv$ raw labor; $k \equiv$ capital; $s \equiv$ skill (schooling) corresponding rental prices: W , R , and Z .

Constant returns to scale are assumed. Also, $N_{ij} = V_j \sigma_{ij}$, where V_j is the share of the j^{th} factor in total costs and the σ_{ij} 's are the Allen-Ugawa partial elasticities of substitution ($\sigma_{ij} = \sigma_{ji}$ and $\sigma_{ii} < 0$). The hypothesis can be restated:

$$0 < \sigma_{nk} > \sigma_{sk} \quad \text{and} \quad \sigma_{kn} > \sigma_{sn},$$

and implies a negative coefficient for $\ln R/Z$ in (1) and for W/Z in (2).

Equations (1) and (2) are derived demand equations from a production function $f = F(N, S, K)$. The hypothesis is that skilled labor is more complementary with physical capital than unskilled labor can be restated as saying that the partial elasticity of substitution between capital and unskilled labor is greater than the partial elasticity of skill labor and capital.

Griliches assumes that the price of skilled labor (Z) has been equalized by the mobility of educated labor, and hence is treated as constant across states and industries.

Two measures of skill are used: (1) an all inclusive "quality per man" measure using the observed occupational and sex distribution within an industry and state and national average earnings by occupation and sex to "predict" the earnings (earning power) of the average worker in the particular industry and state, (2) the second measure is just the ratio of the number of skilled to unskilled workers, where "skill" is defined as all workers who are not laborers, operatives, or service workers. In both sets of data it was found that "skill" or "schooling" is more complimentary with capital than is unskilled or unschooled labor.

Griliches, Zvi, and Mason, William M., "Education, Income and Ability,"

J. Polit. Econ., Vol. 80, No. 3, Part II, May/June 1972, pp. S74-S104.

This article is concerned with the effect of education and ability on income. The basic problem and analytical framework can be demonstrated as follows:

Let income be a linear function of education and ability, or,

$$(1) Y = a + B_1 E + B_2 G + u,$$

where Y = income; E = education; G = ability. Other factors representing income are assumed random and uncorrelated with E and G.

The contributions of authors who ignore the interaction of education with ability may result in estimates of the education-income relation that are too high. If education and ability are positively associated, then such least squares estimates will be biased upwards by the amount $Bz b_{GE}$, where b_{GE} is the regression coefficient of ability on education in a particular sample. Part of the analysis of this paper is concerned with the magnitude of this bias via the income generating equations containing measures of both of education and ability.

In the data the output of the educational process is measured by the number of school grades completed in the formal education system, while ability is measured by the performance on a test at an age when most of the schooling has already been completed. The data are based on a 1964 sample of U.S. military veterans. The variables measured include scores on a mental ability test, indicators of parental status, region of residence while growing up, school years completed before service, and school years completed after

service. Thus, the separate effects of parental background, intelligence, and schooling are explored.

The measures of education and ability are far from ideal: for the education of variable E, what would be ideal is a measure of education achieved. What is obtained is the years of schooling completed (S) without reference to the conditions under which individuals obtained their formal schooling and the kinds of schooling pursued. The discrepancy between S and E is defined by G + M as "quality" (Q), where $E = Q + S$, (quality is assumed uncorrelated with S). But Q is likely to be correlated with ability because (1) there is some correlation between socioeconomic status and ability, (2) more able students are likely to get into better schools, and (3) performances on intelligence tests taken at age 18 or so reflects in part differences in both the quantity and quality of education.

Allowing for the differences in quality of education makes the assessment of the bias in equation (1) more complicated. The true income generating equation becomes

$$(2) \quad Y = a + B_1 E + B_2 G + u \\ = a + B_1 S + B_1 Q + B_2 G + u$$

In this framework, ignoring not only G but also P leads to the same result as before since b_{QS} (the regression coefficient of quality on quantity of schooling) is zero by assumption. But when a measure of ability is included in the estimating equation, the estimated education coefficient becomes $b_{XS.G} = B_1 + B_1 b_{QS.G}$ where $b_{QS.G}$ is the partial regression coefficient of quality on quantity of schooling, holding ability constant.

The upward bias due to the omission of ability is eliminated in the following way:

It is demonstrated that

$$(3) b_{QS.G} = - b_{QG} \cdot b_{GS} / (1 - r_{GS}^2)$$

when r_{GS}^2 is the square of the correlation coefficient between quantity of schooling and individual ability; b_{QG} is the regression coefficient of educational quality on individual ability; b_{GS} is the regression coefficient of individual ability on quantity of schooling. Since both b_{GS} and b_{QG} are positive, then $b_{QS.G}$ is negative. If equation (3) is substituted into

$$b_{XS.G} = B_1 + B_2 b_{QS.G} \quad (\text{page 3})$$

$$\begin{aligned} \text{then (4) } b_{XS.G} &= B_1 + B_2 (-b_{QG} \cdot b_{GS} / (1 - r_{GS}^2)) \\ &= B_1 - B_2 b_{QG} \cdot b_{GS} / (1 - r_{GS}^2) \end{aligned}$$

Since $b_{XS} = B_1 + B_2 b_{GS}$, in going from b_{XS} to $b_{XS.G}$ reduces the coefficient from schooling.

However, this result introduces another upward bias due to the correlation of ability with quality of schooling. (The b_{YS} term $>$ $b_{YS.G}$ not only because b_{GS} is positive in (4) but also because b_{QG} is positive.) Griliches and Mason by-pass this bias by concentrating on that part of schooling during or after military service, i.e., post-service schooling.

The ability variable is less than ideal because it is obtained after most of the formal schooling has been completed, and may contain errors (random or non-random) due to earlier acquired ability. To circumvent the effect on random errors (which would understate the effect of ability on income, biasing the estimated education coefficient upward), another model is

specified which contains an unobserved achievement variable in place of measured ability.

Before discussing the results of the regression analyses, the following is a list of the variables used:

Personal Background: age, color, schooling before service, total schooling, post-service schooling, the Air Force Qualification Test, length of active military service, father's schooling, father's occupation, current location, grew up in south, large city, or suburb of large city.

Current Achievement: length of time in current job, never married, current occupation, actual income, log actual income.

The findings support the economic and statistical significance of schooling in the exploration of observed differences in income. They also point out the relatively low independent contribution of measured ability.

The author's conclude that the bias in the estimated coefficient due to the omitted ability dimension is not very large. The results throw doubt on the asserted role of genetic forces in the determination of income. If AFQT is a good measure of IQ and if IQ is largely inherited, then the direct contribution of heredity to current income is minute.

The above findings (as the authors note) are based upon post-service education. The coefficient on pre-service schooling falls more (this implies a larger bias), but the authors attribute this to the interrelationship between test scores and father's status variable and the omitted variable of the quality of schooling.

Griliches, Zvi, "Estimating the Returns to Schooling: Some Econometric Problems," Presidential Address, 3rd World Congress of the Econometric Society, Toronto, August 22, 1975, January 1976.

This article discusses some of the problems in estimating an "earnings function," or a relationship between earnings and education. With respect to simple least squares estimates of earnings functions, the problems of neglecting the "ability" variable is discussed, which is solved by finding a good ability measure or by estimating its effect in some errors -- in variables context. Also, the problem that schooling is the result, at least in part, of an optimizing behavior based upon some anticipated earnings function, and to the extent that the "errors" in the ex-post and ex-ante earnings functions are correlated they will be transmitted to the schooling equation and induce an additional correlation between schooling in such equations. This suggests the use of simultaneous equations methods in estimating the co-efficient of schooling in such equations.

Griliches demonstrates theoretically that:

1. In optimizing models there is no good a priori reason to expect the ability bias (or the direct coefficient of a measure of ability in the earnings function) to be positive. Empirically, Griliches notes that treating the problem by including direct measures of "ability" in the earnings function indicates a relatively small direct contribution of "ability" to the explanation of the observed dispersion in expected and actual earnings.

Haller, T., Education and Rural Development in Colombia, Ph.D. dissertation
Purdue University, 1972.

In this dissertation, Haller attempts to evaluate the contribution of primary school in Colombia to family income, and to develop a model relating education to agricultural development. To test several hypotheses, Haller uses a production function model and a rate of return model.

Data was obtained for four regions typifying transitional rather than a dual economic structure, with many small and medium sized farms using varying amounts of modern inputs. The farm regions are

- (1) Malaga: tobacco region with much share cropping
- (2) Moniguira: mixed farming for primarily local markets
- (3) Chinchin: coffee growing region using modern varieties, mainly family operated
- (4) Espinal: modern roads and technology allowing wide distribution of cotton, sesame, livestock and rice.

Farm production data comes from local farmers interviewed (74 to 77 per site) and school costs data was provided by the government.

The production function model followed the Cobb-Douglas function, relating three capital inputs, two types of labor inputs, land and education. This model allows isolation of both worker and allocative effects of education. Over all regions, the basic model parameters were significant at the 5 percent level (without the education variable). Adding a continuous education variable provided a significant coefficient at the 10 percent level for only one area. Using dummy educational variables yielded no significant parameters associated

with education. Under the most complicated specification, education was found to be significant for various categories, but many had negative signs. These categories suggested that allocative effects do exist.

Schooling, therefore, does not appear to contribute to increased farm family incomes. Nor does it develop worker effects, although allocative effects are detected.

The following are results of five hypotheses tested:

- (1) School does not lead to increased incomes, except occasionally.
- (2) Although no worker effects exist, there is an allocative effect through use of farm inputs.
- (3) Impact of education on production seemed to vary with type of production activity and modern technology; it is firmly established only for the most modern region (4 above).
- (4) The influence of education by input varied with region.
- (5) Cost-benefit analysis suggested that social returns did not match costs of education except in one area.

Hansen, W. Lee; Weisbrod, Burton A.; and Scanlon, W. J.; "Schooling and Earnings of Low Achievers," Amer. Econ. Rev. 60, June 1970, pp. 409-418.

This article analyzes the relationship between schooling, ability, and income of low achievers. The sample studied consisted of 17-25 year old men rejected by the Selective Service System because of low AFQT scores. The technique used to determine the relationship of schooling, ability, and income was linear regression analysis. Income was the dependent variable, age, race, size of family of origin, whether the family of origin was intact, education, job-training, marital status, and AFQT scores were the independent variables.

The results were that schooling is relatively unimportant as a determinant of income.

The coefficient on education drops about 50 percent when the AFQT variable is introduced into the equation, and drops even farther when the job-training and marital status variables are introduced.

Harberger, A. C., "Investment in Men Versus Investment in Machines: The Case of India," in Education and Economic Development, edited by C. A. Anderson and M. J. Bowman, Aldine Publishing Co., Chicago, 1966, pp. 11-50.

The data are based on a survey by the Reserve Bank of India covering 1,001 companies in all industries. To estimate social return to capital, five methods were employed: Method 1: ratio of net income (inclusive of corporation income tax payments), to the net blue book value of physical assets; Method 2: ratio of net income to estimated net blue book value; Method 3: ratio of true net income to true net assets; Method 4: cash flow approach and the estimated net rate of return is that which yields zero present value; and Method 5: uses gross book values to estimate rate of return when present value is zero. The data were also adjusted to account for problems such as price levels. The marginal productivity of capital for 1955-1959 was found to vary between 17 and 26 percent for the most refined data adjustment with the results varying with the "method" used to estimate the social return to capital. The point was that in general physical capital was highly productive for this period.

Education data was divided by earnings per month and schooling level. The author found that age-earnings profile peaked earlier for those workers with lesser education (later for those with more education). The estimated rates of return (these are the most "refined" estimates) were 10 to 12 percent for secondary schooling and 16 to 17 percent for higher education. It should be noted that physical capital estimates were designed to be "over-estimates" indicating productivity of investment in physical capital exceeds that of human capital.

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Harbison, Frederick H., "The Education-Income Connection" with Statistical Appendix by Joan Maruhnic, a paper prepared for the Princeton University, Brookings Institution Project on Income Distribution in Less Developed Countries, USAID, November 1974.

This article is a survey of some of the results of studies in education and the distribution of the income. The following is a statement of Harbison's abstracts of specific articles:

Joan Maruhnic finds: (a) most developing countries devote a substantial portion of GNP to education; (b) less developed countries, in contrast to more developed, appear to allocate a greater proportion of total public expenditures to higher education; (c) the proportion of students in secondary, and particularly higher education, is much smaller in less developed than in more advanced countries; (d) in less developed countries, the annual per-student expenditures on secondary and higher education are higher than in the more advanced.

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Harbison, Frederick H., "The Generation of Employment in Newly Developing Countries," in Education, Employment, and Rural Development, James R. Sheffield, ed., East African Publishing House, Nairobi, Kenya, 1967.

This is a non-empirical survey of the problem of unemployment in developing countries. The reasons given for the high rates of unemployment in developing countries are: high rates of population growth, use of new, labor-saving technology in industry, income distribution inequalities, and using aspirations through the expansion of education. It is argued that a rural transformation -- modernize traditional agricultural and rural life is as important as industrialization, but this policy could not eliminate all unemployment in most developing countries. A policy of limiting population growth is called for.

Harbison, Frederick H.; Maruhnic, Joan; and Resnick, Jane R.; Quantitative Analysis of Modernization and Development, Industrial Relations Section, Princeton University, Princeton, New Jersey, 1970.

The purpose of this volume is to explore and apply various methods of ranking, classification, and comparison of countries, or regions within countries, on the basis of quantitative indicators of development and modernization. The organization of the text is as follows: Chapter 1 is an introduction, discussing the objectives, data, and outline of analysis; Chapter 2 presents and applies the "taxonomic method" for ranking and classification of countries on the basis of various combinations of indicators. (Separate consideration is given to the 112 countries and five sub-groups: Latin America, Asia, Middle East/North Africa, sub-Saharan Africa, and developed countries.) Chapter 3 is devoted to correlation and regression analysis of the indicators; Chapter 4 concentrates on correlation and regression analysis over time; Chapter 5 describes graphical profiles constructed from the data, and the relative positions for selected indicators within groupings of countries; Chapter 6 discusses the Harbison-Myers human resource index developed in the early 1960's; Chapter 7 attempts to establish growth rate relationships through time; and Chapter 8 is a brief summary of conclusions and suggestions for further study.

Concerning the empirical results pertaining to education, the regression analysis indicates a high association of educational effort variables (first, second, and third-level enrollment ratios, percent female enrollment, pupil-teacher ratios, per capita expenditures on education) and per capita

Harbison, F. (cont.)

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GNP. This association was higher for less developed countries. Also, a strong relationship was found between per capita income and the stock of high-level manpower (doctors, dentists, pharmacists, nurses, and teachers). These results were for the year 1965.

With respect to the dynamic analysis, simple correlation coefficients were examined for the periods 1950, 1955, 1960, and 1965, as well as the multiple regression analyses. The relationships among the educational enrollment ratios and per capita expenditure on education were all significant and changed little over time. With the exception of third-level enrollment and expenditures on education in 1950 and 1965, there were no significant relationships in the developed countries.

Concerning the regression analyses, the relationship between income levels and high level manpower is not very strong. In the underdeveloped group, there is a negative relationship between income and higher level teachers. Concerning expenditures on education and enrollment rates, this indicator becomes less dominant in underdeveloped countries over time.

Harker, B. R., Education, Communication, and Agricultural Change: A Study of Japanese Farmers, University of Chicago, Ph.D. Dissertation, 1971, 171 pages.

The data for this article are from a 3,000 sample of Japanese farmers who had sons in primary or secondary schools in 1966. Those farmers who did not grow rice were excluded from the sample. Least squares analysis was used to measure the educational impacts on productivity through the worker and allocative effect.

The results indicated that years of formal schooling and agricultural secondary schooling were both positively correlated with paternal education levels. This indicates that farmers who had more highly educated parents are more likely to have attained some level of formal schooling.

The use of radio or TV broadcasts is not correlated with either measure of schooling. The author found that the number of visits to extension agents is moderately correlated with education. The education level of the farmer and the education level of his father are both positively correlated with the number of visits to agricultural extension agents. Years of formal education did not explain individual differences in productivity per ton (approximately one-fourth acre). However, years of formal education completed by the farmer were positively correlated with differences in gross sales.

The most widely used non-formal informational sources are extension agents, farm cooperatives and other farmers. The use of extension agents is explained by the proportion of farmers in the community whose fathers had no more than primary education. The adoption of new farming techniques is

positively associated with the use of radio and TV, contact with extension agents and the use of agricultural magazines.

The average amount of family labor that is used on the farm is negatively associated with the average level of community education. This paper found that greater educational attainment is positively associated with the use of institutionalized sources of information. An important determinant of the adoption of new farming techniques seems to be the cosmopolitan nature of the community. This study showed that, in general, the more educated farmers tend to be earlier adopters of new farming methods.

Harker, B. R., "The Contribution of Schooling to Agricultural Modernization: An Empirical Analysis," in Education and Rural Development, edited by P. Foster and J. R. Sheffield, World Year Book of Education, 1974, pp. 350-371.

Japan and India are studied in this paper, where the data sources are drawn from the author's Ph.D. dissertation and "A Factor Analysis of Modernization in Village India," by Irma Adelman and George Dalton (Econ. J., 1971). Regression results show that the correlation of education with income vary from .12 for Japan to .64 for India. This implies that in developing countries, where education is rare, it is an extremely important factor in the process of agricultural development. The author cites a study by Potti¹ where the level of literacy was positively related to the adoption of new farming techniques. When media use and knowledge of new practices are introduced into the regression, education remains as a strong determinant of adoption for new agricultural methods. Hence, in general, literacy has a strong influence upon agricultural modernization. A further point is that after the effects of media use are removed, the partial correlation indicates that there might be an attitudinal dimension associated with schooling (which has implications for technological change). The findings from the Indian studies and the Japanese study² imply that schooling can promote modernization of the agricultural sector by its impact upon communication skills. Hence, education, extension services and mass media speed the modernization of agriculture.

¹Unpublished Ph.D. "A Study of Differential Adoption of Improved Farm Practices in Relation to Reference Group Influence and Community Norms," New Delhi, 1969.

²The results of which are included in the abstract of the author's dissertation.

Harmon, A. J., "Fertility and Economic Behavior of Families in the Philippines,"
Rand Corp., RM-6385-AID, September 1970.

This study is an empirical analysis of the interrelationship between fertility and socioeconomic behavior of families. Interrelationships among employment, income, length of marriage and migration are examined. Using Philippine data for 7254 families from a national sample, a regression model was specified. The results show that education significantly influences employment and income for all age groups, although a given educational attainment yields less income for women than men. Increased female education is also correlated with smaller family size, however, not significantly so.

Harris, John R., "Some Problems in Identifying the Role of Entrepreneurship in Economic Development: The Nigerian Case," *Exploration Econ. Hist.*, Vol. 7, No. 3, Spring 1970, pp. 347-371.

The purpose of this paper is to explore some of the conceptual problems that must be faced by the student of entrepreneurship and illustrate these problems in the Nigerian context. Fourteen specific hypotheses were suggested, and data from interviews during 1965 with 269 Nigerian owners of industrial enterprises were used to test these hypotheses. Various tables were constructed.

Some of the results include: (1) there exists considerable inter-generational and individual mobility; (2) while geographic mobility is limited, different ethnic groups displayed different levels of entrepreneurial success; (3) personality requirements for entrepreneurship seem to be quite specific: willingness to forego immediate satisfaction for future gains, a degree of thrift, a desire to succeed, and a capacity for hard and continuing work.

Hause, John C., "Ability and Schooling as Determinants of Lifetime Earnings or If You're So Smart, Why Aren't You Rich?" Amer. Econ. Rev., Vol. 41, No. 2, May 1971, pp. 289-298.

This article is an analysis of the ability-schooling-earnings relationship. Four samples of cohort data are studied (U.S. and Swedish data). Through linear regression analysis, it was demonstrated that there is a positive relationship between schooling and earnings, and a positive relationship of IQ and schooling. Also, it was demonstrated that for most schooling levels there appears to be a tendency for ability to become more important as labor force experience increases.

Hause, John C., "Earnings Profile: Ability and Schooling," J. Polit. Econ.,
Vol. 80, No. 3, Part II, May/June 1972, pp. S108-S138.

This study examines the role played by ability in determining earnings differentials along both the earnings profile for given levels of schooling attainment and across schooling levels. Ability is measured by IQ or closely related test scores (IQ tests measure ability on both the achievement of specific skills and the speed with which these skills can be applied). Two hypotheses were considered: the complementarity of ability with schooling on earnings, and the complementarity of ability and job-experience on earnings.

Four samples of cohort data were examined to test the ability-schooling-earnings relationship. Using regression analysis, both the statistical tests based upon pooling the school attainment classes, and the pattern of coefficients on measured ability (from regressions run within schooling class) strongly support the hypotheses on the complementarity of ability with schooling and post-school experience in producing earnings. There was a modest contribution of measured ability in explaining differences in earnings, in contrast to the strong association of measured ability and school attainment. This is not surprising, since most of the ability measures studied in this paper are designed to forecast academic potential and achievement.

MS

Hershoqitz, M., and Sussman, Zvi, "Growth, Induced Changes in Final Demand, Educational Requirements, and Wage Differentials," Rev. Econ. Statist., Vol. 53, May 1971, No. 2, pp. 169-176.

This paper is concerned with analyzing one aspect of growth -- the influence of changes in the composition of consumption, both on the demand for skill and education and on occupational wage differentials. The analysis uses data from Israel for the years 1958 thru 1965.

The authors estimate the derived demand for education, due to changes in the structure of consumption caused by increases in per capita income. The results are that changes in the structure of consumption have a negligible effect on average educational requirements.

Next, the authors consider the effect of changes in the composition of consumption on the demand for different levels of education, and their effect on wage differentials. Changes in the dispersion of educational requirements (in times of years of schooling) were calculated in order to assess the effect of changes in the structure of consumption on wage differentials. It was shown that the dispersion tended to remain stable.

The authors also analyzed the effect of changes in labor productivity on the demand for education, and estimated the bias introduced by omitting this variable in the above analysis. It was shown that changes in productivity tended to lower average educational requirements, but had no effect on their dispersion. Their analysis was also modified to incorporate foreign trade data, and it was demonstrated that this modification did not effect the above results.

Herzog, William A., Jr., "Adult Education in Northeast Brazil: Does Literacy Make People More Modern?" in Educational Alternatives in Latin America: Social Change and Social Stratification, ed. by Thom. J. LaBelle, Latin American Center, UCLA, 1975, pp. 185-208.

Study site and methodology: The Cruzada Program, from Joao Pessoa and Paraiba, Brazil. The data were collected from a privately operated adult literacy program for 15 to 30 year olds who had missed regular literacy training.

Time series data were desired, but four spot samples from different levels had to suffice because the program shut down.

Survey sample size: Joao Pessoa - 427 students

Paraiba - 254 students

The Cruzada Program: this program was directed at illiterates at the low end of the socio-economic scale.

Sample variables measured personal characteristics: marital status, age, sex, number of children, birthplace, mobility, term of residence in present dwelling; and socio-economic status factors: home improvements, type of housing, occupational level, monthly salary.

Communication factors, Social contacts, Health and sanitation, and Modern Attitudes were also tested.

Trends observed correlating with literacy among both males and females, in both cities, are as follows:

1. number of home improvements
2. occupational level
3. salary

Herzog, W. (cont.)

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4. newspaper reading ability

5. sanitary garbage disposal

From the above findings, points 2 and 3 indicate that increased literacy leads to increased wages and occupational status, or that increased wages, and higher occupation allow longer attendance in the program. This suggests existence of a motivation factor not counted. Progress appears to be too consistent, however, for motivation to fully explain wage differentials.

The Cruzada Program did seem to add to awareness, media exposure and community activity in a modern direction.

Herzog, William A., et.al., Patterns of Diffusion in Rural Brazil, AID Research Paper, Dept. of Communication, Michigan State University, East Lansing, 1968, 115 pages.

This is a sociological examination of who best promotes adoption of new ideas within a community: innovators or opinion leaders. Innovators are demonstrators, opinion leaders foster widespread adoption. This report attempts a determination of the most reliable information sources and roles and qualities of innovators and opinion leaders. The sample consists of 1,307 interviews from 20 communities in Minas Gerais, Brazil. Five variables are related to innovation opinion leadership: (1) age -- education, (2) economic factors, (3) mass media exposure, (4) social participation, (5) modernity. Collinearity of dependent and independent variables was isolated through multiple correlation and configurational analyses.

Innovation and opinion leader classes do overlap. Innovators tend to be low opinion leaders. Opinion leaders tend to be Medium Innovators. Information sources most trusted are (1) AGAR Supervisors (credit, development agency), (2) neighbors, (3) radio, (4) newspapers. Recommendations for change agencies are the following: (1) identify innovators and opinion leaders, (2) use configurational analysis for further pinpointing innovators and opinion leaders, (3) consider community norms, (4) expand and support increased flow of information into communities through channels thus developed.

Hinchliffe, Keith, "Earnings Determinants in the Nigerian Textile Industry,"
Comp. Educ. Review, Vol. 20, No. 1, February 1976, pp. 48-51.

This article is concerned with the following issues, using textile workers in Nigeria (1972) as a case study: (1) the extent to which worker productivity is related to dyficient levels of schooling, (2) the extent to which experience (or learning by doing) compensates for formal education or training, (3) does the money saved by learning through experience outweigh the time lost?, (4) is primary schooling useful to firms only as a method of reducing the number of applications, or is it a factor actually influencing productivity levels? A regression model was specified, relating earnings to age, years of experience in the firm, and years of primary, secondary grammar, commercial and technical schooling. Regressions were run for four separate labor categories -- daily paid operatives, clerical workers, artisians, and technicians.

The results were: (1) between one-third and one-half of earning variations within work categories are accounted for by variations in age, industrial experience and education among the labor force; (2) earnings variations between firms are substantially accounted for by the variations in (1) above; (3) years of experience in the firm appeared to be the overall most important single determinant of earnings variations and is generally a satisfactory substitute for primary schooling; (4) primary schooling alone does not appear to be a particular profitable investment in purely economic terms; (5) the results of the earnings functions suggest that secondary education has a substantial effect on earnings levels and to substitute for it by experience would involve a very long waiting period.

Hoath, James R.; von der Mehden, Fred R.; Yatsushiro, Toshio; "Innovation in Northeast Thailand," unpublished paper, 1966.

This study is an analysis of agricultural innovations and community development in a province of Northeast Thailand. Data was from a survey conducted during the first half of 1966 by the Research Division of AID. The study attempted to identify the socio-economic characteristics of the innovators, to determine the sources of information employed by the innovator, and to assess his use of this information.

The results of the survey indicated that the most apparent difference between the innovator and others is his level of education and his drive to avail himself of the additional information. The innovator's wealth position did not differ greatly from non-innovators. It was also shown that the village officials appear to be the heart of the system by which technical information moves into rural areas, with substantial diffusion from neighbor to neighbor. Also, mass media are not an influential part of the channel of information, and the effects of the marketplace as a channel of information, and the effects of the marketplace as a channel of information were not identified. The community officials were identified as the source of ideas for change, and community meetings as the mechanism for initiating the change.

Hoerr, O. D., "Education, Income, and Equity in Malaysia," Econ. Develop. Cult. Change, Vol. 21, #2, January 1973, pp. 247-273.

This paper examines the returns to educational investment in Malaysia and their implications for public-sector resource allocation policies, as well as the distributional aspects of public investment in education. The basic data was from a sample survey of households, 1967-68 published by the Malaysian government's Department of Statistics, 1970. Using regression analysis, the study determined the effect of education on income, education broken down into seven categories, from "unschooled" to "teacher-training." Next, the average yearly costs per student was obtained from "Educational Statistics of Malaysia, 1938-67."

The study then determined the cumulative and marginal social benefit/cost ratios under different discount rates. The results were that incremental returns to secondary schooling were two to three times higher than elsewhere and well above the opportunity cost of capital. The returns to primary and tertiary education, on the other hand, were actually beneath capital's presumed marginal productivity.

Other results concerned on-the-job training, implying that the more schooling one has, the more valuable to him will be each year of age/experience -- not simply absolutely -- but relatively. Not only do the less educated commence employment at lower salaries than the better educated in their age cohort, but their incomes rise more slowly both absolutely and relatively. The main reason for this was found to be a reinforcement of educational discrepancies by on-the-job training programs whose intensity

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Hoerr, O. D. (cont.)

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varies with prior scholastic attainment. This implies that even if intelligence and motivation are not perfectly correlated with school attainment, they do not overcome the (on-the-job training reinforced) income effects of educational deprivation.

Hoerr, O. D., "Educational Returns and Educational Reform in Ethiopia," in Eastern Africa Economic Review, Vol. 6, No. 2, 1972, pp. 18-34.

Hoerr sets up a model explaining differences in income by age, years of schooling, and public/private sector employment. Data was collected from business establishments for 40,000 individuals. Those surveyed included (1) public sector employees (including teachers); (2) semi-public or chartered institutions; or (3) large or modern private enterprise. Both private and social returns were computed by level of education, as were costs.

Rate of return computations are then applied to Day and Evening classes for years of schooling (6, 8, and 12) for values before and after the Education Sector Review (ESR) of 1971-1972. Private and social returns were computed and in all cases the ESR caused returns to increase except for people with 12 years of schooling. For this group, day classes had very little effect, but evening instruction was associated with a lower rate of return post-reform.

Conclusions: (1) Schooling enhances earnings terrifically; (2) age, education, and sector of employment explain 94.5 percent of variation in income and education explains 86.2 percent of total variation; (3) expenditures on university students are among the highest in the world, raising questions of both equity and efficiency; (4) there is generally underinvestment in education; (5) highest returns accrue to 6 to 8 years of schooling; and (6) ESR is worthwhile and should be expanded for the primary sector.

Honey, Wava G., "Educational and Occupational Attainment of Migrants and Nonmigrants from a Colombian Highland Community," Land Tenure Center, University of Wisconsin - Madison, Research Paper #63, February 1975.

This study examines overall educational and occupational levels and residential mobility as well as differentials on these variables by the degree of parental land ownership for two generations of residents from a community in the Colombian highlands. The analysis is based on a field study conducted by the author and her husband during 1966-1967. Various tables were prepared displaying population characteristics for three generations. Some of these characteristics were mean educational achievement, occupational level, land owned, family income, and primary and secondary occupation by migration status (migrant, non-migrant).

The implications of the study are that expansion of educational facilities for rural masses cannot take place without pervasive changes in the ownership and control of economic and political resources. As long as the terms of trade favor the urban areas, neither local nor outside resources will be channeled into rural education or into other programs for the rural populace, it is argued. Also, education does not appear to be a panacea for future generations of rural youth. Structural constraints so limit the job market that education alone does not assure productive employment. Even if present forms of education were made available to all rural children, this would not enhance their chances for remunerative employment because of the relative advantages of urban youth and limited, if any, change in the number of such occupational positions.

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Hopcraft, P. N., Human Resources and Technical Skills in Agricultural Development: An Economic Evaluation of Educative Investments in Kenya's Small Farm Sector, Stanford University Ph.D. Dissertation, 1974, 234 pp.

The data source for this project was a survey by the Kenyan government called the "Enterprise Cost Survey" which surveyed 1,700 farms in 1969-1970. This produced information on personal, family, ownership, education, and employment status of the persons living on these 1,700 farms.

Stepwise regression analysis of maize farmer's production showed that Farmer Training Centers were not significant as these centers emphasized other aspects of farming and not maize production specifically. Actual field demonstrations were significant in explaining increased maize production. Those who attended were approximately 50 percent more productive than those who did not attend. These positive effects of demonstrations remain with the introduction of zone variables which compensate for geographic and climatic differences between farm areas.

The use of extension services did not seem to increase the rate of adoption of hybrid variants of crops but extension did seem to increase productivity once the hybrid was being used. The important variable in increasing the adoption of the hybrid was the attendance at demonstrations.

Further results from this study show that formal education tended to alienate farm people from farming and direct them toward opportunities in the urban markets. Also, formal schooling did not seem to increase farming productivity rather rural non-formal types of education were most responsible for increased production. One encouraging result of education was its impact on

increasing the farmer's awareness of modern farming techniques and sources from which information is readily available. These findings indicate that increased formal educational investment will not substantially increase productivity and, since most graduates will be employed in the agricultural sector, these investments may be misallocated.

Concerning the evidence on agricultural extension service, the results were mixed. However, one important finding was the rapidly declining contribution of the marginal visit to increasing farm output. This implies that there is some limit to the number of visits and their effectiveness.

The one consistent result was that demonstrations were highly effective in increasing agricultural output and farmers' earnings. One explanation is that demonstrations are visual and the results are immediately grasped by those attending. Another explanation is that the audience is motivated since each farmer must go to see a demonstration in contrast to the extension worker who seeks out the farmers.

These findings indicate that expansion of the formal education system is not warranted. Rather emphasis should be placed on non-formal rural education methods such as the demonstration program.

Huang, Y., "Allocation Efficiency in a Developing Agricultural Economy in Malaya," Amer. J. of Agr. Econ., Vol. 53, No. 3, 1971, pp. 514-516.

This study focused on how allocative efficiencies change with development stages. Using data from the Malaysian government, the author evaluated paddy production with respect to land area, variable inputs, family labor, and hired labor. This Cobb-Douglas form of the production function was applied to three different geographic areas.

The results indicate that allocative inefficiencies are most common in the transition from a subsistence oriented economy to a double-cropping commercially oriented agricultural sector. Over time, it was shown that these allocative inefficiencies disappear as farmers respond to the changes and possibilities for double-cropping.

Huffman, W., The Contribution of Education and Extension to Differential Rates of Change, University of Chicago, Ph.D. dissertation, 1972, 138 pp.

This seeks to isolate the contribution of education, extension, and other economic variables to the movement toward optimum usage of commercial nitrogen fertilizer per acre of corn. This study utilizes a regression model and data from the Census of Agriculture that is limited to Midwestern counties (U.S.).

The author's findings support the expected conclusion that farmers with greater education adjust to disequilibrium faster than those with less education. A possible reason is that those with higher degrees of education are more aware of sources for information and exhibit greater responsiveness to changes of relative prices.

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International Labour Office, The Quality of Labour and Economic Development
In Certain Countries, International Labour Office, Geneva, 1964,
116 pp.

This work presents a mathematical model explaining changes in income by "Quality of Labor" variables: education, health, caloric intake, investment in dwellings, and social security. The sample consisted of 52 countries stratified by income per capita. Regressions on selected variables by income class were run, relating relative change in income to level of investment, and relative changes in labor force in combination with quality variables.

Conclusions: (1) Addition of "quality" variables enhances modeling results; (2) level of nutrition (calories) explains growth the best of all variables; (3) higher education enrollments show promise, especially for low income countries; (4) variables with lower estimated impact should not be rejected. This modeling effort applies the production function technique for deriving formulas, but focuses on aggregate measures.

Iutaka, S.; Bock, E. W.; and Varnes, W. G., "Factors Affecting Fertility of Natives and Migrants in Urban Brazil," Pop. Stud., Vol. 25, No. 1, March 1971, pp. 55-63.

This paper is an investigation of the factors related to fertility patterns in a modernizing society. The primary concerns of the study are the ways in which migration, a major component of urbanization, affects the fertility patterns of the receiving urban centers.

Using Brazilian data for the years 1959-1960, a multiple regression was performed. The dependent variable was the mean number of children for married males, the independent variables being age, age at marriage, size of cities, migratory status, colour, education, social status, father-in-law's social status, and father's social status. Of the nine variables, only father's social status was not statistically significant.

Jallade, Jean-Pierre, Public Expenditures on Education and Income Distribution in Colombia, World Bank Staff, Occasional Papers, No. 18, 1974.

This study is of the relationship between public expenditures on education and income distribution in Colombia. The data is from the years 1967 and 1970. Both taxes paid and public subsidies to education, with participation rates by income class by level of schooling, are considered in the analysis.

The public financing of education in Colombia contributes to redistribution of income from the rich to the poor. This effect is stronger in urban than in rural areas. The poor are the principal beneficiaries of public subsidies to primary schooling, while middle income groups are the principal beneficiaries at the secondary level. The author notes the importance of migration to the urban areas in order to complete secondary schooling.

Jamison, Dean; Suppes, Patrick; and Wells, Stuart; "The Effectiveness of Alternative Instructional Media: A Survey," Review of Educational Research, Vol. 44, No. 1, Winter 1974.

Several types of instructional media are examined: traditional classroom instruction (TI), instructional radio (IR), instructional television (ITV), programmed instruction (PI), and computer assisted instruction (CAI).*

TI: This contains a survey of the recent regression analysis explaining scholastic achievement. The survey points to the lack of uniformity concerning the significance of various independent variables. For TI, class size is the most significant independent variable. The large class may adversely affect the interpersonal aspects of the classroom since the quality of interaction seems to be inversely related to class size at the elementary level. A consistent finding for TI has been that small classes improve the performance of young children.

IR: A study in Thailand by Schramm (1967) found that students who received radio supplements were superior to those who did not receive the radio lessons (the lessons averaged 10 to 30 minutes weekly in each subject). Numerous other studies have indicated that IR accompanied with printed materials can be as effective in teaching as TI or ITV. However, more research is needed to determine the potential economic impact for developing countries.

* Note that achievement tests are used as measures of effectiveness of the instructional media (annual data) and related only to instruction within a school setting.

ITV: Chee and Schramm (1967) found that younger students respond more favorably than older students to ITV. Administrators tend to favor this to a greater degree than teachers and, it seems to be more effective at the elementary level of education. ITV has been found to be roughly as effective in teaching as TI for all educational levels and the initial negative attitudes of teachers and students tends to lessen with time and "appropriate" administration behavior.

PI: Schramm's study indicated that out of 36 studies comparing TI and PI, 18 showed no significant difference between the two, 17 showed superiority for PI, and one indicated the superiority of TI. Other research has indicated that intelligent students (and creative ones) benefit more from this method in terms of speed of learning and post-test scores. Generally studies show that PI is as effective as TI and may reduce the time needed by each student to achieve specific educational goals.

CAI: A survey of the recent literature indicates that: (1) CAI is effective as a supplement to regular lessons for elementary level education; and (2) at the secondary and university levels, CAI is about as effective as TI when used as a replacement and it may have substantial savings of student's time. In general, technical advancement in education should be used as an augmentor to aid teachers and not as a replacement.

Johnson, George E., "The Determination of Individual Hourly Earnings in Urban Kenya," Center for Research on Economic Development, University of Michigan, Ann Arbor, Michigan, Discussion Paper #21, May 1972.

The purpose of this paper was to investigate the factors which account for differences among individuals in hourly earnings in urban Kenya. Using micro data for 1970 from a survey conducted by the Nairobi City Council, an earnings function was specified and regressions were performed. Education was the single most important variable explaining the logarithm of an individual's hourly earnings, with an increasing marginal proportionate effect of education on wages as the level of education is increased. Also, the effect of the human capital variables, age and education, is systematically different for the self-employed and employers. This suggests that petty capitalism is an alternative to the modern sector only for the relatively uneducated.

Khalifa, A. M., "A Proposed Explanation of the Fertility Gap Differentials by Socio-Economic Status and Modernity: The Case of Egypt," Pop. Stud., Vol. 27, No. 3, November 1973, pp. 431-443.

This paper is concerned with the effects on fertility of three types of variables: socio-economic status, demographic, and contraceptive use. Contraceptive use was considered as an intervening explanatory variable, varying with the structural and demographic variables.

Using Egyptian data for 1970 tables were prepared comparing number of children ever born among ever-users and never-users (contraceptives) concerning the following variables: wife's education, husband's education, husband's occupation, income, wife's age at marriage, husband's age at marriage, ownership of modern durables, access to mass media, and wife's social status. These variables were ranked low, medium, and high. The results were that completed number of children born alive decreases as the variables increase from low to high for any of the nine variables for each of the two subgroups: ever-users and never-users, and ever-users reported smaller numbers of children than never-users for each value of any of the nine variables.

Khin, Muang Kyi and Associates, "Process of Communication in Modernization of Rural Society: A Survey Report on Two Burmese Villages," Maylayan Econ. Rev., Vol. 18, No. 1, 1973, pp. 55-73.

Both towns were studied in 1970 by the Department of Research of the Institute of Economics (both were previously studied in 1956). Communication is viewed not only as an essential process for social interaction but as a means for social change. For this paper's purpose, modernization is seen as the process of changing from a self-sufficient peasant economy into an advanced technological farming society. That is one that is monetized, technically advanced, market-oriented, structurally differentiated and able to carry on self-sustained economic growth.

In this process of modernization, communication must provide the information that is necessary for social change and innovation, e.g., communication is a necessary condition to establish a modern market economy.

It should be noted that the two towns differ markedly in that one is connected to regional city by rail and a dirt road, whereas the other is located on a main highway leading out of the regional center. This translates into the fact that the first village has impaired access to the larger city while the second village has comfortable access to the city. Also, the second town is larger and has a more complicated political exposure.

Despite these differences both towns have experienced an increased demand for education and both have similar proportions of their respective populations having access to radio. However, examination of the programs that are listened to indicates that radio serves as a method of entertainment

rather than instruction. This is verified by the fact that only 11 percent of the smaller village and 4 percent of the larger one listen to the rural educational program. Further, newspaper occasional readership is only 36 and 35 percent respectively. Movies were seen in the last year by 46 percent and 47 percent of the two towns.

A discouraging result concerned identifying world, national, and local officials. At the local level only 7 percent of the smaller town could identify the local agricultural extension worker while 0 percent of the other village identified this person. Radio, newspapers, or movies did not seem to have any impact upon the local level of knowledge; however, these media forms did seem to increase the villagers' national and world-wide awareness. The important point of this is that the modernizing process must be supported by face-to-face relationships and local organizations to support the dissemination of information. This study also indicates that current radio programming is more urban biased and urban directed than is needed for the modernization of rural areas.

Kinyanjui, K., "Educational Opportunities for Rural and Urban Communities in Kenya," in Road to the Village Case Studies in African Development by J. R. Sheffield, African-American Institute, New York, 1974, pp. 114-146.

For the purpose of this paper, educational resources = finance, teachers and teaching facilities and opportunities = chances of being enrolled at primary or secondary school.

This paper aims to analyze the nature and extent of disparities between rural and urban areas with respect to educational resources and opportunities. Teachers' salaries make up most of the expenditure as primary education and urban areas with more highly qualified teachers get more money. A current problem is how to distribute the qualified teachers evenly as well as to increase the number of them. The Kenya School Equipment Scheme provides a standard allotment per child but urban centers (Nairobi) can add to this allotment and increase the expenditure per pupil. Noting that rural incomes have lagged behind urban ones, implies that the sacrifice to fund schooling is far higher in the rural areas. Further, the rural schools suffer from seasonal drought which severely impacts the rural economy whereas the urban centers are somewhat insulated from climatic variations. Urban centers are also able to provide a more varied curriculum and better supervision.

A further problem is that rural students terminate their education with the primary level, yet, the primary education is designed to prepare one for secondary level by means of the Certificate of Primary Education. Most of the national secondary schools are located in Nairobi and other

Kinyanjui, K. (cont.)
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urban areas, thus introducing the problem of geographic mobility. The point is that despite advances in the expansion of education, regional inequalities have remained. The end result has been that the wealthy and politically influential areas have been able to prosper in this era of expanding education implying that how far a student goes depends in large part on his/her parents' financial situation.

Kiros, Fazzil G.; Hushkin, Selma J.; and Billings, Bradley B., Educational Outcome Measurement in Developing Countries, Public Services Laboratory, Georgetown University and the Institute of Development Research, Ethiopia, 1975, 184 pages.

Effectiveness measures of education have changed the focus from inputs (e.g., classroom size, expenditure per pupil) to output indices. These measurements can then be used to formulate policy. Human capital investment must be considered in reference to whether or not the acquired skills can be used to improve productivity. Attitudes and attributes have become both inputs and outputs.

Personality factors with positive impact on performance include: independence, ability to make consistent decisions and achievement motivation. Other factors such as self-concept have an important bearing upon performance. The problem is to find testing methods which provide accurate estimates for these types of measures.

Studies in developed countries have shown that background, i.e., socio-economic status, plays an important role. Background variables have explained variability in achievement measures again and again. Performance at any given point in time depends greatly upon previous total experience which includes: ability (innate), motivation, self-concept, and other factors. Thus innate ability measures provide at most some likelihood of future success or failure. Two views have been identified in the process of modernization (1) personality changes, and (2) institutional changes. The characteristics of the country will influence these two processes and determine the appropriate combination.

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Education is an agent of change which produces complex results. Denison has estimated that between 12 and 23 percent of the total real national (USA) income growth can be attributed to education. The productivity impact is measured by comparing changes in physical output with changes in education status (from formal or non-formal methods). A problem remains: how to develop reliable measures for testing the impact of education.

In general, evaluations should be used to define program potential, target resources, encourage program change, and facilitate cost comparisons. However, these evaluations should be tempered by a tendency to lead to premature political conclusions. Evaluations should be only used when necessary and they should be considered as beginnings and not sufficient for major policy decisions.

Klevmarken, Anders and Quigley, John M., "Age, Experience, Earnings, and Investments in Human Capital," J. Polit. Econ., Vol. 84, No. 1, February 1976, pp. 47-72.

This paper explores the distinction between physical age and experience within the context of the human capital model of earnings determination. The authors extend the human capital model to distinguish the investment behavior of age -- experience cohorts and to incorporate the effects of calendar time. Several alternative models are developed which are empirically tested based on a unique body of data (Swedish engineering graduates) reflecting the earnings of cohorts with identical educational qualifications cross-classified by age and experience for a ten-year period. The data include geometric average salaries by age, year of graduation, and calendar year for separate populations of electrical and mechanical engineers.

Using the method of least squares, it found that salary increases peak at approximately 3 or 4 years of experience. Also, the sample was divided into a "quick" group, composed of those who are younger than "normal" at graduation; a "normal" group, who graduate at the "normal" age; and a "slow" group, composed of those who are older than "normal" at graduation. These are characterized in the following way: the quick group is composed of students who are more efficient at learning than average but with no previous labor market experience; the "normal" group contains students of average ability who graduate with no (or very little) previous labor market experience; and the "slow" group contains those who are less efficient in learning than average but are often those with additional market experience. The empirical model demonstrated that starting salary is smaller for the normal group than for the other two groups.

Also, the analysis suggests that the U-shaped relation between starting salary and age of graduation is the result of two factors: the relatively greater ability of those who are youngest at graduation, and the relatively greater labor market experience of those who are oldest at graduation. The results also suggest that elapsed time to the completion of graduate training is related to "ability" in ways postulated by the theory of human capital.

Krueger, Anne O., "Rates of Return to Turkish Higher Education," in J. Human Res., Vol. 7, No. 4, 1972, pp. 482-499.

The author found that an imbalance exists between middle and upper skill levels and that this is increasing. Employers report hiring university graduates to undertake jobs which could be performed by persons of less training. This practice causes lower productivity for the college graduate and usually he/she lacks the necessary personnel support to complete tasks which involve this limited training. It was estimated that the average length of time enrolled in a university was 6.7 years (time from entrance to graduation). Turkish universities have negligible direct costs for students which are partially offset by reduced fares for transportation, subsidized lunches. Publicly supported education expenditures accounts for about 20 percent of the national budget. University expenditures compete with other educational programs as well as with other developmental government programs.

Two 1968 surveys of wage and salary statistics indicate that a "normal" earnings profile exists and that rates of return to formal education increased with number of years completed, yet, studies for other countries do not support this. The rates of return indicate that if students were rational, all would continue the education process through the university level. This result coupled with capital rates of return of 10 to 12 percent as compared to educational returns of 21 to 27 percent leads to great demand for education, however, social rate of return on capital is greater than social rate of return on education. A possible explanation is that government is a monopolist seller of university education, a monosonist buyer of university graduates and there is tremendous political pressure to expand university education.

Thus the "failure to reflect the direct costs of education to students increases the demand for university education and makes it irrational to enter the labor market after completion of the lycee* ; university graduates then displace lycee graduates for jobs which the latter are qualified to do; and political pressures to expand university enrollments therefore increase and opposition to charging for university attendance intensifies." (p. 499).

*lycee = secondary level education (academic training)

Kuznets, Simon, "Modern Economic Growth: Findings and Reflections," Amer. Econ. Rev., Vol. 63, No. 3, 1973, pp. 247-258.

This work identifies six characteristics of modern economic growth:

1. high rates of growth of per capita product and population
2. high increase in productivity
3. major structural shifts, e.g., from agricultural to non-agricultural
4. changes in social institutions and ideology
5. ability to reach out to world via increases in communication sector
6. limited application of modern technology, i.e., three-fourths of the world's population lives in countries with limited economics.

These characteristics tend to lead to the following:

1. increased urbanization via internal migration from rural to urban areas (one incentive is the available amenities of urban life)
2. shifts in the relative shares in the economy away from the traditional sectors and toward the modern ones

With respect to LDC's, any generalizations should be made carefully so as to account for the wide differences between large LDC's (India) and small LDC's (Paraguay) and the many differences in natural resources of those countries. Further, it should be noted that many LDC's have lower per capita product levels than developed countries had on the eve of their respective industrialization, and modern technology, with its labor-saving bias, may not be suitable for use by many LDC's. Finally, many LDC's have political frameworks which do not promote growth because of their instability.

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LaBelle, Thomas J., "The Impact of Nonformal Education on Income in Industry: Ciudad Guayana, Venezuela," in Educational Alternatives in Latin America: Social Change and Social Stratification. Ed. by Thomas J. LaBelle, Latin American Center, UCLA, 1975^a, pp. 257-292.

This paper compares two types of workers -- obreros (manual workers) and empleados (salaried types), to identify the effect of formal education, background, age and nonformal education to wages earned. The survey was taken from three industries (firms) in Ciudad Guayana, Venezuela; mining, steel working, and aluminum refining. The firms required six years of formal education of all workers. Promotion in the firms was on recommendation of supervisors and formal education background. Only males under 35 were surveyed, 67 obreros and 41 empleados.

Results of survey:	<u>obreros</u>	<u>empleados</u>
Socio-economic status index	23.8	34.4
Salary	973	1742
Increased salary from last job	312	721

Obreros tended to be from more rural backgrounds, were less educated, had parents with less education, both general and technical/vocational.

Regression analysis relates monthly earnings to the following variables: (1) years of schooling, (2) years of mother's schooling, (3) age, and (4) out-of-school course work, including (a) company course-work production related, (b) company course-work non production related, (c) nonformal education, (d) production related nonformal education. Strongest significant

relations are with age and company course-work related to production and earnings; for obreros, course-work bears a slight but positive relationship, for empleados, slight but negative.

Conclusions:

1. Formal education is the most explanatory (strongest) variable, but it tends to reinforce social structure, i.e., impede vertical social mobility.
2. Nonformal education has little or no effect, and because selection for course-work is approved by industry supervisors, even the weak relationship may be the result of a "self-fulfilling prophecy."

Recommendations:

1. Job specific training should be rewarded as with subsidies for training courses.
2. In-house training could be more effective due to identifiability and rewards incentives instituted.
3. New modes of formal education which do not lead to increased stratification should be developed.

LaBelle, Thomas J., and Verhine, Robert E., "Education, Social Change, and Social Stratification," in Educational Alternatives in Latin America: Social Change and Social Stratification. Edited by Thomas J. LaBelle, Latin American Center, UCLA, 1975^b, pp. 3-74.

This is a review article incorporating much of what is included in the articles in this anthology. It is primarily descriptive/theoretical.

Technology has allowed improved teaching techniques and "status conscious" educators, especially in developing countries, have employed it to enhance learning environments. But, studies attribute two-thirds of achievement to socio-economic status, and only one-third to hardware in-house.

This calls for multiple learning systems with community input which are functionally related to goals of development.

Social Change: Adoption and diffusion of innovations.

Factors affecting adoption and diffusion are described and Non-formal education's relation to them is developed. Non-formal education is both a purveyor of innovations and an innovation itself. Therefore, Non-formal education must be compatible, advantageous, trialable, and observable in order to be useful.

Theoretical Perspectives on Sociocultural change:

- (1) Holistic
- (2) Man-oriented approach (psychodynamics/behavioral)

Summary:

- (1) Non-functional education is well suited to flexible programs for particular populations or locales due to low overhead.

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- (2) Of primary importance is a clear understanding of the nature of the client population
- (3) Horizontal rather than vertical interpersonal relationships are stressed, leading to increased involvement of client population in their own learning.
- (4) New or additional processes beyond formal education are needed.
- (5) Incentives are important.

Impact of Non-functional education on Indices of Socioeconomic Mobility

Technical-Functional Theory of Education and Social Stratification:

- (1) skill requirements increase due to technological innovation
- (2) formal education assists (1) through transmission of specific skills and general knowledge.

Responses: This is true in developing countries, but not in the U.S. with rampant overqualification of workers. Latin American schools do not fit criteria -- they are elite oriented, and even if not, they do not appear to meet social requirements. In fact, vocational/technical training leads to more flexibility (i.e., equating supply and demand) than do formal educational institutions with vocational-technical follow-up course work. General education is most important at the literacy level, and schooling may foster development attitudes.

Status Conflict Theory of Education and Social Stratification:

Various status groups struggle/compete for position, wealth, power, etc., and schooling is an important instrument for preserving/strengthening positions. Benefits from formal education are, again, less significant than those derived from socio-economic status.

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Conclusions: Non-functional education is valuable because (1) it provides skill based on practical learning; (2) it is adaptable to need and problem of particular groups; and (3) it is cheap due to short term, informal setting so it is a good development tool. These benefits are, however, limited due to Status-Conflict Theory: employers are much concerned with backgrounds of workers so that non-functional education impact will be greatest among lower and lower-middle socio-economic ranges.

Lee, H. P., "Education and Rural Development in China Today," in Education and Rural Development, edited by P. Foster and J. R. Sheffield, World Year Book of Education, 1974, pp. 209-233.

A major part of China's fourth five-year plan (1971-1975) is devoted to rural and agricultural development. One method, aimed at meeting manpower demands, has been the development of both formal and non-formal schools. The non-formal schools are designed to provide a practical type of education for the rural areas. Since the 1950's, there has been a continuing effort to expand schools into the rural areas with a decreasing role for the urban-oriented type of education. All of these efforts were designed to transform poverty stricken rural villages into modern farming communities. One example is the town of Tachai. By redistributing the ownership of the land and an intensive literacy program, the poverty torn village transformed its poor life style into the modern world over a period of approximately 15 years.

Although the rural schooling program encourages local flexibility, its overall goal is to increase the farm production in the local areas. For this reason, the content of the education program includes such topics as: water and soil conservation, the use of improved farming techniques and tools, the use of crop strains, study of pests and insecticides, and the extension of cultivated areas by reclamation processes. The system of higher education incorporates a belief in schooling and work. Each university student spends a good part of the year studying, with the remaining months being devoted to work. Additionally, each university is supposed to be self-supporting through this work effort. The end result is that the graduates are not elites but are close to the rural people with whom they will work in the future.

Other intensive programs in the areas of public health and medicine have largely eliminated many of the diseases which have plagued the nation in earlier years. Medical programs have resulted in providing medical care to rural areas that were previously ignored. In addition to these very specialized efforts, there has been an increased commitment to mass public health education at the primary level.

In general, the rural development program has succeeded in raising the living conditions of the rural population. By focusing on education, agricultural development, and public health, the Chinese have established a system in which efforts in one area improve conditions for the general living conditions. Perhaps the most constructive improvement has been in the willingness and the desire of China's people to work together for the future development of their homeland.

Lee, Jil-Hyun, "Economic Value of Korean Farmers' Education -- Their Earnings and Productivity," College of Agriculture, Seoul National University, 1970.

This is a study of the economic value of farmer's education in Korea. It was primarily concerned with the causes of the increase in agriculture resource productivity and income. The data used in this study came from two sources: (1) the Farm Economy Survey undertaken by the Korean Ministry of Agriculture and Forestry, and (2) a Supplemental Survey made by the Korean Extension Service. The levels of farmer's education were measured in terms of years of schooling, types of high school or college education, extension education and year of completing school. The analysis was for the year 1965. Tabular and regression analysis methods were used to determine the relationship the levels of education and income. The results were based upon the assumption that the economic results from farming are positively related to the farmer's capacity for making managerial decisions which are improved through education, training, and practical experience. The results of the analysis demonstrated a simple relationship between farmer's education and income -- farmers with more education, on the average, made higher incomes than farmers with little education. Also, on-the-job training had the same effects on earnings as formal education, and it was demonstrated that farmers who engaged in extension education made higher incomes than farmers who did not.

Lee, John E., Jr., and Chastain, E. D., "The Role of Problem Recognition in Managerial Adjustments," J. Farm Econ., Vol. XLII, August 1960, No. 3.

The objective of this article was to discuss the nature of problem recognition relative to managerial adjustments and make some implications of problem recognition to educational efforts in farm management. Data was collected from a sample of FHD agents and farm families in Alabama for the year 1957. No specific empirical methodology was used except for an "empirical" questionnaire. It was found that the proportion of managers recognizing income opportunities increased as the number of years of formal education increased.

Leibenstein, H., "Shortages and Surpluses in Education in Underdeveloped Countries: A Theoretical Foray," in Education and Economic Development, edited by C. A. Anderson and M. J. Bowman, Aldine Publishing Co., Chicago, 1966, pp. 51-62.

The rate of adjustment to skill requirements shows that a surplus exists for certain skills. The adjustment is most likely to take place through the development of substitute skills by workers which implies that workers can migrate to other labor markets. A major cause for non-adjustment is lack of economic resources. Some individuals may not have the resources to undertake educational investment, even with schooling facilities and free tuition which implies that existence is not sufficient to guarantee investment. Schooling creates skills and develops certain attitudes. It is possible that attitudes are more important in development, especially, attitudes concerning the value of education itself.

The conclusions are: (1) formal education should be designed to minimize the time needed to attain skills; (2) education should serve to increase mobility which accelerates the development process; (3) education increases the cultural integration of society which leads to development and mobility increases; (4) education provides certain social capacities such as the ability to cooperate; (5) educated parents instill a respect for education in their children; and (6) realizing the importance of educated expectant and future mothers as this has great impact on the attitudes and skill level of the future labor force.

Levy, Mildred B., and Wadyck, Walter J., "The Influence of Family and Friends on Geographic Labor Mobility: An International Comparison," Rev. Econ. Statist., Vol. LV, No. 2, May 1973, pp. 198-204.

This analysis is concerned with testing the hypothesis that previous migrants from one region exert a strong influence on the volume and direction of current migration flows. In support of the hypothesis, the authors give the following two reasons: (1) Family and friends who have previously migrated from one region to another may provide information about their present location to persons residing in their former place of residence; (2) former migrants may provide temporary food and shelter as well as facilitate social transition.

Using data obtained from the 1961 Population of Census of Venezuela, the authors employ a linear regression model to estimate the gross interstate migration of males in Venezuela, ages 15-54, during 1960-61. The model is that developed by Greenwood (Review of Regional Studies, 1973) to study the same phenomenon in India, 1955-60. The variable used to capture the effect of cumulative past migration is the "migrant stock": the number of persons born in the origin state and living in the destination state over which migration is being studied. The data on literacy was obtained from Adelman, I., and Morris, C. T., Society, Politics and Economic Development, Baltimore, The Johns Hopkins Press, 1967. The estimated coefficients for the effect of literacy on gross migration were found to be positive and significant. Better educated people may have more information and may be more open to change than less educated people.

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The results concur with Greenwood's (for India). Past migration patterns do affect current migration flows for Venezuela. Failure to take account of this effect overstates current direct effects of other explanatory variables on migration.

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Link, Charles R., and Ratledte, Edward C., "The Influence of the Quantity and Quality of Education on Black-White Earnings Differentials: Some New Evidence," Rev. Econ. Statist., Vol. LVII, No. 3, August 1975, pp. 346-350.

This analysis is concerned with the influence of the quantity and quality of education on the earnings of young black and white males in 1967. The data is U.S. data from the National Longitudinal Survey of the Labor Force conducted by the U.S. Census. The particular sample examined consisted of 861 males age 15-25 in 1967, 707 white and 154 black. All were out of school at least one year and had positive earnings.

The methodology used was linear regression estimated by ordinary least squares. The proxy variable for quality of education is the district-wide annual expenditures per pupil where the respondent attended secondary school.

The results indicate that the quality of education (measured by expenditures per pupil) exerts an important impact for both races. The results also indicate that expenditures may be more important for blacks than for whites, i.e., increasing the quality of schools in black areas may have long-run effects on black earnings.

Lockheed, M. E., and Young, Kau-hua, State-of-the-Arts Paper: Cost Analysis in Nonformal Education, Educational Testing Service, Princeton, New Jersey, 1977.

A critical step in cost/benefit analysis is to enumerate all input requirements. A reason that nonformal education has relatively low cost is that many of its inputs are priced in terms of MC and much of the capital and operating expenses are picked up by formal education. Essentially this is the problem of joint costs between nonformal and formal education. Another problem is to isolate the effect of nonformal education and economic development.

There are consistent results indicating that exposure to nonformal variants of education increases agricultural output. This has been observed in Kenya, Korea, Thailand, and the Philippines. But similar evidence shows a positive relationship between formal education and farm output. Similar studies found that nonformal education was positively related to earnings as well. A consistent result was that the size of the estimated effects and benefits of education depend upon the variables which are included in the production function. In a simultaneous function, the effects of nonformal variants are lower.

The point of the article is a concern with whether or not all costs (hidden, joint, capital, operating, fixed, or variable) are included in the cost/benefit or cost/effectiveness analysis. This implies that the conclusion, as to whether a given program is socially desirable or not, depends upon the quality of the cost/benefit analysis.

Lukomski, Michael, "Alternatives for Training of Skilled Industrial Labor in Sao Paulo, Brazil," Supplementary Paper #1, Program of Studies in Non-formal Education, Michigan State University, East Lansing, 1975.

This study relates non-formal education activities, i.e., vocational training schools, to the process of economic development and deals with the development of skilled workers, (lathe operators) in Sao Paulo, Brazil. Three questions were asked: (1) what was the origin of the workers? (2) how did these workers learn and develop their mental and manual skills? and (3) does origin and type of learning experience influence the nature, quality and market valuation of the work they perform?

The model he uses can be described as a "reverse tracer" technique, the reverse of Professor Harbison's "tagging" technique. Lukomski took the lathe operators and worked backwards to find the various routes followed by the operators in obtaining the skills they have and positions they occupy. The model took into consideration (540 lathe operators interviewed) three basic elements: condition at birth, the learning process which included formal education, work experience and training, and present situation, i.e., type of work and pay.

With regard to: (1) present work situation -- large variations are found in hourly wages and type of work done; (2) initial conditions of worker workers were of relatively high socio-economic starting points (parents were well educated compared to general population, only 17 percent had fathers who worked in the agricultural sector); (3) formal education -- a high percentage of workers had a primary education (could read and write) (educational levels

of operators did not vary greatly from general population so formal education cannot explain the income differential of the well paid lathe operators); (4) work experience -- most workers started in industrial occupations; (5) training -- only 11.5 percent reached the skilled occupational level without some form of special industrial training. The private industrial school trained more than SENAI programs. Four paths to lathe operator are described: (all require four years of formal education): (1) SENAI program, (formal government training program), (2) industrial school (private), (3) courses, part time either SENAI or industrial schools; and (4) work experience.

Macridis, Roy C., and Meehan, Eugene J., "Attitudes, Cognition Skill, Participation and Achievement," AID Contract csd-824, Brandeis University, 1970.

Field research gathered in Guatamala in 1968 and 1969. Cognitive skill is the capacity to develop, use, modify, and adapt intellectual tools to a changing environment. Goals make the individual aware and sensitive to the different dimensions of the environment and all perceptions must be screened through a complex network of attitudes before the significant and trivial can be separated. Education must face a pragmatic test of usefulness relating to the search for knowledge. Cognitive skill is an indication of the quality of an individual's production, that is, a measure of performance quality. Organization is viewed as part of cognitive skill. Cognitive skill is a complex construct and identification of the various skills involved is essential in order to organize the learning process. There are four dimensions of cognitive capacity: (1) temporal -- ability to associate or relate to changes over time; (2) analytic -- breaking complex tasks into components; (3) synthetic -- producing patterns relating one specific factor to other factors in the situation and (4) calculative -- projecting implications accurately and avoiding errors in logic. Also individuals should be able to handle counter-to-fact conditionals, counterfactuals.

Two groups aged 25 to 45 were selected, one group which was outstandingly successful and the other group, with the same general background and occupational interests, who were not performing at the same level. Assumption was made that highly successful persons would have higher cognitive skill levels. The sample number was 200 of which 198 responses were used.

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The hypothesis to be tested are: achievement and participation associated with high levels of cognitive skill rather than high levels of developmental orientation, i.e., is cognitive skill a better indicator of achievement than attitudes?

The findings show that cognitive skill correlates positively and strongly with occupational achievement and participation in community affairs. Generally cognitive skill is a more effective indicator of both occupational achievement and participation in local affairs, than are attitudes:

1. High cognitive scores are associated with achievement and participation but not with high scores on the developmental attitude index.
2. Those with high developmental attitude scores do not score very well on the participation index nor are they outstanding occupational achievers.
3. High levels of participation correlate strongly and positively with high scores on the cognition skill index and only weakly with high scores on the attitudinal index.
4. Low skills on the cognition skill index correlates negatively and strongly with high levels of achievement on participation in community affairs.
5. Cognitive skill provides a good correlate for occupational achievement and attitudinal scores correlate negatively with high level achievement.

Those persons with high scores on the cognitive skill index (1) have high incomes, (2) are concerned with economic questions, (3) tend to produce

Macridis, R. C. (cont.)
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complex explanations of events, (4) are more likely to suggest careful investigation for social change, (5) regard elites as the prime factor for change; (6) tend to think in terms of institutional arrangements rather than personalized terms.

Maldonado, R., "Education, Income Distribution, and Economic Growth in Puerto Rico," Rev. Soc. Econ., Vol. 34, No. 1, 1976, pp. 1-12.

This analyzes the income distribution of Puerto Ricans in relation to their rapid economic expansion, since 1950. Specifically, this paper examines Kuznet's hypothesis that a country which is undertaking growth is likely to worsen its income distribution. The data for this study are from the 1959 and 1969 census, which collected information on the income of families.

Evaluating family income for the population by deciles shows that the highest 10 percent of the population (by income received) have experienced a decline in their share of income received as it has dropped from 45 percent in 1959 to 36 percent in 1969. For this same period, the lowest deciles' percentage of income received dropped from 0.44 percent in 1959 to 0.31 percent in 1969, while all other deciles improved their share of income received. This amounts to an improved income situation for the middle 80 percent of the population while the highest and lowest groups suffered setbacks. Lorenz curves for these same figures show the 1969 curve lies to the northeast of the 1959 curve, thus indicating greater equality of income distribution. Similarly, the Gini coefficient for 1969 is .51 as compared to .59 for 1959. It should be noted that two problems exist with the data: (1) the income figures are drawn from interviews and hence from memory, and (2) the income figures exclude any measures for income in kind.

Education is examined as a possible explanation for this equalizing trend in income distribution. Figures for enrollment, literacy, number of students per teacher, number of teachers, and percent of the government budget

spent on education indicate a greater emphasis on education between 1960 and 1970. Lorenz curves for education show greater equality of the distribution of education for this period as well.

Education is not offered as the most important factor in moving towards a more equal distribution of income, rather, the results for Puerto Rico are special given the economic and political ties with the U.S. Without liberal out-migration, the labor force would be nearly double its current size which would have serious implications for income distribution and educational policies. These results do, however, support the contention that education can alter income distribution patterns.

Martin, Lee R.; Cortu, Arthur J.; and Singh, H. S.; "The Effects of Different Levels of Management and Capital on the Incomes of Small Farmers in the South," J. Farm Econ., Vol. XLII, February 1960, No. 1, pp. 90-120.

This article investigates the relations between incomes on the one hand and management and capital on the other by including the level of management as an input. Using a sample of eleven farmers in Macon County, North Carolina, input-output relations were assigned to each farmer at three different management levels. Linear programming procedures were used to determine optimum resource use combinations and levels of output.

The results indicate that the ability to manage may be the most important single determinant of potential farm income; there is a high degree of complementarity between management and capital levels.

These results imply that farmers in low income areas need to have a much better general education.

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Maverer, Kenneth; Ratapzah, Rosalinda; and Schultz, T. Paul; "Marriage, Fertility, and Labor Force Participation of Thai Women: An Econometric Study," Rand Corp., R-829-AID/RF, April 1973, Santa Monica, California.

This study was undertaken to formulate, test and integrate the components of family fertility as part of a general view of the family decision-making process. Estimates were obtained of the relationships between several constraints on the environment within which households function in Thailand and three related forms of "family" behavior: the proportion of women currently married, the average number of children born per woman, and the proportion of women in the non-agricultural labor force. A simultaneous-equations model was specified from data from 71 administrative units of Thailand from the 1960 census, and then these equations were estimated to account for the cross-sectional variation in age-specific marriage patterns, fertility, and women's participation in the nonagricultural labor force.

Changing levels of men's and women's schooling was shown to have substantial effects on completed fertility levels among older women. Men's schooling is associated with delayed marriage and childbearing but greater fertility by the time women reach their thirties. Schooling for women is linked to higher fertility in the 25-29 age cohort but substantially lower fertility at later ages. Increased education among women may also marginally reduce the proportion of women married, but it may not affect the size of the female non-agricultural labor force significantly. The tendency of women to occupy non-agricultural jobs appears to be largely a function of the local

structure of industry and the level of female unemployment. These labor market variables for women also have a pronounced indirect effect on fertility and the timing of marriage.

The proportion of women who have recently migrated into a region appears to increase the proportion married, decrease non-agricultural participation, and increase fertility. The variable for education was not broken down into primary, secondary, and college. The measure for "schooling" was the average number of years of schooling completed in each age-group for both men and women.

McClelland, David C., and Winter, David G., Motivating Economic Achievement, Free Press, New York, 1969, 385 pp.

McClelland attempts to link economic growth to achievement motivation, suggesting that the need to achieve (n Ach) is directly related to the entrepreneurial spirit. Purely economic incentives may be inadequate to channel broad energies, so an effort to increase n Ach and trace the impacts on the test group is undertaken.

The test site was the Small Industries Extension Training (SIET) Institute at Hyderabad, India. The program was a voluntary management training seminar for Indian businessmen. Basic inputs included: (1) achievement syndrome, (2) self study, (3) goal setting, and (4) interpersonal supports. Effectiveness of the seminars was measured by how participants (a) thought about improving business activities, (b) took more successful, moderate risks, (c) used feedback mechanisms, and (d) explored the environment.

One test course was run, then the fully monitored course was developed and run. 74 course participants were measured against three control groups of 73 businessmen, and against their own pre-seminar attitudes.

The major manifestations of the program were (1) longer working hours, (2) more capital investments, (3) more employees, and (4) a large percentage increase in firms' gross revenues. Case studies are presented showing the changing characteristics of participants, and the psychological impacts of the course. All effects suggest that the project was well worthwhile, and effective, but it could not be carried on due to prior responsibilities at the SIET institute.

Michael, Demissie Gebbs, Factors Associated with Innovative Adoption Among Selected Farmers in Southern Brazil, Ph.D. Dissertation, 1972, Ohio State University, Columbus, Ohio, 106 pp.

In this Agricultural Economic Factor Rotation Model, individual characteristics, nature of farm and structural variables, and adoption of innovative agricultural technology are related. Samples of farms were made in 1965 and 1969, stratified by size, excluding largest and smallest farms, with both cross-sectional and longitudinal perspectives. Sample size: 1965 data = 501 farms; 1969 data = 740 farmers; the intersection of samples for 1965 and 1969 = 336 farmers. Variables include farm, family, and attitude categories.

Conclusions: Highest factor loadings were achieved with (1) economic resources, (2) time span (age and experience), and (3) motivation (explaining 44 percent of total variation of the sample). These factors explained 46 percent of the variance in adoption, ranked (3), (1), then (2). However, because motivation is incorporated into the adoption variables, there exists circularity within the model. Age and experience related inversely to adoption; education and mobility showed no effects; credit availability and family size loaded highly.

Mincer, J., "Education, Experience, and the Distribution of Earnings and Employment: An Overview," in Education, Income, and Human Behavior, edited by F. T. Juster, McGraw-Hill, 1975, p. 71.

Education is viewed as an investment and the relationship between the distribution of earnings and the distribution of investments in human capital is examined. From earlier work by Mincer, roughly 60 percent of the inequality of earnings (annual) for white urban males could be attributed to the distribution of human capital investment. The theory suggests that most investment takes place at younger ages yet the investment continues at a diminishing rate throughout the working life. If earnings are the return to net investment, one would expect the earnings to increase at a diminishing rate over the person's working life time. Years-of-experience is used as an argument for the schooling model to better estimate lifetime earnings, as this would account for persons whose labor force attachment is not continuous. Using only schooling to explain the earnings function -- the correlation is only 10 percent. Further, 50 percent of aggregate inequality, i.e., variance of logs of annual earnings is attributed to the distribution of schooling and post-school investment. However, adjusting these variables for quality and individual differences in expenditure of time increases this joint distributional effect of schooling and post-school investment to 60 percent. Earnings of those workers with greater quantities of human capital are higher for two reasons: (1) they receive higher hourly wages, and (2) they have fewer and shorter separations from the labor force. Generally, the inequality of the distribution of earnings is affected by both the distribution of investment in human capital and the magnitude of the rates of return to that investment.

Monson, T. D., Migration, Experience-generated Learning and Infant Industries: A Case Study of Turkey, Ph.D. Dissertation, University of Minnesota, 1972.

Migrant workers (Turkish) working in Germany were unskilled and any skills acquired were those picked up at the place of work in a strictly non-formal setting. There are very few formal on-the-job training programs, so that skills must be learned in the actual production process. The process of transforming agricultural workers into industrial workers is in terms of the direct effect of time (required to learn the new skill) and the indirect effect of changes in the quality of the work force. Learning-by-doing worker productivity depends on the quantity of human capital (HC), physical capital and the length of time one has been employed in the industry. This results in an expected log learning function.

A sample of 63 workers (from 11 work groups) found that 30 individuals and 7 groups fit this form (log learning function). Of those not fitting this mold, most had high initial levels of HC and showed little change over the test period. The data and analysis also showed that differences in wage systems did not influence the rate at which workers learned. Higher initial values for HC in hourly wage firms indicates that these firms have more controlled production, implying greater opportunity to learn-by-doing with the aid of supervision. This is supported by the fact that in the sample firms paying straight hourly wages employed more supervision personnel. Education, regardless of nature, had a minimal impact upon the learning behavior whereas industrial experience (obtained in Germany) was an important influence upon

Monson, T. D. (cont.)
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upon productivity levels. If the worker was unskilled and the work force skilled, then the worker showed lower rates of learning. Perhaps most important was a change in the experience mix. This led to outward parallel shifts of the learning curves.

The author concedes that problems existed in his study (imperfect data and multicollinearity), but the study shows that entrants of unskilled workers into semi-skilled work force undergo an adaptation process of learning-by-doing.

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Moock, Peter Russell, Managerial Ability in Small-farm Production: An Analysis of Maize Yields in the Vihiga Division of Kenya, Columbia University, Ph.D. Dissertation, 1973, 336 pp.

In an attempt to maintain or increase agricultural productivity, the government has abandoned its attempts to rely on population control and largely focused its effort on increasing expenditures in the rural sector. The district of Vihiga was one of 14 rural communities selected to be included in Kenya's Special Rural Development Program. The primary objectives of this program were to increase employment opportunities and rural income of the inhabitants. In order to achieve this, the program focused on increasing per capita income, maintaining an equitable distribution of income, providing employment opportunities for the greatest number of people, and attempting to reduce the rate of population growth.

The data for this study was based on a survey of farms between May 1970 and February 1972. This sample was divided into two parts where the first group of 72 farms received loans to purchase hybrid maize out of which 66 farms actually used the loans. The other group had 88 farms and did not receive loans. This study utilized data from a general random survey in 1970 for comparative measures, and two selective surveys in 1971.

In comparing these subsets of farmers, the credit recipients were in general more innovative and more wealthy than the average farms in the district. Further, of those who received loans, most would have used their own financial resources to purchase hybrid maize inputs if they did not receive assistance.

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Regression procedures were used to analyze the production function for maize. The results showed that there is, in general, too much use of labor and too little use of fertilizer components.

In reference to formal schools' role in fostering a desire for off-farm wage employment, this study seems to indicate that the rural people harbor that desire prior to attendance at school or that the school adapts to the desires of those attending. Further, this study shows that there is a significantly positive result from education on the managerial ability* of the farm managers, who make technical allocative decisions. It is the fact that some of the more general skills taught in the formal school are extremely useful in the agricultural sector.

The analysis of the agricultural extension service revealed that visits by the farmer to the agent were unrelated to managerial ability yet visits by the extension instructors to the farmers were positively related to managerial ability. One explanation for this is that the one-to-one extension serves a social function more than one of transmitting useful agricultural information. However, there was a positive relationship between managerial ability and attendance at demonstrations. One reason for this is that the demonstrations tend to be more highly structured and tend to focus on some particular agricultural lesson.

Differences in output for farms receiving loans and farms which did not receive loans can be best explained by managerial differences which predated the issuance of the loan. This was supported by the result that the effect of the loan on maize output was not significantly different from zero.

* Managerial ability defined as having greater output given identical inputs for a number of farms.

Moos, Rudolf H., Conceptualizing Educational Environments, Seadag Research
Paper presented June 28-30, 1973, Aspen, Colorado, 31 pp.

This is a social environmentalist examination of major methods by which human environments have been assessed -- social climate categories defining social environments and its relationship with attitudes, achievements, and other environmental variables with attention to learning environments. Six social climate categories are developed.

Conclusions: Social Environment acts catalytically, not as a stimulus to change behavior. The six categories themselves explain little without additional information. Social climate indices may provide additional sensitivity to relevant environments, both in terms of individual and institutional (e.g., education, rehabilitation) decisions.

Morgenstern, Richard D., "Direct and Indirect Effects on Earnings of School and Socio-economic Background," Rev. Econ. Statist., Vol. LV, No. 2, May 1973, pp. 225-234.

This analysis is concerned with examining the relationship among income, socio-economic background, years of schooling, and quality of inputs. Several models are postulated which permit the examination of both direct and the indirect effects of the various factors, separately for blacks and whites. To measure the direct effects on learning, a linear model is specified which assumes independence among socio-economic background, years of schooling, and school quality; to measure the indirect effects, a second linear model is specified making education (years of schooling) a function of socio-economic background and quality of education. A third model is specified to test the recursive nature of models I and II.

The primary data source was the 1968 Urban Problems Survey conducted by Campbell and Schuman (1968) at the Survey Research Center at the University of Michigan. In all, 2,700 heads of household, half black and half white, were interviewed within the corporate limits of 15 largely northern cities and two suburbs. In addition to standard census-type questions, the survey asked about the respondent's father's occupation, his parents' education, and the state in which he spent his formative years. The measure of socio-economic background, therefore, was the parents' education and the Duncan Index of Occupational Status, from O. D. Duncan, D. L. Featherman, and B. Duncan, "Socioeconomic Background and Occupational Achievement: Extension of a Basic Model," Project No. S-0074 (EO-191) Washington, D.C.: HEW, 1968. The principle

conclusions were: (1) school quality has a small direct effect on the wage rates of blacks but no apparent effect at all on the wages of whites; (2) for both races school quality has strong indirect effects as it influences the number of years of schooling attained; (3) socio-economic background appears to have significant direct effects on earnings and indirect effects as it also influences the number of years of education attained; and (4) years of schooling appears to exert a strong influence on earnings independent of other variables, especially for whites.

Naik, J. P., "Optimizing Investment in Schooling: An Alternative to Universal Primary Education," in Education and Development Reconsidered, sponsored by the Rockefeller Foundation and the Ford Foundation, 1972.

The task is to maximize educational achievement for a developing nation where no more than six years of formal education at state expense can be made available to all youth. It is assumed that: (1) early adolescents learn the same material more quickly than young children, (2) pupils who enter at age 7 learn as much arithmetic by 13 as children who enter at age 5, (3) vocabulary and reading comprehension in a second language are achieved almost twice as fast by 12-15 year olds as by 6-11 year olds, and (4) parents and communities will invest education funds not available to the central government through taxation.

The author states that less educational attainment will be achieved with universal primary education in state schools. Students would enter at age 6 to 7 and be taught basic cognitive skills in classes. Roughly 10-15 percent would continue school with 85-90 percent finishing school at this level. The major problem with this system is that most school leavers are alienated from farm work and not yet ready for marriage or for entry into the labor force.

An alternative solution would defer age of entry in state schools to 11 or 12 with informal and locally supported education to teach children aged 1-11. Because children would enter state school at 11-12 with varying backgrounds, there would be a need to extend the scope of the state schools over

Naik, J. P. (cont.)
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10 years, and place students at appropriate entry level and expect different levels of achievement in 6 years. Ample opportunity for scholarships should be made available to able students to enable completion of work in school, and gear higher education to the competence level to be expected of pupils who attain the tenth achievement level in the national schools.

Nelson, Richard R., and Phelps, Edmund S., "Investment in Human, Technological Diffusion and Economic Growth," Amer. Econ. Rev., Vol. 56, Nos. 1-2, May 1966, pp. 69-75.

A model is developed to explain the relationship between innovation and education in U.S. agriculture. In a technologically dynamic economy, it is assumed that production management is a function requiring adaptation to change and that education accelerates this process.

The rate of return to education is greater the more technologically progressive is the economy. This implies that society should build more human capital relative to tangible capital, the more rapid is the progress of technology and the larger is the gap between available and used technologies. Education may produce externalities via innovation which leads to imitation of modern agricultural techniques.

Nesman, Edgar J., and Rich, Thomas A., The Comparative Study of the Impact of Mass Communication on Subsistence Farmers in Guatemala, University of South Florida, Tampa, Contract # AID/CM/1a-C-73-19, 1975.

Field interviews with 506 farmers in 1973 were used to analyze the impact of mass communication. It was found that radio can be used to affect change in knowledge and attitudes among a traditional population. Knowledge and attitude changes increase with group meetings and personal visits. Such changes led to agricultural innovation, e.g., adoption of recommended practices with regard to fertilizer application. Fertilizer applications rose in the experimental area relative to the control area. (They fell again later, apparently in response to an increase in the price of fertilizer.)

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Norbye, Ole David Koht, "Long Term Employment Prospects and the Need for Large-scale Rural Works Programs," in Education, Employment, and Rural Development, Homer R. Scheffield, ed., East African Publishing House, Nairobi, Kenya, 1967.

This is an empirical analysis of Kenya's development plan in terms of long-run employment prospects of Kenya's labor force. Based upon the projections in the study, it is argued that less than one-fifth of the labor force will be able to find jobs in urban areas in 1985, and Kenya must plan for the preparation of rural life for most of its inhabitants. It is argued that the educational system must adapt to this condition, not by increasing agricultural training in primary and secondary schools, but by changing the attitudes of teachers and students in order that young people appreciate what they have learned in a rural society as farmers.

Nowacek, C. G., Manpower Development and Utilization Policies and Practices in the Rhodesian Private Sector and Their Interrelationships with Public Policy and the Management System: A Case Study, Ph.D. Dissertation, New York University, 1966.

The labor market structure for Rhodesia shows a dual economy and a dual labor market with an urban and traditional sector. Mobility of workers tends to draw young underemployed workers from the traditional sector to become unemployed in the larger urban markets. These workers are becoming more attached to the urban markets as indicated by declining absenteeism. The rural education programs are oriented towards urban culture and have been a factor in increasing the youth's mobility out of the agricultural sector and into the urban sector. Additionally, many tribal customs reinforce the mobility of the young males, e.g., custom holds that men should not do traditional agricultural work. In order to obtain employment in industry, the male must be willing to break his tribal ties and adopt the life-style of the modern worker.

As the wage structure becomes more related to worker productivity, it will send out the right signals to encourage investment in higher skills by offering higher rewards for these skills. These skills have been traditionally provided via on-the-job training with general skills being provided through the educational system. As immigration and migration fail to satisfy employers' demands for workers, a need will arise for more comprehensive manpower planning which should include efforts to increase secondary education and apprenticeship programs. Policy recommendations include: (1) primary and secondary

Nowacek, C. G. (cont.)
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educational facilities for general education, (2) technical schools and colleges for specialized training, and (3) improvement of on-the-job training programs of a more specific nature. This will lead to a narrowing of the wage gap for different occupations and hence impact income and its distribution.

Odia, Solomon, "Rural Education and Training in Tanzania," Int. Lab. Rev.,
Vol. 103, No. 1, 1971, pp. 13-28.

Expansion of educational program is needed to meet expected population growth. Currently, 97 percent of the population live in rural areas which indicates the importance of rural educational programs. There exists a committed government policy to satisfy employment needs through education by 1980. One goal is to have major means of production controlled by peasants and workers. The education system is designed to meet egalitarian social objectives and to improve economic aspects of life, viz. standard of living. Agricultural education combines class work and actual experience on school farms. Further, the schools have established the dominance of national language and programs are designed to integrate the school with the rural community. Other goals are to extend non-formal education and training to as many people as possible; and, to provide special leadership education to people who are likely to be influential in their communities. The results have been inconclusive at this point, but this production-oriented education seems to hold promise.

O'Neill, J. A., The Effect of Income and Education on Inter-Regional Migration,
Columbia University, Ph.D. Dissertation, 1970, 107 pages.

A cross-sectional model is developed to analyze regional migration. In this framework, migration is treated as a consumption good and an investment good. The data are from U.S. Bureau of the Census for 1960, and the areas are confined to the nine geographical units of the U.S. Also, the migration period is from 1955 to 1960, which implies that only long-term migration will be observed, i.e., migration which lasted five years. This gives rise to a problem in that this would reflect more "successes" than normal since failures would migrate back to their original residence in many cases. Also, the data does not separate inter-firm and intra-firm migration, thus income differentials may be biased by the inclusion of intra-firm migrants.

Regression analysis for white males of differing age groups and non-white males 25-29 years old showed that the income differential had a positive relationship with the migration rate for the groups considered. Further, it was found that the response to income differentials increases with years of education completed. As expected, the independent variable distance has a negative impact on migration rates for all groups considered. By including a variable for level of income, it was found that given the same income differential between destination and origin, those persons with higher levels of income are more likely to migrate.

Higher income levels has a negative impact via the opportunity cost, yet it also enhances one's ability to finance a move. This implies that the

O'Neill, J. A. (cont.)
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positive impact of financing outweighs the negative impact of the increased opportunity cost, thus, leading one to think that part of migration is consumption oriented.

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Onimode, Bade, Education, Manpower, and the Economic Development of Nigeria, 1950-1970, Ph.D. Dissertation, Ohio State University, 1972, 183 pp.

Methodology of indexing the factors of production such that if the production function is homogeneous to the first degree, this implies that the index of labor should also be homogeneous of degree one. Basically, the study uses standard neo-classical production theory. Three approaches are used: (1) the index approach, (2) educational capital approach, and (3) regression approach.

Each approach derives an equation to measure the contribution of education to the rate of growth of economic development. The role of education is to maintain the quality of the labor force (LF) and improve the overall quality of the LF over time. For 1960-1970 the overall contribution of educational capital to the growth rate was 0.92 percent exceeding the result of 0.73 percent for physical capital. For 1950-1970 the contribution of each source of development as a percentage of the growth rate of the national product was as follows: physical capital 14.93 percent; labor 56.53 percent; labor of constant education 10.30 percent; improvement in labor quality 27.85 percent, with the residual 20.58 percent. After plain labor (adjusted for changes in quality), education has had the greatest impact on the growth rate of the national product. The manpower model and the econometric model give emphasis to expansion of secondary level schooling and both do not indicate any bottleneck problem at the primary education level. Later expansion of third level education facilities, viz., higher education, will be needed.

Pack, Howard, Employment and Productivity in Kenyan Manufacturing, Economic Growth Center, Yale Univ., Center Discussion Paper No. 196, February 1974.

In search of ways in which more workers can be absorbed in manufacturing, the author conducted interviews of Kenyan manufacturing (top level) managers. The firms are labor intensive in their production techniques. Pack finds that labor productivity has been raised primarily through reorganization, simple innovation, increasing the rate of capacity utilization, and better training and supervision of the work force -- not through capital deepening or embodied technological change.

Adaptive managerial behavior, reorganization of the production process or simple innovation in a labor intensive context, is associated with technical knowledge of the production process, on the part of the manager. Formal training in production or production experience, as the source of that technical knowledge, seem to have no differential impact on managers' innovative behavior. Such behavior is not associated with managers whose experience is in financial or commercial areas.

Palmore, J. A., and Marzuki, A., "Marriage Patterns and Cumulative Fertility in West Malaysia: 1966-67," Demography, Vol. 6, No. 4. 1969, pp. 383-402.

The data for this study are taken from the national probability sample of the "West Malaysian Family Survey" for 1966-67. This study concentrates on the various characteristics of married women 15-44 years old. With respect to the fertility aspects of the survey, 5,457 homes were interviewed.

Some of the characteristics of the women 15-44 years old are: 23 percent of the currently married women were married before the age of 15, an additional 52 percent had married by age 20, and 24 percent married after the age of 20. In general, women living in urban areas married later than rural women, as indicated by the finding that three times as many rural women as urban women were married by the age of 15. In general, it was found that the proportion of all women married at young ages has declined. Much of this can be explained by the increase in women's attainment of formal education which has been made possible by changes in the educational system. Further, wives of blue and white collar workers marry later than those women who are married to husbands with rural occupations.

A more disaggregated breakdown of the married women 15-44 years old produced additional insights. It was found that rural Malay women with no education married at the youngest ages and Chinese women with more than 5 years of schooling married latest. The addition of racial factors produced similar results for all but Malay women where a slight differential arose between those married to white collar and blue collar workers. Here those married to white collar workers married earlier than those women married to white collar workers.

Considering cumulative fertility, it was found that early marriage led to higher cumulative fertility. At age 25, women who married before 15 had 3.8 live births while those married between ages 15-19 had 3.1 live births, and those who married after age 20 had 1.2 live births. There is some ambiguity as to whether couples who marry early are more fertile or if early marriage causes couples to be more fertile.

Patrick, George F., and Kehrberg, E. W., "Costs and Returns of Education in Five Agricultural Areas of Eastern Brazil," in Amer. J. Agr. Econ., 55(2), May 1973, pp. 145-153.

Uses a simple model to relate value added in production to schooling, extension schooling, and fixed capital. Because of the indirect effects of education on fixed capital, two stage least squares estimates were made, then employed in the original estimating equation. Data came from five areas of differing major industrial composition, and modernity.

The relationship of earnings to formal schooling was negative to barely positive as modernity increased. This suggests the direct effects of education may assist development very little. There was no measurement of indirect effects, for example, fostering mobility or complementarity with other investments. The greater value in more modern settings results from the ability to deal with more varied techniques.

Costs of schooling per individual could be reduced, it is noted, by providing more schools, particularly at the secondary level. Many families, however, are too poor to allow children to finish primary education, so that a system of subsidies may be required for poorest families. Extension activities seem to return the most highly through adoption of techniques by participants and spillover effects. The authors suggest schooling has higher returns in more modern areas, while extension has higher returns in those less modern and allocation of resources should follow this distribution.

Paulston, R. G., "Cuban Rural Education: A Strategy for Revolutionary Development," in Education and Rural Development, edited by P. Foster and J. R. Sheffield, World Year Book of Education, 1974, pp. 234-260.

A brief sketch of conditions prior to the revolution show that nearly one-half the adult population was illiterate. There was a vast difference in living conditions between urban and rural areas. For the most part, rural education was offered by the plantation or it was not available. Under the plantation system, education was directly related to an individual's intended position on the plantation. The children of the owners and managers received a more traditional education. Generally, the entire rural population of workers were living in severe poverty.

Rural education became a major focus of the new government after the revolution. Comparing enrollment figures for 1958-1959 to 1968-1969 shows that enrollment increased from 63,526 to 186,358 for the primary level. For the same periods, the number of agricultural schools went from 0 to 11. In general, it is clear that there has been tremendous progress in terms of number of students attending school and number of schools available.

Illiteracy was attacked vigorously by recruiting urban youths to teach the rural illiterate. This program was supported by establishing over 800 literacy-education centers in the rural areas. The results seem quite impressive as the percent of illiterate in the population dropped from 15.5 percent in 1961 to 3.9 percent in 1962. However, there is no mention as to how literacy was measured so that these figures may or may not be suspect.

An important goal of the future is to improve the quality of the educational system. That is to reduce the average time needed to graduate, since, many students repeat grades often without great success. For 1965-1966 only 20 percent of the total students enrolled graduated from elementary school. In terms of rural elementary schools, only 11 percent graduated.

A problem that is more basic concerns the attitude of students and their desire to enter into technical training schools. There seems to be a desire of students to stay in urban areas with the cultural and social advantages of the city. Although some progress has been made toward improving rural education, there remains much work to be done in eroding the superior attitude towards urban life and its subsequent elitism. This is the greatest challenge for Cuba if it is to succeed in attaining agricultural development.

Peaslee, Alexander L., "Education's Role in Development," in Econ. Develop. and Cult. Change. Vol. 17, No. 3, 1968-1969, pp. 293-318.

A comparison of international statistics on education through enrollment figures is completed for varying levels of schooling.

The author found a close relationship between high primary enrollments and significant economic growth. Countries were ranked by percentages of population in primary schools, per capita gross domestic product and energy potential (KWH per capita). Twenty-five nations had more than 10 percent of their population in primary schools in 1920 and these same countries led the world in output by 1958 (with explainable exceptions USSR and Japan). Among the first 35 countries in per capita gross domestic production in 1958, all but six had over 10 percent of the population in primary schools by 1920 or earlier and these six exceptions attained the 10 percent mark by 1938. Of the 50 countries without 10 percent, only Columbia had attained 1958 production above the U.S. (however, Columbia passed the 10 percent mark in 1956). No country had achieved significant growth until after 8-10 percent of its population was enrolled in primary education. Key factors relating growth and primary education are: elementary education promotes the breaking of the "crust of custom" and leads to systematic means of obtaining and disseminating information; brings a more systematically informed set of actors into the economic stage; and, increases the per capita productive efficiency (by breaking the traditional way of operating). Secondary enrollments are associated with growth only after 8-10 percent primary enrollment has taken place and empirical results show a good relationship between secondary enrollment and

real income per capita after primary education is completed. Higher education: evidence suggests that, after universal primary education is substantially attained, a higher rate of per capita growth results when the secondary level number of pupils is 10 or more times the number of higher education students. After primary education is completed, emphasis should be placed on secondary enrollments and gradually shifted to higher education.

Piñera, S., and Selowsky, M., "The Economic Cost of the Internal Brain Drain, Its Magnitude in Developing Countries," World Bank Staff Working Paper No. 243, September 1976.

The central notion of this paper is the hypothesis of factor complementarity between pre-school ability and education in determining an individual's future productivity. The existence of a particular measure of ability at pre-school age fulfilling that complementarity implies that the impact of schooling will be higher the higher the initial level of that ability in the individual.

Under the above hypothesis, an optimal allocation of existing educational resources across individuals with different pre-school abilities (in the sense of maximizing the value added of these resources) must generate a positive and perfect correlation between pre-school ability and the amount of schooling. The existence of an educational system where the amount of education an individual receives (or the "selection" process of the system) that is determined by factors other than ability (such as family income) induces a misallocation of the existing educational resources. The economic cost of this "internal brain drain" is defined as the value added lost by the existing educational system relative to a fully reformed system, under which students at all age levels are selected according to previous school abilities.

An analytical framework is specified which measures the gains in value added that would accrue from such "full reforms" as well as from "partial reforms." The capacity of the educational system is assumed to be constant for this exercise, so as to isolate the pure qualitative effects of such reforms. The quantitative effects appear substantial: a full reform would

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double the net value added of the educational system. For a range of very diverse countries, a fully reformed educational system would increase the long-run contribution of labor to the economy by 11 percent, assuming labor's share in GNP is 0.5. This implies a long-run gain in output equal to 5.5 percent, which is substantial.

Psacharopoulos, G., "Rates of Return to Investment in Education Around the World," Comp. Educ. Rev., Vol. 16, No. 1, 1972, pp. 54-67.

Statistical data indicates that people with more education earn higher wages. Private rate of return is calculated with the direct costs of schooling and gross benefits (before tax). Social rates of return use benefits (before tax) and full costs of schooling. Estimates of social and private rates of return are compared for 30 countries. One problem with this comparison is that the results of rate of return are for various years depending on the country. These general results were found: (1) private rates were higher than social; (2) rates of return declined with higher levels of education; (3) education rates exceeded rates of return on conventional investment alternatives; and (4) the more undeveloped the country, the higher the returns to investment in education. These findings imply that priority should be given to investment in men (rather than machines) also that countries should avoid overinvestment in higher levels of education. The fourth finding indicates that LDC's have greater income growth opportunities via educational investment.

See also: George Psacharopoulos and Keith Hinchliffe, Returns to Education an International Comparison. Amsterdam: Elsevier Scientific; San Francisco: Jossey-Bass, 1973.

Rogers, Everett M., "A Note on Innovators," J. Farm Econ., Vol. XLI,
February 1959, No. 1, pp. 132-133.

This note utilizes a new definition of innovation: the first 2.5 per-
cent of the population to adopt new practices. It critiques an earlier study
by Hildebrand and Partenheimer, who use data from farmers who have innovator
images, rather than actual behavior. A state-wide sample of 96 innovators
from Ohio was obtained and their characteristics were determined. It was
found that these innovators were (1) more highly educated, especially in
agriculture, (2) earning higher gross incomes, (3) farming large farms,
(4) participating more in extension services and activities, and (5) acquired
information from agricultural scientists.

Sadan, Ezra; Nachmias, Chava; Bar-Lev, Gideon; "Education and Economic Performance of Occidental and Oriental Family Farm Operators," World Devel., 1976, 4, 445-455.

This article is an attempt to evaluate the relative effect of socio-logical and economic factors on economic performance of occidental and oriental farm operators in Israel. Unusual circumstances prevail in Israel, where farm operators with modern and traditional backgrounds coexist within a modern economy.

Inquiries into the effects of the farm operator's socio-cultural background as well as their level of education upon economic performance are confronted with considerable difficulties because the system cannot be separated from its constituents. A social system, whether traditional or modern, will, in most cases, set the socio-cultural background of its (indigenous) members. Unusual circumstances which allow for an inquiry into the operator's capacity as an entity separable from the system have materialized in Israel in the early 1950's. A large influx of Jewish immigrants (orientals) in the early 1950's with a cultural pattern predominately traditional can be contrasted to the modern natives (occidentals).

Using a Cobb-Douglas production function, income ratios were specified as the performance variable. The income ratio was defined as the ratio of the gross value -- added income originated per man year in an average family farm operated by orientals or native born relative to the income originated in an average family farm operated by occidental settlers. For the year 1969-1970 the estimated income-ratios reveal the superiority of occidentals,

and that of second generation occidentals in particular.

This performance variable was then related to variables representing the educational and cultural background. Concerning differences in schooling (number of years of formal schooling), it was found that differential economic performance was related to these differences in schooling, i.e., farmers with a higher level of schooling appear to be better producers. There was also high performance associated with heterogenous villages incorporating an occidental element as well as an oriental one, reflecting induced adjustment and emulation on the part of the orientals.

In arguing that the relation of education and performance is not a simple one, that is, education does more than simply train future farm operators (it enables them to think analytically, to generalize, and is associated with basic cultural dispositions), the authors specify a regression model relating gross value added to herd size, use of irrigation water, schooling of operators' wives, and family size. Using 1969-1970 data it was found that a significant proportion of the difference between the relatively successful and poor achievers among dairy farmers operating under supervision of the Israeli Settlement Agency was related to the "educational" background of the operators. Therefore, while performance was associated with the level of formal schooling, it was also associated with various background elements.

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Sandoval, Rodrigo Parra, Dependency and Education in Columbian Underdevelop-
ment, R.P. #51, Land Tenure Center, Univ. of Wisconsin, Madison,
June 1973, 77 pages. Abbreviated Ph.D. thesis, U. of Wisconsin, 1971.

Sandoval presents a dialectic analysis of the relationship of educa-
tion to dependency. Increased education serves to develop increased depen-
dency on dominant classes, leading to stifled autonomous development. Data
is mainly demographic (population, educational level, and migration) and
industrial in the aggregate, with attention to foreign trade. The focus is
on university education.

Conclusions: Increased education leads to increased dependency and
the polarization of the educated and uneducated. Education provides an
increased stabilizing effect, leading to protection of the dominant class,
i.e., land and property owners, and international interests. Educational
aid, therefore, is repressive and aggravates separation of classes while
building a dependent middle class of university trained individuals.

Sanyal, Bikos C., and Versluis, Jan, "Higher Education, Human Capital and Market Segmentation in the Sudan," World Employment Programme Research Working Papers No. 10, International Labor Office, Geneva, March 1976.

This paper analyzes statistical data collected from Sudan both from the point of view of educational planning and from the point of view of employment and income distribution. Using linear regression analysis, the dependent variable was the growth in earnings. The significant independent variables were (1) the waiting period before finding the first employment, and (2) duration of studies. Labor market segmentation variables, i.e., sex, father's occupation, type of diploma, sector of activity, occupational group, etc., did not demonstrate any significance.

Schiffelbein, E. F., and Farrell, J. P., "Factors Associated with Educational Achievement in Chile," Planning Office of the Ministry of Education, Chile, 1970.

This study is concerned with determining the relative effect on student performance on a national achievement test and transitions from eighth grade to various types of second-level education, of a variety of variables representing characteristics of the student himself, his classmates, his teachers, his school, his family and his community. Using Chilean data for 1970, and simple correlation analysis, numerous relationships were determined. The most significant conclusion is that, however strong the direct effect of social class is on student academic performance, and however much social class background accounts for certain important distinctions between school types, there still appears to be some independent effect of important pedagogical variables on student academic performance.

Schultz, T. P., "Explanation of Birth Rate Changes over Space and Time: A Study of Taiwan," J. Polit. Econ., Vol. 81, No. 2, Supplement, 1973, pp. S238-S274.

A reduced form equation is used to analyze Taiwan's birth rate, when the birth rate for a given year is a function of the following independent variables: the reciprocal of the child-survival rate, proportion of the male labor force employed in agriculture, male school attainment, female school attainment, and two classes of family planning field workers employed in the health and family-planning programs. Data are for 1964 through 1969 but this paper only uses the figures for 1965 and 1969.

Regression analysis showed that additional schooling for women lowered teenage birth rates but increased birth rates of women 35 years old and over. This result is contrary to the expected result in nations where industrialization has begun.

The family-planning programs seemed to lower fertility rates initially in 1965 and 1966, but, since then program efforts have been positively associated with fertility. A possible explanation for this finding is that where reliable birth control methods are available, there is a tendency not to delay marriage and this produces wide oscillations in birth rates among the younger women.

The schooling coefficient was found to be consistently negative for males and positive for females. This is contrary to economic theory and it casts doubts on the ability of static cross-sectional evidence to capture economic determinants in a changing economy.

Utilizing a time series model, the author found that results obtained in static cross-sectional models were biased upwards. Rather a more appropriate model should be concerned with desired family size as compared to actual size. Disequilibrium between these would initially result in higher birth rates. This hypothesis could not be fully checked because of data limitations, namely a lack of longitudinal data.

In general, the study found support for the fact that both adult schooling and child mortality exert strong significant affects on birth rates for the 3 to 5 year time horizon.

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Schultz, T. P., "Returns to Education in Bogota, Colombia," Rand Corp., RM 5645-RC/AID, September 1968.

This article is a study of the rate of return, in terms of wages, to various levels of education for men and women in Bogota. Using Bogota data from a survey conducted in 1965, estimates are derived for the private rate of return and for a partial social rate of return. It was determined that while the rate of return for both men's and women's secondary and vocational education, and to some extent men's primary education, is high, the return to university training is unusually low. Therefore, a high priority should be given to the expansion of secondary and vocational training, and not as much for university education.

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Schultz, T. Paul, "Rural Urban Migration in Colombia," Rev. Econ. Statist.,
Vol. LIII, May 1971, No. 2, pp. 157-163.

This article attempts to measure the responsiveness of migration in Colombia from rural to urban areas based upon economic, demographic, and political developments. Using Colombian data for the years 1951-1964, migration rates are determined and a multiple regression model is specified. It was found that high local wages reduce out-migration, population growth accelerates out-migration, and the prevalence of violence adds to out-migration. The incidence of schooling in an area in the 10-14 age bracket is strongly positively associated with out-migration; schooling participation among the 5-9 group is associated with less out-migration.

Schultz, T. W., "Institutions and the Rising Economic Value of Man," Amer. J. of Agr. Econ., Vol. 60, No. 5, 1968, p. 1113.

The author addresses the role played by institutions and how they respond to demands of human agents. Institutions are treated in a number of ways: (1) growth models which exogenize institutions; (2) institutions are treated exogenously but are allowed to change via political acts; and (3) institutions as part of the economic system (Schultz's preference).

This is accomplished by subjecting institutions to demand and supply analysis, where the institution is a supplier of a service and its constituents form a demand for that particular service. Examples of such include the demand for better information in the growth process, demand for credit by farmers to increase their well capacity will lead to the formation of cooperatives, and demand for skills will result in a demand by agents to build more and better schools. It is these lagged adjustments by institutions which are a major cause of disequilibria in the economy. By improving the economy's response to these institutional demands, efficiency and welfare can be increased.

Schultz, T. W., "The Education of Farm People: An Economic Perspective,"
in Education and Rural Development, edited by Philip Foster and
James R. Sheffield, World Year Book of Education, 1974, pp. 50-68.

Four different agricultural states are considered: (1) traditional agriculture, (2) modernizing, but poor, (3) rich and continuing to modernize, and (4) rich with the modernization of agriculture completed. These are considered in terms of two macro economic models, long run equilibrium economy and a dynamic economy. Agricultural states (1) and (4) are included in an economy that is in long run equilibrium while (2) and (3) are part of a dynamic economy.

In considering the educational implications, the traditional state demands that farmers obtain useful information (in a production and consumption sense) in a very informal way by passing information from one generation to another. Essentially, there is no demand for a formal schooling structure. In the modernizing, but poor, agricultural state, there is an increased demand for schooling to enable the farmers to fully utilize the improved agricultural production inputs. Since these farmers have initial low levels of schooling, the demand for formal education is primarily caused by the returns education brings in terms of agricultural production, that is, reading and writing skills are rewarded by increased output. In this situation, elementary levels of education are most useful, in terms of raising the use level of these new agricultural methods. For the rich and continuing to modernize agricultural state, more education is demanded and there is a demand for secondary levels of education. At this stage the impact of increased education is transmitted

through differences in allocative abilities (a la' Welch). In attaining the fourth agricultural state (one stage that is never fully reached), educational emphasis for agricultural activities will diminish. At this level, those farmers with 12 years of schooling would do about as well as those with higher levels of education.

During the development process three relations have been identified: (1) the accumulation of human capital takes place at a higher rate than that of non-human capital, (2) it is the absolute earnings differential between workers with little and those with much education that determines whether additional education is warranted, and (3) there seems to be some decrease in the inequality of personal income distribution.

Further in the process of development the highest private rates of return are realized by completing elementary schooling and the highest social rates of return are realized by educating females because of the impact on future generations. Also schools tend to have greater efficiency when rules exist concerning attendance, and equal opportunity for public funds. This leads to a successful development process where the rates of return to schooling are comparable to investments in non-human capital.

Schultz, Theodore W., "The Value of the Ability to Deal with Disequilibria,"
J. Econ. Literature, Vol. 63, No. 3, September 1975.

The main purpose of this survey is to explore how education and experience influence the efficiency of human beings to perceive, to interpret correctly, and to undertake action that will appropriately reallocate their resources. The approach of the paper is to extend the concept of entrepreneurship, postulating a supply function of entrepreneurs that takes into account individual's abilities to deal with disequilibria. The effects of education in this connection can be tested empirically: if education enhances the ability of students to perceive new classes of problems, to clarify such problems, and to learn ways of solving them, then the realized gains from adapting to disequilibrium are the observable rewards.

Various studies are surveyed and the difficulties inherent in the data are discussed. From the equilibrating performance of housewives, laborers, students, and farmers, the author concludes that there is enough evidence to give validity to the hypothesis that the ability to deal successfully with economic disequilibria is enhanced by education and that this ability is one of the major benefits of education accruing to people privately in a modernizing economy.

Selowsky, Marcelo, The Effect of Unemployment and Growth on the Rate of Return to Education: The Case of Colombia, Center for International Affairs, Harvard University, Economic Development Report No. 116, 1968.

Rate of return analysis that explicitly accounts for the problem of unemployment is used. Age-earnings profiles were adjusted by probability distribution of unemployment for age and education. Internal rate of return was evaluated at the shadow price. Costs of education include earnings foregone and direct costs of attendance.

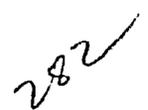
The hourly wage is positively related to education. Wage differentials between males and females diminish with increased education as do weekly hours worked. Unemployment is reduced with increased education, however, for all levels of education. Unemployment is highest for the relatively young (20-30). Internal rate of return (adjusted for participation and unemployment) was found to fall with increased levels of education.

Complicated methods of estimating rate of returns indicate the order of priorities for education that are predicted by the simpler methods and policies should recommend expansion of primary education and incentives to increased voluntary enrollment. Major focus on the lower levels of education, then the medium and finally the university level.

Selowsky, M., "A Note on Preschool-Age Investment in Human Capital in Developing Countries," Econ. Develop. and Cult. Change, Vol. 24, No. 4, July 1976.

This study attempts to separate the independent aspects of ability and schooling upon adult performance. A survey of recent literature isolates the findings by Bloom where the correlation coefficient between IQ at any age (T-t) and the IQ score at maturity (T) increases for consecutive lower values of t (Bloom's data was longitudinal). Bloom's conclusions are: in terms of intelligence at 17 at least 20 percent is developed at age 1, 50 percent by age 4, and 80 percent by age 8, and 92 percent by age 13. This and other results have led to the accepted conclusion that a good portion of children's IQ scores are explained by heritable factors.

The effect of early malnutrition has been identified as causing abnormal development of the central nervous system which later reduces the child's ability to perform certain tasks. Findings have also shown that by changing the early environment, the performance of children can be raised above other well-nourished children from similar income groups but who did not benefit from changes in early environment. Thus changes (via government policy) in the out-of-home early environment can bring about increased performance. However, most LDC's do not have the resource capabilities for this type of program. The next best alternative is to encourage parents to send their children to the first level of elementary school at earlier ages, since the evidence indicates that lower income Latin American parents send their children to school 1 to 3 years later than higher income parents. Regarding malnutrition, a major cause seems to be the decline in breast feeding and the unattainable resource cost of substitute goods.



Selowsky, Marcelo, "Investment in Education in Developing Countries: A Critical Review of Some Issues," Center for International Affairs, Harvard University, Economic Development Report No. 232, May 1973.

The author attempts to make explicit the source of conflicting views concerning the micro-mechanism by which education affects growth. Some basic questions that must be answered to solve disagreement are those dealing with:

- (1) differentiation of education's contribution to past growth from its possible contribution to future growth.
- (2) finding an acceptable index of productivity of investment in education.
- (3) reaching a consensus on how to empirically measure such an index.
- (4) the main differences between such an index and the index that governs private decisions for education.
- (5) the sources of differences between social and private return to education.

The author makes two recommendations. First, the need of an elementary education whose main objective is to equip individuals with a "minimum" basket of attributes so as to neutralize difference in their initial conditions. This can be achieved by a more aggressive policy toward basic elementary education, and supplementary nutrition programs at primary school level in order to increase the incentives to attend school. Second, higher education should be more self-sustained so as to release public funds and planning abilities to primary education.

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Sexton, James D., "Education and Innovation in a Guatemalan Community: San Juan la Laguna," Latin American Center, Latin American Studies, Vol. 19, University of California, Los Angeles, 1972.

This study focuses on the impact of formal education (grades 1-6) and informal education (mass media, travel, military service) in respect to innovation in the town of San Juan, Guatemala. Guatemala was chosen because of its high rate of illiteracy, compared to other Latin American countries. Ethnographic field techniques of participant observation, key informant interviewing and analysis of local records were coupled with a systematic collection of a random and a purposive sample of interview schedules in the town of San Juan la Laguna, a rural community.

Innovation was defined as the "process by which alteration occurs in the structure and function of a social system," the variable for innovation was an innovation index, comprised of: (1) modern dress, (2) speaking Spanish, (3) having an outdoor toilet, (4) having running water in the home, and (5) having a cement floor. Simple correlation analysis and multiple regression analysis was done. The dependent variables were external exposure, grade completed in school, economic status, fatalism, satisfaction with living, and age. External exposure, grade completed in school, and economic status accounted for most of the variation in innovation, in that order of importance. Also, grade completed in school positively influenced external exposure, measured in terms of mass media exposure and military service.

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Shaath, Nabell Ali, Education, High Level Manpower, and the Economic Development of the United Arab Republic, Univ. of Pennsylvania, Ph.D. Dissertation, 1965.

For the period 1900-1964, the composite index of Harbeson and Myers (HMCI) is employed. The index is a rough measure of the potential high level manpower in a country. For 1900-1945 negative correlation was found between HMCI and per capita real income, for 1950-1956 a small positive correlation was found, and for 1957-1964 a high positive correlation was found. The growth of High Level Human Resources (HLHR) was greater than the growth of the labor force (LF) or the population. The ratio of employed university and higher institution graduates to the LF increased from .14 percent in 1910-1919 to 2.66 percent in 1961-1964, indicating that HLHR grew 20 times faster than the rise in the LF for this period. Public expenditure on education also grew for this period. The ratio of expenditure on public education to total government expenditure rose from 7 percent in 1925 to 16 percent for 1955-1965.

It is important to note that for the long period 1900-1964 no relationship between education and economic development could be found but if this period is subdivided, then the results were found to go from a negative relationship to a small positive, and finally to a large positive relationship. The ratio of employed high level manpower (HLMP) to total HLMP diminished from 74.4 percent in 1937 to 47.0 percent in 1960. One possible explanation was the increased percentage of women in HLMP who stayed home as a result of few jobs and family obligations. During this period the structure of HLMP shifted towards the services industry in large part.

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Shaath, N. A. (cont.)

Migration from rural to urban areas increased over this period especially for those persons who were educated. The growth of the cities accentuated the dualism of the economy and led to lopsided investments being strictly located in the larger cities.

Education was primarily focused on general academic training in the 1940's and 1950's, as opposed to previous emphasis on vocational training. With the increased number of graduates and limited jobs, the government was forced to absorb as many as possible. Because of the relative open society, culturally, education was viewed as the road to economic improvement, security, prestige, and social status. Higher education certificates became the passports to a better life. The reward system favored those who had attained higher levels of education.

Students attended universities for the chance of being employed by the government and schools offered the kind of program to satisfy government demands for employees. The government oriented program stressed certain personality patterns: obedience, docility, and discipline. This resulted in graduates suited for nothing else except government work (era of 1930's and 1940's). Vocational schools catered to the lower classes and the rural areas. This also led to a belief that manual work was for the lower classes, indicating (or implying) these conditions hindered the development of an entrepreneurial class, rather, it developed a class of government bureaucrats.

Sheffield, J. R., "The Development Orientation in Rural Ethiopia," in Road to The Village Case Studies in African Community Development, by J. R. Sheffield, African-American Institute, New York, 1974, pp. 93-113.

Data was collected from survey of 1,200 people (interviewers attempted to cover between 30-50 percent of all persons over 16 years of age in each village). Out of this sample, 81 percent were male and 46 percent were farmers. For the purpose of this paper, modern occupations included trader, government employees, and students while traditional occupations included farmer, craftsman, church and unskilled.

Respondents were asked what could be done to solve local problems with the following available responses (1) government action, (2) local initiative, (3) both, and (4) don't know. The combination of government and local action was the most popular response. Local initiative was favored over government action only for the one area which had the lowest number of problems per respondent. A general result was that education raises awareness and expectations beyond the short run and therefore increases the dependence upon non-local government action.

Those persons who preferred local initiative were ranked by frequency and occupation: craftsman, church, government, student, trader, farmer, housewife, unskilled, and unemployed; while those who preferred government action were ranked in the following order: unskilled, craftsmen, farmer, trader, unemployed, student, housewife, government, and church. In ranking government services that were considered most useful, one village out of five ranked

Sheffield, J. R. (cont.)
Page 2

agriculture first, three ranked community development first, and one ranked health first. In general, there was skepticism about government service and self-help programs which indicates the difficulty in planning training programs without an effort to integrate development activities.

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Shortlidge, Richard L., Jr., "A Socioeconomic Model of School Attendance in Rural India," occasional paper No. 86, Technological Change in Agriculture Project, Department of Agricultural Economics, Cornell University, January 1976.

Becker's theory of household choice serves as the conceptual framework for this analysis of school attendance in rural India. The data for the analysis comes from a household survey conducted by Cornell University and G. B. Pant University of Agriculture and Technology in 14 villages located in two districts in India. The survey was done during March and August of 1971, and was restricted to individuals between 5 and 21 years of age.

Using regression analysis, it was found that three variables were significant in measuring the opportunity cost of attending school. School attendance was negatively related to the number of days worked in agricultural labor, owning livestock and the child's age. It was also demonstrated that the ability of a family to purchase labor saving equipment (a thresher or a tube-well) and to absorb in general the costs of sending a child to school were the major determinants of school attendance. Also, the significance of the amount of land owned coupled with a lack of significance for relative income suggests that school attendance is affected by permanent rather than transitory income. Because India subsidizes certain costs, school attendance was not strongly influenced by the direct costs of education, the opportunity costs weighing more heavily. Also, the sex of a child was an important determinant of attending school, boys being on average much more likely (2.5 - 4.0 times more likely) to attend school than girls. A family's attitudes toward education, as well as the general educational attainment of the village were significant determinants of whether the child went to school.

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Shortlidge, Richard L., Jr., Is Human Capital An Important Determinant of Earnings in Small Manufacturing and Retail Firms in India? Technological Change in Agriculture Project, Department of Agricultural Economics, Cornell University, Occasional Paper No. 85, March 1976.

The data for this report are from a survey of four urban communities in Western Uttar Pradesh. This survey was conducted by the author in 1971 between March and July. Three of the cities selected were block headquarters while the other city was district headquarters. In this survey, all firms were classified by their function into 14 categories, out of which a 20 percent stratified sample was drawn. Data was collected on all employees for this sample, however, this paper only focused on male employees exclusive of owners.

The first step of the analysis was to develop an earnings function. In this model, monthly earnings were used to estimate individual productivity. Productivity is assumed to be a function of years of schooling completed, the amount of firm-specific experience, the amount of occupation-specific experience, the amount of general experience and a set of control variables.

Regression analysis showed that 47 percent of the variation in monthly earnings was explained by the model. By holding the experience variables constant, education's effect on monthly earnings was isolated. This task showed that if the years of schooling completed are under 3.5 then the marginal product of education is less than zero. However, beyond the 3.5 year threshold, the marginal product of education was positive and increased at a constant rate.

The marginal product of general experience declined at a constant rate as the number of years worked increased, while the effects of firm-specific

and occupation-specific experience were nonsignificant. By holding all other forms of experience and education constant, the effect of general experience on monthly earnings reached a peak with approximately 40 years of labor market experience. However, the peak for each worker varies with the educational level.

By considering education and experience as compliments, it was shown that the marginal product of all forms of experience varied directly with the number of years of completed schooling. This implies that peak earnings were reached at later stages in life for those with higher levels of education. This finding is quite consistent with human capital theory (Becker 1964).

For workers without any formal education, occupation-specific experience had a greater marginal impact on earnings. Yet, as the worker attained higher educational levels, firm-specific experience became most effective in its impact on earnings. Also, at each level of schooling, a year of general experience could be substituted for by less than one year of firm-specific experience. In particular, seven months of firm-specific experience could compensate any worker for a year's loss of general experience.

These findings indicate that there is a strong earnings incentive to continue formal schooling. The impact of schooling was particularly important in its effect on experience variables. Further, it seems that employers felt that education was a desirable attribute.

Shortlidge, Richard L., Jr., "The Labor Market for Agricultural Graduates in India, A Benefit-Cost Case Study of G. B. Pant University of Agriculture and Technology," occasional paper No. 69, Employment and Income Distribution Project, Dept. of Agr. Econ., Cornell University, April 1974.

Rate of return analysis is conducted for graduates of the university. A 10 percent sample of expected senior graduates was examined for early analysis. The average student comes from the top 1 percent of rural income families and top 5 percent of urban ones. A poll of 1,536 graduates -- 605 responding -- provided the sample.

Significant unemployment arose only between graduation and the first job. Grade point average at graduation is positively related to earnings. It is important for the business and research employee selection process and for advancement of village level workers. Both social and private rates of return are calculated and are found to be higher with private, business than governmental employment. No gain is shown in earnings by post-graduates over undergraduates when employed with government. Considerable variation in returns is reported. Returns are highest for M.Sc.Ag. employed in farming and private business, 34 percent (social) or 48 percent (private).

Shortlidge, Richard L., Jr., "University Training for Gramsevaks in India: An Example of Recurrent Education in a Low Income Country," Econ. Develop. Cult. Change, Vol. 24, No. 1, October 1975, pp. 139-153.

Rate of return analysis is employed in evaluating a program of recurrent education in agricultural science, for older village level government workers. These students are from the upper 10 percent income group of rural families, unlike the average student who is from the upper 1 percent. Earnings functions are estimated.

For this special program five years of experience in agricultural extension work are, in effect, substituted for one year of academic work. The former experience is required of entrants to the program which is one year shorter than the normal three year undergraduate program. The social costs of the program are thus reduced relative to the conventional course of agricultural training. The lowering of costs contributes to a finding of social returns for the program equivalent to or higher than comparable ones for regular agricultural graduates.

Although most graduates returned to their earlier employment, some who changed jobs experienced an initial period of unemployment. That unemployment was, however, positively associated with earnings as those graduates improved their salaries outside of government service.

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Simmons, John, "A Dimension of the Technology of Education: Retention of Cognitive Skills," Economic Development Report No. 215, Development Research Group, Center for International Affairs, Harvard University, Cambridge, Massachusetts, April 1972^a.

The purpose of this study was to make an empirical test of a model with factors that are theoretically significant in predicting individual's loss or gain (retention) in cognitive skills after they had left school. To measure the retention in cognitive skills, the study uses a comparative cross-sectional approach, where two samples were taken at the same point in time, one finishing school, the other out of school. Both groups of individuals are tested for cognitive levels and interviewed for background variables to control for possible variations in the populations. The mean score for the in-school group becomes the baseline for measuring a gain or a loss for the individuals who have been out of school.

A survey was conducted on urban young men from Tunisia, all of whom had completed six grades of primary education. They were tested in Arabic, French, and Math. It was demonstrated that there was a serious loss of cognitive ability, the length of time being out of school significantly related to the loss of cognitive ability. However, using linear regression analysis, it was also demonstrated that the length of time of being out of school was not a predictor of the individual's ability to retain what they had learned. What was significant included family background and past school use of cognitive skills.

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Simmons, John, "The Income Benefits from Formal and Informal Education:
Estimate for a Socio-economic Model," Economic Development Report
No. 211, April 1972, Cambridge, Mass.: Center for International
Affairs, Harvard University, 1972^b.

This article is concerned with the relationship of education, work-
experience, and earnings. Using Tunisian data, the technique of linear
regression analysis demonstrated that work experience was much more signifi-
cant than using cognitive skills from primary education in predicting earnings.

Singh, Vidya N., Transfer of Technology, Technological Change and Economic Development: The Prototype Case of India, Ph.D. dissertation, Georgetown University, 1975, 176 pp.

A framework is developed to analyze the complex problem of technological transfer for the purpose of economic development. The suggested conditions for economic development (via technology and transfer of technology) are: (1) willingness of transferee and transferor, (2) stable and efficient government, (3) research and development, (4) appropriate education system, and (5) proper planning and financing. Additionally, methods or channels by which the process occurs include the following: (1) direct foreign investment, (2) foreign collaboration, (3) personal and student transfers, (4) exchanges and missions, (5) military.

For India between 1961-69, this study shows that the regulation of foreign investment did not stop this activity, however the changes have declined since 1966-67 when the Indian Government wanted greater control of these investments. Since 1964, foreign collaboration, that is, Indian attempts to induce other nations to undertake specific types of investment, has declined. The government's emphasis upon using local personnel has slowed the influx of foreign personnel, however, India has faced a shortage of trained personnel for most of the period examined. Generally, the training of the domestic work force has not kept pace with the demand for skilled personnel by industrial enterprises. The government has encouraged the adoption of small, labor intensive industry which has contributed to the slow introduction of technology.

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Singleton, John, "Schools and Rural Development: An Anthropological Approach," in Education and Rural Development, edited by P. Foster and J. R. Sheffield, World Year Book of Education, 1974, pp. 117-136.

Support for educational programs has stemmed from the belief that, by investing in education, communities can stimulate development. It is held that cognitive skills acquired in schooling are desirable in a social sense. This paper examines schools in a wider perspective, that is, schools are viewed as social institutions.

Schools encompass much more than education and in most situations, they prescribe social norms and social life. This implies that schools are not solely educational but in fact they are a multi-faceted institution. There is some question as to which activities of the school are educational and if these are educational, to what extent are they educational. This implies that cognitive and effective learning processes are not independent.

The author identifies a problem of educators as immediately thinking of lower class persons as not having a social culture and social life. Yet, for educators to be competent, they should learn these traits and use them, as needed, in the educational process. The educational process is viewed as a cultural transmission mechanism. It is by this process that children become adults in both a physical and social sense.

This transformation into society is aided by the selection process for admission, tracking of students, examinations and other evaluations which all serve to determine a pupil's future in the wider society. These practices are rationalized as being democratic, where each child is judged on his/her

individual merit. Realistically, the socio-economic status of the child's family is strongly related to the pupil's chance for success in and out of school.

The author cites two recent case studies by Priscila S. Manalang and Robert Gurevich (both unpublished Ph.D. Dissertations, University of Pittsburg) on rural villages in Thailand and the Philippines. The report on the Philippine village and its school indicated that one obvious feature was the school's role as an extension of the national bureaucratic school system. Much of the work in the schools was concerned with visits to the school by school officials. The structure was such that the local schools had some discretion in selecting its own curriculum but any major or substantial deviation in curriculum had to be approved by the Director of Public Schools. The school was expected to provide students with the traditional values of the society and certain basic literary skills.

Although the Thai school was enthusiastically supported by all members of the community, it suffered from many similar problems as were identified in the Philippine case. Success in school was directly aimed at providing further opportunities for additional schooling. Most of the learning is very formal and structured with great emphasis being placed upon measures of ability. Examination results are used to evaluate students and teachers alike in the highly formalized structure of education.

These two case studies indicate problem areas for rural development. If schools are an extension of the urban sector, then they will be primarily training students with skills that are not of great use in the rural sector.

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In general, viewing education as a social institution would seem to imply that the educated will be encouraged to migrate to urban centers given that they are trained to satisfy urban educational bureaucracies. An impact goal for developing nations should focus attention on changing rural educational methods to suit the needs of the students. Educational flexibility should be emphasized so that rural stagnation is not the result of rural education.

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Slighton, R. L., "Relative Wages, Skill Shortages, and Changes in Income Distribution in Colombia," Rand Corp., R M 5651 -- RC/AID, October 1968^a.

This article is an analysis of income distribution relative to economic growth in Colombia. The study examines the hypothesis that the extreme inequality in income distribution in Colombia will widen if growth in the modern sector of the economy is retarded after the transition from agrarianism to the dual economy is begun. Part of the inequality is explained by the widening wage differential between the modern and traditional subsectors as a result of intensive educational differences.

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Slighton, R. L., "Urban Unemployment in Colombia: Measurement, Characteristics, and Policy Problems," Rand Corp., RM - 5393 - AID, January 1968^b.

This is a study of the dimensions and characteristics of urban unemployment in Colombia. Approximately 10 to 16 percent of the labor force is unemployed in the larger cities, and the unemployment rate is increasing. The analysis determined that the urban unemployed are younger than the employed and less educated, but the relationship between unemployment and education is very weak.

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Skorov, G. E., "The Developing Countries: Education, Employment, Economic Growth," Soviet Educ., Vol. 14, No. 10, 1972, p. 5.

In this article, colonial education's role is identified as being primarily concerned with developing helpers for the colonial administration and supporting the traditions of the mother country. The problem as to the type of education that should be developed in LDC's is addressed. The author notes a problem with the two types of educational systems, practical and academic, as increasing the degree of polarization in LDC's between the urban and the rural sectors. In fact, education in LDC's is under the indirect control of developed countries' educational systems which emphasize rote learning and retard the originality of the mind. This phenomenon is primarily caused by LDC's dependence on developed countries for teaching personnel. LDC's are faced with a trade-off either expanding admissions to elementary schools or limiting enrollment with more extensive programs to develop good technical workers. Education in LDC's should be viewed as part of the whole system of socio-economic development and not as a separate entity.



Smith, M. G., "Education and Occupational Choice in Jamaica," Soc. Econ. Stud., Vol. 9, No. 3, 1960, p. 332.

By re-examining the data collected in two previous studies, the author evaluates the desires of young students looking for work. Further, the author attempts to indicate the aspirations of those in school as to what they would like to do after completing their education. The study indicates that students largely hold unrealistic views about their future occupational opportunities. The typical experience is that bright outlooks are held during school, yet, this outlook becomes bleak once the job search has begun and the student becomes aware of employment opportunities.

Solari, A., "Secondary Education and the Development of Elites," in Elites in Latin America, edited by S. M. Lipset and A. Solari, Oxford University Press, New York, 1967, pp. 457.

This study concentrates on international comparisons of Latin American countries for the years 1955 and 1960. For these countries, secondary enrollment as a proportion of school-aged population varied from 3 percent to 32 percent for Haiti and Uruguay, respectively. Secondary education is usually an urban characteristic so that countries which have recently and are currently experiencing urbanization should be expected to have higher rates of secondary enrollment (this is verified by the enrollment figures). The percentage of the labor force employed in service sector also is a good indicator of secondary schooling enrollment. Other factors that are identified as having a positive influence on secondary enrollment include income level per capita, and equal distribution of income.

The bulk of secondary students are from middle class backgrounds as secondary education becomes an indispensable condition to maintain upward occupational and social mobility. In the past the secondary level was the highest level attainable in the educational system and as such was crucial in the development of elites. Most leaders were developed in the academic schools. Although education will continue to influence social mobility there is no guarantee that elites will continue to be prepared in the educational process.

Soll, Hugo H., Technology Transfer, Labor, Capital Intensity, and Capital Utilization Rates: A Study of Industry in Guadalajara, Ph.D. Dissertation, University of Colorado, 1973, 382 pp.

The data for this study are from interviews with high level management personnel of 41 firms in Guadalajara. This study is excellent in its main area of concentration, namely, the role of industrial development.

Labor training is usually given in an on-the-job format which is not terribly specific and, in general, is not expensive or time consuming. Many firms prefer this procedure in that "bad habits" can be detected and the employee is better able to learn the operating procedure of the firm. In Mexico, basic education is provided for by the state and lasts six years. This enables firms to undertake specific training in an on-the-job format. The level of basic education attained by the individual worker has a positive relationship to his ability to learn complex tasks required by certain firms.



Srinivasan, K., "A Prospective Study of Fertility Behaviour of a Group of Married Women in Rural India -- Design and Findings of the First Round of Enquiry," Population Rev., Vol. 11, No. 2, 1967, pp. 46-60.

The data for this study are derived from a sample of 2,093 married women in the reproductive age group residing in 2,842 households. The actual data gathering took place in January 1965 for the Athoor Block, Madras State, India. This survey was to be conducted over a four year period with revisits to be made every six months after the initial survey was conducted. The entire survey population was subdivided by population size of the village where these groups were the following: more than 9,000; 1,000 - 9,000, and less than 1,000. This study only considers the information collected in the first round of the survey which was completed in May 1965.

The child-woman ratio is defined as the number of children under 5 years of age to 100 women in the age group 15-44. This ratio was 78.2 percent for the entire country as compared to 64.5 percent for the sample area. It is suggested that family planning programs, which were implemented in the last 7 to 8 years, may have been at least partly responsible for the child-woman ratio gap. Dividing the sample by religion reveals that the child-women ratio was 63.5 percent for Hindus (84.9 percent of the sample), 66.9 percent for Catholics (9.8 percent of the sample), and 77.5 percent for Muslims (4.5 percent of the sample). In addition, it was found that Muslim women had higher fertility than either the Hindus or Christians (Catholics plus other Protestant sects).

Considering fertility of the women by economic status shows that, in general, the women from the low economic level have higher fertility than those from the high economic level. In this study, economic status was determined by the family dwelling, i.e., brick walled, mud walled, or huts and the housing rent. This result seems to imply that those families in the higher economic levels are more apt to practice birth control methods.

Using the caste system to evaluate the sample shows that the Devanga and Gounders caste show consistently lower fertility than the rest of the population. This may indicate something about the rate of acceptance for birth control and family planning.

Although there is some decline in the fertility of women by the education of their husbands, the data are not conclusive and cannot validate the hypothesis that educational attainment lowers fertility. However, in general, this study has shown that the women of this sample do have lower fertility than the country as a whole.

Stycos, J. M., Human Fertility in Latin America, Cornell University Press, Ithaca, New York, 1968.

In addressing population control for Latin America, there are three alternatives, (1) allow the death rate to increase, (2) decrease the birth rate, or (3) encourage out-migration. Of these alternatives, the latter two have been emphasized with primary emphasis given to birth control and family planning. The data for this study are from the various country's government sources.

A major block to any substantial progress in birth control or family planning has been the lack of support that professionals (i.e., economists, demographers, sociologists) and government organizations have given towards these efforts. In sum, there has been a general lack of support to sponsor any dialogue on the issue of population control by whatever means.

A case study of the birth control clinics in Puerto Rico have revealed that few persons (families) have utilized this service (these clinics were founded in 1939). Despite their reluctance to use the clinics, there is a strong desire to reduce family size as supported by a survey of 13,000 where three-quarters of those interviewed felt that a family of three or fewer children is ideal. Although most desire smaller sized families, few couples delay their first pregnancy because of fear of male sterility. Also, one way for males to exhibit their virility is through the family by having a child. Further, some men objected to their wife's using birth control methods because this robbed them of their authority as males. Fear of infidelity and fear that it might impair one's health were other reasons mentioned for resisting birth control methods.

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This study found that the most frequent source of influences and information on birth control for both males and females was friends and neighbors. In general, there is very little discussion of family planning among family and others and this seems to slow the acceptance rate of family planning or at least the age at which family planning is started.

Similar interviews were conducted in Haiti with the primary response being that God controls the number of children that one will have and God also controls who is wealthy and who is poor. It is this type of fatalistic reasoning that pervades all aspects of Haitian life and greatly reduces the chance for family planning.

An analysis of the impact of education upon fertility indicates that it has little impact on fertility. Rather the degree of urbanization is more effective in lowering fertility in Latin American countries. To the degree that education influences social class, there may be some impact on fertility since a study of women in Lima, Peru, shows that lower class women marry at the earliest age. In general, family planning efforts in Latin America have met with established social barriers that prevent any widespread acceptance of birth control efforts.

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Sundaram, K., "Education and Class Structure: Further Evidence from India,"
World Develop., Vol. No. 5, May 1973, pp. 37-40.

This article is concerned with giving empirical evidence that supports some of the conclusions of Bhagwati's article in the same journal. Using data from the All-India Rural Credit Survey and follow-up surveys of the Reserve Bank of India, as well as from Blaug, et.al., The Causes of Graduate Unemployment in India, London: Allen Lane, The Penguin Press, 1969, several tables are constructed which establish:

- (1) Bhagwati's conjecture that indebtedness and the level of income are inversely related, while not being supported by the raw data on outstanding debt, is valid when indebtedness is normalized by relation to area of land owned or value of gross produce or value of assets owned.
- (2) There exists both direct and indirect evidence supporting Bhagwati's conjecture that the cost of borrowing will tend to rise as income level falls.
- (3) Bhagwati's conjecture that the rate of governmental subsidization to higher education is greater than that to primary education is valid if the rate of subsidization is defined as subsidy per student and invalid if it is defined as subsidy as a percentage of the total cost of educating a student.

Sussman, L., "Democratization and Class Segregation in Puerto Rican Schooling: The U.S. Model Transplanted," Sociology Educ., Vol. 41, No. 4, 1968, p. 321.

The expansion of the educational effort in the 1950's was directly aimed at establishing an egalitarian educational system. The problem became one of maintaining quality under rapid expansion with limited resources. The overall result was a decline in the quality of public schools at the high school and university level. This was evidenced by test scores where private students consistently scored higher in relation to public school students. However, Puerto Rican schools experienced an equaling of the rate of attendance by urban youths in the 12th grade for upper, middle, and working classes. In general, although there is equal access to public schools, there is not equal access to superior private ones.

Swenson, Burton Eugene, "Training Agricultural Research and Extension Workers From Less Developed Countries: An Examination of Training Approaches Used by the International Rice Research Institute and the International Maize and Wheat Improvement Center," Ph.D. dissertation, University of Wisconsin, 1974.

A research project approach to training leads to participants focusing on experimental research problems -- knowledge generating projects and technical research papers.

Participants in programs stressing technology development completed a large number of activities directly linked to the development of improved genetic and production technology.

Those extension workers trained in modern production technology are engaged in the delivery of technical information -- but have done little training of other extension workers.

Taubman, P., and Wales, T., "Education as an Investment and a Screening Device," in Education, Income, and Human Behavior, edited by F. T. Juster, McGraw-Hill, 1975, pp. 95-121.

This article attempts to isolate the separate impact of productivity gains from that of screening upon earnings. The data base that is used is the NBER-TH source. One slight problem is that this data source is better educated and brighter than average and therefore these results are not intended to apply to the entire U.S. population. Ordinary least squares regression analysis is used to estimate the relationship between a number of independent variables and the dependent variable, earnings for a given year.

In examining different levels of education completed, it was found that the earnings of those who attended college exceeded the earnings of high school persons in 1955 by 10 to 15 percent, further M.D.'s earnings exceeded high schoolers by 70 percent Ph.D.'s by 2 percent, and L.LB's by 20 percent. For 1969 comparing earnings to those with high school resulted in the following: college educated persons received 17 percent more; those with undergraduate degrees, some graduate work and masters degrees earned 25 to 30 percent more; Ph.D.'s earned 25 percent more; L.LB's earned 85 percent more; and M.D.'s earned 105 percent more (these are comparison with high school graduates of the same ability).

Concerning the study of initial salaries, this report found no evidence linking it with mental ability. Rate of return analysis showed that the rate of return to a college dropout exceeded that of a college graduate.

This contradicts findings by other studies -- one main reason may be that ability is held constant and many dropouts became self-employed and hence part of their earnings may be returns to financial capital. A further explanation might be that the males in the survey were aviation cadets and many became airline pilots which is high paying but does not require a college degree. Without the screening assumption, that is free entry to occupations, the earnings differentials due to education were one-half to one-third as great as actual returns in 1955 and in 1969 they were roughly one-half as large. This seems to indicate that the labor supply for high-paying occupations is restricted causing a redistribution of earnings to the more highly educated.

Taubman, P. J., and Wales, T. J., "Higher Education, Mental Ability, and Screening," J. Polit. Econ., Vol. 81, No. 1, 1973, pp. 28-55.

This article discusses the relationship between education, ability, and earnings. The data is from the NBER-TH sample, data that was collected by the Army Air Force during World War II. The Army accepted volunteers for the pilot, navigator, and bombardier training programs. The volunteers had to pass the Aviation Cadet Qualification Test with a score equivalent to that of the median of high school graduates. These people were given a battery of seventeen tests which measured such abilities as mathematical and reasoning skills, physical coordination, reaction to stress, and spatial perception. Thorndike and Hagen undertook a study in 1955 to determine the validity of the tests -- 17,000 (of the 500,000 during WW II) responded. Various follow-up programs were initiated in 1968 and 1969. Regression analysis was performed, with income the dependent variable, and education, ability, quality of schooling, and several sociodemographic and background variables as the independent variables.

In order to ascertain the effect of screening on private and social rates of return, the authors make the following assumption: Suppose that a person is paid his marginal product in any occupation in which he works and that education, mental ability, and other personal characteristics add to an individual's marginal productivity. Then to demonstrate that education is being used as a screening device, (screening people out of high-paying occupations) the authors must show that some people with low education are not in the occupation in which their marginal product and earnings are highest, but that highly educated people are allocated properly. It is in this sense that screening lowers the private rate of return.

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Concerning the social rate of return, it is usually thought that if education is being used to screen people, then the extra earnings a person receives from education are due both to skills produced by schooling and to the income redistribution effect from supply limitations. But this latter result is not a gain to society, and therefore, the social rate of return will be less than the private rate of return. The authors criticize this result as overlooking a very important aspect of the screening process. If firms use educational credentials to screen people, then it might be due to the following profit-maximizing behavior (rather than snobbery or the mistaken belief in the true importance of schooling): Suppose that successful job performance (monogual, ect.) depends upon the individual pursuing a complex set of skills and talents, only some of which can be measured easily by appropriate tests. Firms could develop and use these tests in recruiting people, but this is expensive. If firms know or believe (from past experience) that college graduates have the desired skills, then to save on hiring costs and mistakes on the job, firms use information on educational achievement (available at near zero cost) as a preliminary screening device. Therefore, if educational screening were not permitted, then firms would have to use additional resources in order to sort people, and hence, any sorting costs saved by using education as a screen are a benefit to society and must be taken into account when comparing private and social rates of return.

Concerning the regressions, it was found that mental ability (mathematical ability), education, and background factors (good health, family education, etc.), were important determinants of earnings at several points in the individual's life cycle.

Thomas, Hendrik, "Literacy Without Formal Education: A Case Study in Pakistan,"
Econ. Develop. Cult. Change, Vol. 22, No. 3, April 1974, pp. 489-496.

The hypothesis of this study is that "literacy without formal education" can be considered as an innovation which diffuses according to the presence of literates with education. Using Pakistan Population Census data for 1961, regression analysis was performed using a logit function, as well as a linear model. The results were that a strong relationship exists between educational density (the proportion of the age group having one year of primary education) and literacy without formal education (defined by the Pakistan government). Also, there was some evidence suggesting a relationship between urbanization and literacy without education, although this was not strong.

Trosper, Ronald and Kelly, Robert, "Education and Worker Productivity in Tunisian Shoe Industry," unpublished paper, Department of Economics, Harvard University, September 1970.

Testing the hypothesis that education makes a worker more productive, the authors use a Cobb-Douglas production function ($Y = AK^a N^b E^c$) and data on 16 out of 20 industrial shoe firms in Tunisia, to test the hypothesis that $c = 0$ and $b = c$. They use two indices of labor quality (E), average years of school attendance per firm and average wage per firm. They also use a third index of average years of experience in industry. They note the fact that it is likely that education of managers and education of workers make different contributions to the productive process.

Their regression showed that the level of schooling does not appear to affect the productivity of the firm. They tried to find out if education was a significant variable affecting wage differentials. Their data showed that work experience and gaining seniority had a greater effect on raising wages than did education. A year of schooling raised wages by 16 millimes per day. While a year of work experience raised wages by 18 millimes per day.

Attitudinal effects on earnings are investigated using proxies: birth place, father's occupation, and literacy (reading newspapers).

No firm conclusions are reached. Basic question is: in a LDC do the schools prepare people for participation in the industrial economy. The answer requires that two other questions be answered: (1) what traits and knowledge does an industrial worker need, and (2) how do the schools contribute to this development. Data suggests no strong relationship between schooling and

Trosper, R. (cont.)
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productivity. Acquisition of literacy appears to be the most important result of formal education enabling a worker to receive a higher wage.

Turnham, David, "The Employment Problem in Less Developed Countries," OECD, Paris, 1971.

This study reviews the employment problem in developing countries under various aspects during the 1960's. With respect to education, various tables are presented illustrating the relationship between education and unemployment. Some of the more significant relationships were: (1) unemployed, as a group, tend to be better educated, especially where young and inexperienced employed are numerous, with particularly low unemployment rates among the urban illiterates; (2) unemployment rates are also particularly low among highly educated people.

These results demonstrate that unemployment is the highest among those that are primary and secondary school leavers.

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Valdis, Alberto E., "Wages and Schooling of Agricultural Workers in Chile,"
Econ. Develop. and Cult. Change, Vol. 19, No. 2, January 1970/71,
pp. 313-329.

This article uses a 1965 sample of 328 wage and salary workers employed in agriculture as its data base. The sample was separated into 5 occupational categories as defined by job tasks and required training. The author concludes that both completed years of schooling and seniority, within the firm, had significant positive relationship to wages earned. It was also found that according to national income account estimates, real income per worker in non-agriculture is roughly three times that for the agricultural worker. This last result indicates the degree of dualism that exists in the economy.

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Vanzetti, N. R., and Bessell, J. E., "Education and the Development of Farming in Two Areas of Zambia," J. Devel. Stud., Vol. XXI, October 1974, No. 1, pp. 41-54.

This article is concerned with the effect of education on the development of farming in two areas of the Province of Zambia. Using data from the UNZALI survey in 1968 and 1969, a multiple regression model was specified. The results demonstrated that education contributed very little to the improvement of the farming of cultivators, but contributed to motivation in the area where the general standard of farming was higher, and where the farmers were more motivated for money than were the cultivators where the standard of farming was much lower. This implies that education contributes more where the abilities acquired at school are not constrained by traditional attitudes. This supports other findings that the effect of schooling doesn't take place until the transition to a market orientation had already begun.

It was found that direct contact with a modern society was not an important contributor to the motivation of the cultivator towards farming. It was also found that informal educational experiences (association with peers, etc.), contribute to the motivation toward farming.

Waisenen, F. B., Individual Modernity and Non-formal Education, from Seadag Seminar on "New Strategies for Educational Developments: Non-formal Alternatives," Washington, D.C., May 13-15, 1971, 16 pp.

This two axis model relating self-perceived autonomy and influence abilities demonstrates how traditionalism and modernity work in opposite ways.

People in the "modernity quadrant" will be the most responsive to non-formal education following Waisenen's definition of modernity: (1) information seeking, (2) planning and investment, (3) multi-system participation, and (4) innovativeness. To get a fix on the relation of modernity to non-formal education, clusters of villages were exposed to radio, pamphleting or no information. "Modernity" exams were made and effectiveness of programs compared to modernity quotients.

Conclusions: Modernity variables to explain some percentage of adoption and increased knowledge (42 percent and 48 percent). Populations the most in need are the most difficult to reach. Development of mobility experiences is most important, as an indicator of modernity.

Watts, E. R., "The Educational Needs of Farmers in Developing Countries,"
in Education and Rural Development, edited by P. Foster and J. R.
Sheffield, World Year Book of Education, 1974, pp. 150-162.

Education is identified as one of many factors which influence agricultural development. Mosher (Getting Agriculture Moving) groups these factors into two groups: essentials -- incentives, markets, transport, input supplies, and research accelerators -- education, credit, group action, an improving land base, and planning. When education has failed to bring about agricultural development, often one or more of the essentials is missing. Education is usually thought to increase farmers' income, but in the case of peasant farming, education may decrease the motivation for hard work (physical labor) that is necessary in this situation. In general, the application of any one of the accelerators without the essentials leads to frustration and a failure to stimulate development.

Since many developing countries depend upon agriculture export expansion in order to sustain growth, there is a need for education for farmers. A study of Kenya by the author showed that the agricultural extension worker was a respected source of information for the farmers.* This merely points out the inadequacy of transmitting information from father to son. Development requires new farming methods that are best relayed via some educational effort. In terms of a formal schooling situation, LDC's can best benefit from agricultural education programs which emphasize the use and applications of scientific farming methods. This indicates the need for practical skills and not necessarily traditional academic skills.

*The ratio was 200 farmers for each extension worker.

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In terms of the educational system that is needed, much can be gained by examining Uganda's "Farm Schools." Although these were closed in 1969-1970 the results have important lessons. Follow-up on ex-students showed that roughly 90 percent were employed in agricultural occupations, despite the fact that only 15 percent were farming on their own. In order to ensure that farmers are produced from these programs, it is necessary that some capital and land is available to graduates, as well as markets for their products.

Concerning the education of women farmers, they have generally been educated in the areas of nutrition and health. Although these are vital for development, during the process of development some emphasis should be made towards education that deals with the commercial aspects of farm production. This type of education should have a favorable impact on incomes and farmers' standards of living. Thus an important role of education during modernization is to develop entrepreneurial ability.

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Weisbrod, Burton A., and Karpoff, Peter, "Monetary Returns to College Education and College Quality," Rev. Econ. Statist., Vol. L, November 1968, No. 6, pp. 491-511.

This article is concerned with the extent to which college education brings financial returns. Using data from a sample of 7,000 male college graduate employees of the American Telephone and Telegraph Company in 1956, the authors attempted to distinguish returns to ability and motivation from returns to schooling. The proxy variable used for ability and motivation was class rank. Using the method of least squares, it was estimated that approximately one-fourth of the earnings differences are attributable not to educational attainment, but to ability and motivation. The authors also examined the ways in which schooling and non-schooling variables affect earnings. It was found that there was a tendency for the rate of increase of earnings over time to be larger for graduates with higher class rank, and thus earnings differences widened over time. To the extent that college education is an investment in higher earnings, it appears to be a better investment to those individuals who have the ability and motivation to achieve high class rank.

Welch, F., "Education in Production," J. Polit. Econ., Vol. 78, No. 1, January/February 1970, pp. 35-60.

This analysis is concerned with distinguishing between the "worker-effect" and the "allocative effect," specifically attempting to empirically measure the allocative effect. The worker effect is the value of the marginal product of labor, *ceteris paribus*. The allocative effect refers to the gains from the worker's ability to acquire and decode information about costs and productive characteristics of other inputs. As such, a change in education results in a change in other inputs, including, perhaps, the use of some "new" factors that otherwise would not be used. If education enhances the ability of a producer to decode information about the productive characteristics of new inputs, the greater will be the productivity differential associated with additional education.

The empirical analysis of factors determining the productivity of schooling is restricted to agriculture in the U.S., for the year 1959. The unit of observation is the "state" of which there are forty-nine. The data used is U.S. data from the U.S. Census of Population.

The effect on wage differentials between college graduates, high school graduates, and illiterates, of non-labor inputs, research expenditures, and extension personnel is measured by the technique of linear regression. Using a CES production function, and aggregating the high-school and illiterates in one group, at the sample's geometric mean, the wage of college graduates relative to high school graduates is 1.62, and relative to functional illiterates it is 1.75. The allocative effect is measured by considering the effect of

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reducing the coefficient of research expenditures per farm to zero on the relative wage. It is estimated that the relative wage in each case would fall by 14 percent, which implies that approximately one-third of the productivity differential between college graduates and high school graduates or functional illiterates is directly attributable to research. This "leverage" associated with added schooling appears to hold only for skills that result from college. Relative wages for persons who have not attended college are determined by labor ratios only.

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Welch, Finis, "Measurement of the Quality of Schooling," in Amer. Econ. Rev.,
Vol. LVI, No. 2, May 1966, pp. 379-392.

In this study, Welch attempts to relate earnings to years of schooling. Schooling is then further qualified by quality of education (salaries of teachers and size of secondary institutions) and return per unit of education. In search of factors affected by quality of education, production function analysis is used relating value added to rural farm production to physical labor, education and non-labor inputs. Data is from the U.S. Census and Department of Commerce for rural males aged over 25.

The results showed that increased teachers salaries are associated with improved quality. Higher teacher-pupil ratios, however, are associated with lower quality. This indicates that larger schools with more specialization and larger classes yield higher quality education than smaller schools where teachers must have more broadly based knowledge.

Estimates for the production function indicate that factor shares for labor and education are each about 38 percent of value added while other inputs account for about 24 percent. Also, returns to one unit of schooling will be 35 percent less for non-whites than for whites.

These results suggest that teacher quality and specialization have impact on the quality of education and, hence, the productive capabilities of workers as measured by earnings.

Wells, S., Instructional Technology in Developing Countries: Decision-making Processes in Education, New York: Praeger Publishers, 1976.

This study is a critical review of the effectiveness of operational instructional technology projects. An examination of the results indicate that radio and television can be used as effectively as traditional techniques to teach cognitive knowledge as measured by examination scores. For non-formal programs, the evidence indicates that instructional technology in Senegal, Columbia, India, and Ghana improved learning of agricultural techniques, nutrition, and health care. However, there was less evidence that this knowledge was translated into action. The author postulates that it is likely that the attainment of knowledge from instructional technology is insufficient to induce the motivation to act, and more directed leadership may be needed at the stage of translating knowledge into action.

Wilder, Bernard D., The Effects of Literacy Skills Obtained Through Non-formal Modes in Rural Laos, Seadag Research Paper presented February 24, 1971, Chicago, Illinois, 25 pp.

An educationalist evaluation of non-formal and formal education on several sociological variables. Literacy surveys of rural and urban men and women of various ages were undertaken. Non-formally educated literates were compared to formally educated literates on the following topics:

(1) attitude toward their children's schooling, (2) mass media exposure, (3) cosmopolitaness, (4) empathy, (5) political awareness, (6) economic level of the household, and (7) achievement motivation. Sample groups were drawn from the same villages: unschooled, formally schooled, non-formally schooled.

Conclusions: Although many significant differences between literate and illiterate groups occurred, distinctions between formal and non-formal literates were less clear. Recommendations and conclusions regarding stimulation of non-formal modes and allocation of education close the article.

Wilson, S., Occupational Mobility and Social Stratification in Latin American Cities, Ph.D. dissertation, Cornell University, 1972.

This study focuses on Rio de Janeiro, Buenos Aires, Santiago, and Montevideo and their respective processes of urbanization. All of these cities have over one million residents and all serve as the centers of their nation. The educational system is used as a measure of mobility in the society, where the system's openness is reflective of the social structure. Hence, changes in class structure during urbanization should be reflected in data on the educational system.

Data for this study are a single survey of the residents in each of the above cities. A rank measure of occupations was used to order various occupations -- an occupational prestige ranking. Findings show that as respondents originate in larger towns, in general, there is a stronger association between the occupational level of a son, who is a head of a household, and the occupational level of the father. Also immigrants (or direct descendants of immigrants) were totally unable to capitalize on the occupational prestige of their parents.

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Wolf, Richard, "The Measurement of Environments," A. Anastasi (ed.), Testing Problems in Perspective, American Council on Education, 1966, 71 pp.

This paper analyzes the relationship between home environment and general intelligence and achievement test scores. The author measured 34 characteristics of the home environment through interviews which he hypothesized were directly related to general intelligence and achievement test scores. The sample was composed of 60 mothers from a medium sized Midwest Community. He found that he could explain more of the variance in test scores than previous studies using the crude variable of social status as an indicator of home background.

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Wu, C. Chi-yen, The Contribution of Education to Farm Production in a Transitional Farm Economy, Vanderbilt University, Ph.D. dissertation, 1971, 156 pages.

This study focuses on the impact of education for farmers in Taiwan. Regression analysis is used to evaluate cross-sectional data of individual farms. Some characteristics of these farms are: (1) they are small family operations with roughly 2 hectares of land and 7 to 8 people, (2) farming on this scale is not a full-time job -- only 32 percent of all farms are full-time farms, and (3) most farmers are educated and compared to other economic sectors, the farm people are not falling behind in terms of education.

The theoretical basis for the author's work is that done by Finis Welch ("Education in Production" J.P.E., Vol. LXXVIII, February 1970). Welch identified the "worker effect" and the "allocative effect" of education on production. The allocative effective can be separated into: (1) gains from altering the allocation of given quantities of inputs, and (2) gains obtained by varying the quantities (these will be referred to as Type I and Type II allocative effects). In this framework, the total output effect of education can be estimated by using a value-added production function. Education itself is divided into that portion which is embodied in the farm laborers and that which is tied to the managerial role of the operation. Much of the managerial role depends upon the time horizon of the farm.

Model I utilizes the very short-run time horizon where the farms are assumed to be producing at or near short-run equilibrium. The education variable is introduced, into the unrestricted Cobb-Douglas production

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function in an exponential form. Model II differs slightly in that it assumes a short-run time horizon and uses a gross-scale unrestricted Cobb-Douglas rather than the value-added form used in Model I. Finally, Model III assumes the long-run and again utilizes the gross sales unrestricted Cobb-Douglas production function. These models are important in that the adoption of any one will affect the findings concerning education's impact on production. Because of the actual farming characteristics in Taiwan, the short-run production function (Model II) was used.

The data consists of bookkeeping records of 649 farms for 1964 to 1966. This sample includes six farming regions with a variety of main crops. By examining actual yields for the three main crops, rice, bananas, and pineapples, it was determined that the rice farmers had a lower technical horizon (given the relatively constant increase in rice yield) than the other-than-rice farmers (as exhibited by a distinct increase in yield between 1963 and 1964).

The regression analysis was completed in three different methods where Method I does not use any dummy variables for regional differences; Method II uses farming region dummy variables and Method III uses farming region and township dummy variables. These regression farms showed that the education coefficient was .024, .025, and .021 for methods 1, 2, and 3 respectively. This indicates that an additional year of education increases farm production by over 2 percent for all three methods. Further, all three results are significant at the 5 percent level with the results for Methods 1 and 2 being significant at the 1 percent level.

One explanation for the lower coefficient value while using the region and township dummy variables is that there is a "learn from the neighbor"

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effect. Hence the contribution of education to relative individual income in this case would be lower.

In analyzing the rice regions, education did not significantly affect gross farm income at the 20 percent level. For the other-than-rice regions, the results were .035, .038, and .029 for methods 1, 2, and 3, all of which are significant at the 5 percent level with the first two being significant at the 1 percent level. This implies that education of other-than-rice farmers has a greater contribution to farm production than education of rice farmers.

Rate of return analysis showed that, in general, rural education was a productive investment as long as the farmers were with sufficient amounts of new farming inputs and techniques. Actual rates of return were: 83 percent for the first year, 43 percent for the sixth year, and 26 percent for the 12th year for all regions. This supports the general result that there is a rapidly decreasing marginal return to education when the return is confined to farm production.

Yotopoulos, Pan A., "The Greek Farmer and the Use of His Resources," Balkan Stud., Vol. 8, No. 2, 1967, pp. 365-386.

This paper is concerned with static allocative efficiency, or the way in which resources of production are utilized in the process of economic development. Explicitly, the paper relates this concept to agriculture, using empirical evidence from a random sample of Epirus farms during the time period 1963-1964.

Epirus is the least developed region of Greece, with possibly the exception of Crete and Thessaly. The data were obtained by interviews with a random sample of households. The basic methodology was the estimation of a Cobb-Douglas production function, and performing linear regressions on a logarithmic transformation of this production function. The dependent variable was the (log of) gross value of agricultural production; the independent variables were the (logs of) man-days worked, number of acres, labor index, land index, capital index, and total years of education of farm household members aged 15-69.

Concerning education (computed at a mean value of only 2.24 years of education per farm household), the marginal product of education was computed as the difference between two alternative income streams: the real net earnings stream over n years of one year's education, and the income stream that the household would have received without this education. The value of education was computed as the capitalized value of this difference, capitalized at 5 percent. The following assumptions were made: no depreciation, constant marginal product, and that the productive value of the resources imbedded by

education will last as long as the member remains in the labor force, i.e., to age 69. The capitalized value of education was computed to cover all age brackets 15-69, and was weighted by the number of household members in each age bracket. The results were that the capitalized value to education for the average household was higher than the capitalized value of all other three forms of capital (live capital, plant, and equipment) even though the mean was only 2.24 years of education.

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