Exploring the Role of Various Education Strategies in National Economic Development

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EXPLORING THE ROLE
OF VARIOUS EDUCATION STRATEGIES
IN NATIONAL ECONOMIC DEVELOPMENT

by

Donald F. Depew

A Thesis
Submitted to the
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in partial fulfillment
of the
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CHAPTER I

THE PROBLEM AND IT'S BACKGROUND

Introduction

With the termination of colonialization, many new countries embarked on the task of development. Virtually all were, and for the most part still are, poor. All share the desire to achieve rapid economic growth. Hence, they desire insights as to the best possible utilization of resources to attain this goal.

In recent years, the development of human resources has gained recognition as a significant variable in the economic development formula. Investment in "transformative knowledge" is considered an important dimension of human resource development. As a result, social scientists have been attempting to determine the role of transformative knowledge, especially that obtained through systematic education, in the development of economy.

Related Literature

Schultz\(^2\) was one of the first social scientists to assert the importance of the role of knowledge in expanding national

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wealth. He felt that the theory of economic growth would be enhanced by the inclusion of human wealth in the development formula. Schultz strongly emphasized the necessity of balanced growth in both human wealth and physical capital to generate economic expansion and maintain economic stability. He hypothesized that developing countries were economically thwarted because they overemphasize the generation of physical capital and underemphasize investment in education.

Schultz\(^3\) cited conditions in the United States as indirect support for his thesis. He pointed out that between 1919 and 1957 income rose three times as much as investment in labor and physical capital. He believed that increments in labor and physical capital could not solely account for this large return, and thus the effect of other variables had to be taken into consideration. In sum, Schultz reasoned that much of the income return could be accounted for by the accumulation of human wealth.

Research\(^4\) has also revealed that individual income is associated with the degree of educational attainment. That is, the higher the level of education an individual attains, the more wealth he tends to accumulate over his life span. This indirect method of illuminating the productive dimension of knowledge has been subjected to a great deal of criticism. Most critics point out that this

\(^3\)loc. cit., p. 115.

procedure does not explicate a priori factors associated with individuals who acquire high levels of education, such as socio-economic status, urban-rural residence, and the like. The most severe limitation involved in utilizing this approach, when attempting to demonstrate the relationship between education and economic development, is that the unit of analysis is not the nation but instead the individual. Bowman\textsuperscript{5} states that this approach, taken by itself, should not be causally introduced in analysis of national economic growth or used without other analytical tools in making large scale educational decisions.

Becker\textsuperscript{6} utilized the individual rate of return approach in a study designed to test the existence of an underinvestment in college education in the United States. Becker compared the rate of return of a college education for white urban males with the rate of return earned from tangible capital. He assumed that if the rate of return from a college education was considerably higher than the return from tangible capital, a greater investment in college education would be necessary. Such a condition would be indicative of a large demand for college trained manpower, but a small supply. In computing the rate of return from college education, Becker adjusted for foregone earnings, cost of education and loss of capital through income tax. He found that for the years 1940 and 1950 the direct

\textsuperscript{5}loc. cit., p. 120.

return, (occupational income only), was approximately 9% per year. Becker compared this with the rate of return earned by business enterprises from tangible capital. The rate of return from tangible capital, which was based mainly on estimates, was about 8% per year. Based on these findings, Becker concluded that was neither an underinvestment nor an overinvestment in college education for the United States. However, the Becker study did not include in the analysis indirect economic returns from education, i.e., those not associated with occupational earnings.

Camoy,7 in his article "Rates of Return to Schools in Latin America," argues that education plays a significant role in explaining differences in income among Mexicans. By controlling for age, father's occupation, type of industry, and urban-rural residence, Camoy was partially able to isolate the effects of formal education. By controlling for these extraneous factors, he was able to overcome much of the criticism directed at the individual rate of return approach.

Comparing the Mexican findings to findings of similar studies conducted in other Latin American countries, Camoy8 discovered that higher rates of economic return to individuals from education are associated with rapid economic growth. That is, the more rapid the rate of economic growth, the greater the economic returns from education. Camoy9 apparently assuming that rapid

9 ibid.
economic growth is highly dependent upon the level of investment in industry, concludes that resources devoted to education must depend on past and present investment in physical capital.

In a global study, Harbison and Myers\textsuperscript{10} found the level of national educational development to be highly correlated with gross national product per capita, \( r = 0.88 \). Observing that investment in education increases much faster than GNP per capita as nations develop, they recommend that developing countries make major efforts towards the development of human resources through education. Bowman and Anderson\textsuperscript{11} assert that the necessity for advanced education aside, nations have to attain 90 to 95% literacy to realize incomes over 500 dollars per capita. They state that in order to function properly, complex industrial societies depend on many forms of mass communication and without high levels of literacy such systems at best would function imperfectly.

In sum, these social scientists are demonstrating something which seems quite obvious. Regardless of how rich a nation is in natural resources, unless the people possess the know-how to develop them, they will be, at best, dependent on the requirements, skills, and physical capital of advanced industrial nations for their economic development. Many of these studies, however,


appear to overlook another seemingly obvious fact. The concept of education covers a variety of areas, and one would not expect all of what is considered education to be productive for the development of economy.

Lewis\textsuperscript{12} asserts that from a standpoint of economic development we can distinguish between two types of education. He states that certain types of education help increase economic productivity while others do not. Lewis\textsuperscript{13} believes that the economic problems developing countries are having partially result from the wrong kinds of manpower being turned out by the various educational systems. He states that too little emphasis is given to the natural sciences and technology at all educational levels, which results in a surplus of people prepared in literary disciplines and an acute shortage of people trained in biological, scientific, and mechanical arts.

Lewis infers that developing nations tend to expand primary education too rapidly at the expense of secondary education. This uneven expansion affords a large number of semi-educated people who contribute little to the betterment of the economy. Lewis\textsuperscript{14} points out that the secondary school graduate is the non-commissioned officer of the economic and social system. The absence

\begin{footnotes}
\item[14] ibid.
\end{footnotes}
of appropriate numbers of secondary schools in poor countries is an enormous handicap to their development. The secondary school graduates with a little additional training become the technologists, nurses, clerks, school teachers, agricultural assistants, and supervisory workers of various kinds. Lewis\textsuperscript{15} denotes that:

"The balance between primary, secondary and higher education; between general and vocational studies; between humanities and sciences; and between institutional and in service training, all these need to be blended in the right proportions if education is to be a help rather than a hindrance to economic development."

Harbison and Myer\textsuperscript{16} advise that in "partially developed" countries specifically, technical and professional people are in short supply. Positions that require such skills are filled by expatriates. This situation has been created primarily because the educational systems in such countries concentrate on preparing students for occupations in government and education. The authors note that excessive emphasis is placed on academic areas and too little stress is given to science and engineering.

A factor affecting the dominance of academic education in third world countries is the cultural influence of the European colonizers. In the case of Africa, Foster\textsuperscript{17} points out that:

\begin{itemize}
    \item \textsuperscript{15}loc. cit., p.136.
    \item \textsuperscript{16}Harbison and Myer, op. cit., pp. 73-100.
    \item \textsuperscript{17}Foster, P.J., "The Vocational School Fallacy in Development Planning." In C.Anderson and M. Bowman (Ed.); Education and Economic Development. Chicago: Aldine, 1965. P. 146.
\end{itemize}

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"The European colonial elite itself acted as a reference group for African aspirations; emulation of that elite led to a pressure for parity between metropolitan and colonial institutions. Since the colonial elite provided only a partial image of western society and was composed overwhelmingly of administrative and government servants, educated primarily in academic institutions, African demand for education was understandably oriented to the acquisition of that kind of education that was perceived to be the key to European type occupational roles."

Anderson, Harbison and Myer and others also have indicated that education in underdeveloped countries is academically oriented. It encourages the vast bulk of students to enter either government or teaching upon graduation. In this process, government and education become isolated from the economic realities in developing countries. Bologh points out, for example, that 80 to 90 percent of Africans are dependent on agriculture for their livelihood and that schools at all levels need to create training programs to promote the development of this sector. Bologh's views suggest that the existing educational facilities are obstacles to development in that they promote attitudes that encourage flight from the immediate economic requirements of underdeveloped nations.

Bowman cites the necessity for developing nations to begin to turn out manpower capable of entering their economic sectors. She indicates that the modern industrial sectors of third world

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economies are mostly controlled and operated by foreign interests. Investors tend to transfer their plants intact, including labor, when they move to a host country. Bowman advises that locals need to be trained to take over the operations of this sector if developing countries are to gain real control of their economies and thereby foster development.

To accomplish this feat, Bowman visualizes the necessity of a coordinated effort upon the parts of both education and industry. She recommends that educational institutions place less emphasis on academic subjects and much more on science and math. Bowman also stresses the need for industry to expand on the job training facilities in order that locals can be trained to replace expatriates presently operating the modern industrial sector.

The Role of Transformative Knowledge

Etzioni's generalized concepts of "transformative" and "stable" knowledge appear to sum up the arguments presented to this point. Transformative knowledge is defined as a body of facts and ideas that generates social and economic change. The development of such knowledge encourages a dynamic interaction between man and his environment, thus creating a situation which promotes the development of the social system. Etzioni states

20 ibid.
22 Etzioni, op. cit., p. 125.
that:

"Transformative knowledge is concerned with exploring potential challenges to the basic assumptions of a system."

Investment in transformative knowledge is not confined to the creation or a specific piece of information such as a new agricultural technique. Development of transformative knowledge also concerns the communication of information to relevant members of the social system so that it can be put to use where necessary.

Conversely, stable knowledge is defined as a body of facts and ideas that reinforce the socio-physical environmental status quo. According to Etzioni:

"Production of stable knowledge elaborates and re-specifies, even revises, secondary assumptions within the basic framework of a knowledge system, but the framework itself is taken for granted."

The spread and development of such knowledge encourages a static interaction between man and the environment. Investment in stable knowledge results in social members interpreting and reacting to environmental stimuli in set patterns of responses as opposed to flexible patterns.

The concept of transformative and stable knowledge are ideal types and one would be hard pressed to provide a precise operational definition of either term or find a nation that invested exclusively in one or the other. However, any form of technical and advanced knowledge would likely reinforce this framework. The articles reviewed above suggest that more emphasis is placed on transformative knowledge.

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23 Etzioni, op. cit., p. 125.
in advanced nations than in developing nations. That is, the transformative-stable knowledge ratio is high in advanced economies and low in third world economies. Keeping in mind the assertions of the researchers cited to this point, it may prove useful from a strategic framework to refer to knowledge that promotes a new or innovative response to environmental stimuli as transformative knowledge and that which encourages an established response as stable knowledge.

Transformative Knowledge and Levels of Economic Development

The arguments of Bowman, Bologh, Foster, Harbison and Myers, Lewis and Etzioni appear very plausible. Thus one might recommend that developing countries begin to turn out engineers, chemists, and the like. But it may also be true that different types of transformative knowledge are required for different levels of economic development. For instance, in a global study, Bennett found that vocational education at the secondary school level was positively correlated with economic indicators at the lower and middle levels of economic development, but negatively associated with these same indicators at the advanced level of development. Bennett suggested that this relationship may be due to the economic requirements of nations at different levels of development. The Bennett study proposes that in early stages of industrialization, nations may require educational programs with a direct and primary relation

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to the production of capital goods. Whereas, in more advanced nations this may not be the case. The data indicate that advanced nations appear to have embarked on a new stage of development, one that requires more generalist type skills. This purports to be a plausible assumption when we consider such facts as the rapidly changing occupational structure, large service sectors, needs for widespread consumption, and expanding human service operations endemic to advanced economies.

This is not meant to imply that developing countries should place sole emphasis on one type of education. By observing the economic situation in third world nations it becomes apparent that various types and levels of transformative knowledge are needed. As Harbison and Myer\textsuperscript{25} and others have advanced, engineers and technicians are needed to replace expatriates operating the foreign owned industrial sectors. However, the locally owned and operated economic sectors in third world nations are on a lower plane of sophistication and thus we might expect the types of education necessary for the development of this area to be different. Advances in the local sectors may well depend on the expansion and/or improvement of education in such areas as agriculture, fishing, textiles, construction, marketing, and the like.

It is also apparent that much more than curriculum change is needed if education is to be economically productive in developing countries. As many of the articles reviewed here have implied, \footnote{Harbison and Myer, op. cit., pp. 1-48.}
bridges have to be made connecting the educational programs to the economy; the educational programs will have to correspond to local economic situations; and student beliefs and attitudes towards economic activity will have to be modified.

Hanson for example, cites five conditions that will have to be met if vocational education is to "pay off" in Africa:

"The perception of students and potential students that vocational courses will actually pay off; the development of work habits and attitudes which subsequently enable students to make a success of manual vocations; the relevance of courses of study to African conditions; the existence of bridges over chasms that separate school from successful earning power; and the reinforcement which comes from continuing help, follow up, or cooperation."

Hanson suggests that until such conditions are met the educational systems in third world nations will not make a productive contribution to the development of economy.

Systems Considerations

Most of the present studies appear to suggest the existence of a system in which the industrial and educational sectors within a nation interact with each other to promote development. Hence Bennett has proposed that a systems analysis approach might yield fruitful insights about the relationships between education and economy. The orientation developed here will utilize this approach within a functional framework. Such an approach assumes that the social system is a real system:

27 Bennett, op. cit., p. 170.
"in which the parts perform functions essential for the persistence (eventually the expansion or strengthening) of the whole and therefore are interdependent and more or less completely integrated." 

Within such a system no one part of the social system is assumed to have precedence over another in promoting the stability and the development of the whole.

The concept, "social system," assumes a mutual dependence of the parts making up the system. Further, mutual dependence suggests a reciprocal interacting relationship in which each part, through specialized functions, contribute to the development of all other parts as well as the system as a whole. Within this framework one can conceive of a nation's educational and economic sectors to be specialized parts of a macrosocial system. For instance, in the United States the economic sector is dependent upon the educational sector for trained personnel necessary for its proper functioning. In turn, the educational sector is dependent on the well-being of the economic sector for support in the production of well qualified personnel. Formal and informal patterns of interaction are established to communicate the needs of each sector. In modern nations the mass media, manpower reports and school occupational placement offices keep the students and schools informed of the personnel needs of industry. The schools meet their economic requirements through communicating them to the various levels of government. Government in turn extracts resources from the nation and redis-


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tributes these resources in ways to maintain the proper functioning of various vital sectors including the educational sector. On a "micro" level this interdependence can be observed in the ties of various educational institutions to local industry. For example, in Kalamazoo, Michigan, Western Michigan University's paper technology department is closely linked to local paper industries.

Underlying assumptions

All social research is designed, carried out, and interpreted within a framework based on the values and knowledge of the experimenter. The assumptions discussed below evolved out of the research reviewed and discussed above. Although there is no means by which these assumptions can be completely validated, they do reflect the findings of empirical investigations. The reader should be made aware that these assumptions will guide the development of the investigation and affect the interpretation of the data.

It has been suggested that transformative knowledge and physical capital interact with each other in a dynamic form of equilibrium. Neither transformative knowledge nor physical capital alone is sufficient to produce development. Neither has precedence over the other and as one becomes more sophisticated and developed it affects the development of the other. The test of this balanced growth is reflected by how well education and economy complement each other. A complementary relationship between transformative knowledge and economy is dynamic and results in the accelerated development of
the nation. The product\textsuperscript{29} of this interaction generates the motivation\textsuperscript{30} in the individual members of the culture necessary for the continued development of the economy as a whole.

This process should not be considered automatic. Much depends on the level of awareness and actions of decision makers. How well decision makers conceptualize the problems confronting them and most importantly their willingness to act in ways to promote the solutions to these problems should also be considered.

At advanced levels of development this willingness is highly dependent upon the internalization of cosmopolitan patterns of orientation and the coordination of decision makers from many areas. In the United States, for example, a need has been expressed for a mass transit system to conserve resources and cut down on air pollution. However, it is unlikely that the auto makers will be willing to close shop merely because a need has been expressed. It is apparent that the appropriate response requires a coordinated effort upon the part of leaders in education, industry and government. And the pattern of response must be based on common or complementary values.

At lower levels of development such orientations and coordination

\textsuperscript{29} "product" refers to both the economic and social consequences of this interaction. Economic product alludes to the tangible wealth realized. By social product it is meant the influence this interaction has on shaping beliefs and attitudes toward the environment.

\textsuperscript{30} "motivation" refers to the drives within individuals created by the product of the interaction. This motivation, it is assumed, is important for the continued development of the system.
may not be needed to safely maintain stability and foster a limited rate of growth. However, poor nations have expressed the desire for rapid modernization. Such acceleration of the growth process does require cosmopolitan technology and patterns of organization.

Rapid modernization can not come about unless leaders conceptualize in terms of the whole system and creatively apply knowledge and tangible resources accordingly. Finally, the human factor inherent in the development process indicates that decision makers may act in ways to impede development. Especially if they perceive modernization as a threat to their positions.

It is suggested that there are two major reasons for the situation of economic stagnation that many poor nations find themselves in today. First, the transformative-stable knowledge ratio tends to be low in many poor nations. Secondly, in many developing countries, the elites, although espousing the values of modernization, have acted in ways to protect their own positions and statuses and thus have inadvertently impeded development. Etzioni suggests that nations which emphasize a stable knowledge system may persist only for as long as they are not affected by major environmental change.

One reason many such systems survive today also lies in the

31 Bowman and Anderson, "Concerning the Role of Education in Development," op. cit., p. 121.

32 Etzioni, op. cit., p. 125.
economic needs of advanced economies. That is, one of the major sources of income for poor nations is obtained through the sale of resources on the world market. Their future may be determined by the prices of agricultural products and raw materials on the world market. Often the knowledge necessary to exploit demands for these goods is transported from advanced economies. Experts are imported from developed economies to assist in the exploitation of resources and in many cases foreign investors actually control the means of extracting resources. If elites utilize the income derived from the sale of resources to reinforce their own positions instead of investing towards internal control and expansion of the modern sector, they may one day find the stability of the social system in jeopardy. This is the case when a major environmental change occurs, especially when the demand for a nation's primary export diminishes on the world market. As a result of the decision makers' failure to either invest in the expansion of the modern sector or to train local manpower capable of productive involvement in modern industry, system reorganization often proves difficult. Cuba, which is attempting to overcome such a reorganization problem provides an excellent example.

The Political Context

The main question for this thesis becomes, under what conditions may a developing economy initiate a "transformative" education

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33 Harbison and Myers, op. cit., pp. 49-50.
program and begin to promote interaction between the education and economic sectors? Bowman and Anderson advise that the elites in third world nations may hold the key that determines if the processes necessary for the promotion of economic development are initiated. They propose that in countries where elites reinforce "status values and/or special privileges" that are not in tune with the values necessary for economic growth, these elites may impede development.

The political regime may be considered a reflection of the values of power structure (elites) for most nations. Not many would question the significance of governmental influence in education and economic policy. Nor would many deny that elites play an important role in determining and/or influencing government decision making. Etzioni again has suggested that one might consider government the societal "supra-unit" that guides the actions of societal "sub-units" such as the economic and education institutions. It has been advanced that interaction must take place between the economic and educational units before the processes involved in development can be launched. Here it is further suggested that government may be the key to determining whether or not an appropriate interaction ensues. That is, when governments act in ways to reinforce "status values and/or special privileges,"

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35 Bowman and Anderson, "Concerning the Role of Education in Development," op. cit., p. 121.
37 Etzioni, op. cit., pp. 120-30.
(stable knowledge), they will impede the interaction implied by the concept transformative knowledge.

There is some evidence that supports the assertion that type of political regime is important in the promotion of the economy. Curle advises that there may be an association between social egalitarianism and educational systems capable of promoting economic growth. Curle employed Almond and Coleman's political competitiveness scheme to test his idea. He rated nations within the framework of the scheme to ascertain the degree of relationship between this dimension of government and investment in education. Curle did find a meaningful positive correlation on a global level between the two variables.

Curle believes that the association might be even more pronounced if an egalitarian dimension was added to the competitiveness scheme. This dimension is defined as:

"The possibility for anyone, irrespective of class, race, tribe, religion or any other ascribed qualities to attain the highest position in the land."

Utilizing an impressionistic approach in his analysis of national education investment, Curle secured the following relationships. Observing nations clustered at lower levels of development, the

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41 Curle, op. cit., p. 241.
findings reveal that countries with egalitarian political regimes, (competitive or noncompetitive), tend to have high quality education programs, have strong planning approaches towards education and have school curriculums, which for the most part reflect economic activities. On the other hand, nonegalitarian countries have poor to good (good for elites only) quality education, have weak to fairly strong planning approaches toward education and emphasize traditional curriculums. Competitive nonegalitarian nations stress economic education as well as traditional programs. In sum, the findings suggest that nonegalitarian political systems tend to promote the development of transformative knowledge. However, these associations should be viewed with caution since the analysis appears to be somewhat subjective.

Cutwright has also created a political development classification scheme based on the degree of political competition at the national level. It is probably one of the most elaborate of such schemes built to date. All nations, with the exception of African countries, were scored on a six point scale of competition for a twenty year period, 1940 to 1960. A dimension of egalitarianism is included in that nations are given additional points when ruled by a chief executive who was elected by a direct vote in an open election where he faced competition or was chosen by a political party in a multi-party system. Cutwright found the degree


\[43\] loc. cit., p. 259.
of political competitiveness to be highly correlated with other national development indicators such as education, urbanization and communications development. That is, the higher the degree of political competitiveness the higher the level of urbanization, communication and educational development. 44

It seems probable that the elites who control the political systems in third world nations must, to a certain degree, adhere to democratic-egalitarian attitudes in order to initiate the process of development. It is suggested that a political regime may function either as the bridge that promotes interaction between the education and economic institutions or the chasm that keeps them apart. If a political elite operates in ways to reinforce "status values and/or special privileges," Bowman and Anderson 45 suggest they may impede development. This is highly consistent with Etzioni's perspective. As Curle 46 puts it:

"The elite of the world have, for the most part, tended to be satisfied with their position of wealth, power and status. They see no need for vast changes in the existing socio-economic structure and it would be strange indeed if they espoused a system which threatened to overturn their world."

On the other hand, where political elites adhere to democratic-egalitarian values, it is proposed that they will function in ways to bridge the gap between the education and economic sectors, thereby promoting the process of development.

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44 Cutwright did not include any direct measures of economic growth, e.g. GNP per capita, in the investigation.

45 Bowman and Anderson, op. cit., p. 121.

46 Curle, op. cit., p. 226.
There is one additional theoretical consideration of interest that may be derived from the arguments of those researchers interested in the political context. Theoretically, investment in transformative knowledge, i.e., the spread of transformative knowledge to citizens, in competitive nations would prove harmonious with existing political institutions. Active participation on the part of citizens is a key factor in the proper functioning a competitive system. Aspiration levels and participant orientations tend to increase in individuals as they procure knowledge. Thus the spread of transformative knowledge to the citizens of competitive nations should prove positively associated with economic stability and growth.

In contrast, investment in transformative knowledge in noncompetitive nations might lead to social conflict. The functioning of noncompetitive political institutions is dependent upon nonparticipant orientations on the part of the vast majority of citizens. Investment in transformative knowledge would promote activities upon the part of citizens that would run against the grain of existing institutions thus encouraging the transformation of these structures. The political elites, having a vested interest in the prevailing institutions, would be likely to attempt to prevent their transformation and thus conflict impeding development might result. Theoretically then, investment in transformative knowledge would prove negatively associated with growth in noncompetitive nations. At least this would be the case until resolution of the conflict occurred. This assumption is given more depth
Summary

This chapter presents a theoretical discussion of the role education may play in the development of economies. The first section of the chapter summarizes what various economists and sociologists have said about the functions of education in the development process. What follows is an attempt to tie together the findings of these writers into a series of general propositions relating education to economy in the development context.

The following several propositions are suggested: 1) that education is a necessary but not sufficient variable in the development formula; 2) that from an economic perspective one can distinguish two types of education, one which is productive for the economy, (transformative knowledge), and one which is not productive for the economy, (stable knowledge); 3) that knowledge and physical capital are the two main components in the economic development formula; 4) that their interaction is necessary for and results in the development of economy; 5) that different types and levels of sophistication of transformative education are required for different types and levels of complexity of economy.

A final observation is advanced that in some nations there is an absence of integration between the education and economic sectors. As a result, this lack of integration may be responsible for the lack of production, in the education sector, of the types of manpower needed for economic growth. Many such educational
systems appear to be preparing and encouraging students to enter economically unproductive occupations.

There is also evidence that suggests governments may be the key which determines if the processes necessary to promote economic growth are initiated. Studies by Curle and Cutwright have demonstrated that political competitiveness is related to development. Curle's study revealed that nations with egalitarian regimes tend to have stronger planning approaches toward education, have greater curriculum quality and have educational programs more oriented to the development of economy than nonegalitarian nations. Cutwright's investigations demonstrated that the degree of political competitiveness, at the national level, is significantly correlated with urbanization, education and communications development. Thus it is suggested that a competitive political structure may be necessary to initiate the development process.

The following chapter will state some limited hypotheses that bear on the general orientations discussed above and which are suitable for empirical examination within the limitations of available global data on education, politics and economic growth. Although it is obvious that this a very complex area, bound to a broader macrosociology, it is felt that it will be valuable to start with some precise, but admittedly speculative, hypotheses.
CHAPTER II

RESEARCH HYPOTHESES

Introduction

The role of transformative knowledge in economic growth and the intervening variables that affect the development and application of transformative knowledge covers a great deal of territory. It is well beyond the scope of the present study to deal with the transformative knowledge thesis in its entirety. This chapter will describe some specific hypotheses that bear on the more general orientations discussed in Chapter I. Although these hypotheses relate to crucial dimensions of the transformative knowledge thesis as developed by Etzioni, Bennett and others, they are not conceptualized as being capable of validating the entire complex process discussed in Chapter I.

A secondary purpose of these hypotheses involves examining the effects some selected environmental dimensions have on the relation between education and economy. The major environmental variable considered is political structure.

Hypothesis No. 1, the Ratio (VE/GE)

The first hypothesis concerns the structural relationships between the direction of investment in the ratio between the rate of vocational and general education at the secondary school level and the level of economic development. Bennett has stressed the
vocational-general education ratio (VE/GE) as noted above, and correlated this variable with several indices of economic development.\footnote{Bennett, William, "Educational Change and Economic Development." In M. Eckstein and H. Noah (Ed.), Scientific Investigations in Comparative Education. London: Macmillan, 1969. P. 176.} His research indicated that developing nations (less than $500 GNP per capita) tend to invest proportionately more in vocational training as they progress economically. Conversely, countries that have passed the $500 mark tend to increase the relative emphasis on general education as they become more affluent.

Bennett\footnote{loc. cit., p. 175.} suggests that the association between (VE/GE) and economic expansion may result from dissimilar manpower requirements for nations at different levels of development. That is, economies located on the lower end of the development continuum may need manpower trained for direct involvement in the production and maintenance of tangible goods, whereas advanced economies appear to require manpower possessing more general training. These both appear to be plausible hypotheses. Poor nations have yet to satisfy the physical needs of their peoples and one would expect the production of tangible goods to be of high priority. In advanced nations where such primary needs have been satisfied, secondary needs (e.g., those associated with human services) can be attacked. Likewise, advanced technologies require greater flexibility in occupations and place greater emphasis on integrative functions than on primary productive tasks. Therefore there is a certain \textit{prima facie} plausibility to the notion of a curvilinear relation
between (VE/GE) and degree of economic affluence.

There was one major limitation of the Bennett study; that is, the analysis only dealt with one point in time, 1955 to 1956. Data is now available for a ten year period, and thus permits the re-examination of the findings within a longitudinal framework. The following hypothesis derived from Bennett's results is suggested and will be tested with the newly available data:

For all nations, the (VE/GE) ratio is related to gross national product per capita in a curvilinear manner. Developing nations (less than $500 per capita) require an increasing ratio as GNP increases. Developed nations ($500 GNP per capita and above) require a decreasing ratio as GNP increases.

Bennett also observed interesting regional variations in the (VE/GE) ratio for nations at similar levels of development. For instance, in 1955 Asian nations seemed to favor general education regardless of level of economic growth. Bennett thought that such differences were possibly a result of cultural differences at the regional level. The present investigation, also following this lead, will examine the association between (VE/GE) and GNP per capita within a regional framework to determine if this relationship has persisted over time. In addition, type of political regime and level of economic development will be incorporated as a control variable, (see Chapter III).

Hypothesis No. 2, the Ratio (SE/PE)

Another question that has received little empirical attention pertains to the preference of various age levels as objects of

3 loc. cit., p. 173.
educational investment in developing countries. In fact, this too seems relevant to the transformative knowledge thesis. There appears to be two strategies available to these nations. These strategies shall be referred to as open and limited access educational systems. As an open access system refers to a program designed to educate the entire school age population to one minimal level. Developing countries would have to make two sacrifices in order to accommodate an open access system. First, it would limit the amount of capital available for other government sponsored programs. Secondly, due to the cost of such a program, the quality of instruction would be limited in areas such as follows: length of instructional program, student/teacher ratio and the availability of good textbooks. Typically, a limited access strategy would educate a modern percentage of the school age population. Such a program would concentrate on advanced and quality instruction. Considering the limited resources and modern job opportunities available in developing countries, it is suggested that a limited access system is most favorable for economic growth. In addition, Lewis* points out that poorer nations must place less emphasis on primary (mass) education and channel more resources into the secondary school system. He asserts that people prepared through the primary school level can contribute little to the development of economy. Conversely, the secondary school graduate is the backbone of the economic and social system. The absence of sufficient numbers of secondary school graduates is an enormous handicap to the develop-

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ment of poor nations.

A measure that appears to be a fair index of a limited access educational system is the relative investment by a nation in secondary and primary education, which will be referred to as the (SE/PE) ratio.\(^5\) Apparently nations emphasizing primary education train a higher percentage of students, but at the expense of the length of the educational program. On the other hand, nations emphasizing secondary education appear to be providing students with a higher level of knowledge, but educating proportionately fewer students.

As indicated in the first chapter, Lewis\(^6\) has asserted that an educational program that overemphasizes primary education at the expense of secondary education is dysfunctional for economy.

Lewis' findings are completely consistent with the theory presented here, and together they suggest the following hypothesis:

For all nations, the ratio between the rates of secondary and primary education is positively related to the level of economic development.

Again, the relationship will be examined controlling for region, level of economic development, and type of political regime.

Hypothesis No. 3, the Ratio (TE/GE)

Most comparative education studies have restricted themselves to primary and/or secondary education when examining the role of formal education in economic growth. For instance, the Bennett


\(^6\) Lewis, loc. cit., pp. 135-36.
study was limited to secondary education; Bowman and Anderson have looked at both primary and secondary levels independently. If their findings interpreted in terms of the transformative knowledge thesis are valid, one would expect to obtain similar relationships at the college level. The present investigation, therefore, will assess the relationship between the technical-general education ratio at the college level and economic development. This collegiate level ratio, parallel to the (VE/GE) ratio, will be referred to as the (TE/GE) ratio mainly to distinguish it from its secondary school counterpart.

There is little empirical evidence concerning the association between the (TE/GE) ratio and economic growth from which a hypothesis can be derived. Since there is no obvious reason to postulate a significant difference in the relationship between type of education and economic growth at any level of instruction, the hypothesis proposed for the secondary level will be refurbished to fit the higher education level. The only difference will be the replacement of (VE/GE) with the (TE/GE) (higher education).

For all nations, the (TE/GE) ratio is related to gross national product per capita in a curvilinear manner. Developing nations (less than $500 GNP per capita) require an increase in ratio as GNP increases. Developed nations ($500 GNP per capita and above) require a decrease in ratio as GNP increases.

As is the case with the secondary school data, the college level data will be examined controlling for region and level of economic development.

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Hypothesis No. 4, Predictive Value of Educational Measures

The fourth section of the investigation is concerned with the ability of various educational indices to predict economic growth over time. Even if educational investment is not found to be a direct function of economic level, it is nonetheless possible that educational investment, especially measures of the mix of educational investment (e.g., (VE/GE) ratio) may be predictive of subsequent economic growth, in this case over the ten year span, 1955-65. The educational measures of most concern are again those defined as indicators of investment in transformative knowledge. Three measures of transformative knowledge based on 1955 data will be utilized as independent variables. They are: (VE/GE), (SE/PE) and (TE/GE) as discussed above. The dependent variable is the average annual economic growth rate for any nation between 1955 and 1965. The following hypothesis is suggested:

For all nations the greater the relative investment in transformative knowledge (technical, vocational or secondary education), the greater the rate of national economic growth.

Finally, as noted in the first chapter, there is a body of literature that suggests that government is a factor of major significance in national development. Cutwright found the degree of political competitiveness to be positively correlated with other national development indicators. If these findings are valid, it might be expected that the form of government or a dimension thereof will have an effect on the relationship between education and economic growth. Therefore, the above hypothesis (No. 4) will be examined controlling for the effects of political regime. In addition,

region and level of economic development will be incorporated as control variables. As noted in Chapter I, it is suggested that investment in transformative knowledge may prove temporarily dysfunctional for economic growth in non-competitive policies and hence, negatively associated with economic growth. The reasoning behind this hypothesis is discussed in Chapters I and IV.

Multiple Regression Analysis

As a final step in the analysis, explained more fully in Chapter III, the zero-order correlations involved in testing the above hypothesis will be examined for inductive evidence that some combination of them may bear a multiple correlation to economic growth. If this is determined (again see Chapter III), they will be placed in multiple regression analysis as a preliminary attempt to get a model for the combined effects of various transformative knowledge structures.

Summary

In this chapter the hypotheses to be tested and the variables to be included in the investigation are specified. The variables incorporated in the study are as follows: the ratio between rates of primary and secondary education, the ratio between rates of general and vocational education, and the ratio between the rate of technical and general education at the college level. These variables will be correlated with variations of the dependent variable economic growth, which is based on GNP data, 1955 to 1965. Indicators of the level of economic development, world region, and national
political competitiveness are utilized as control variables.

The variables will be examined within the following framework: direction of investment in transformative knowledge by nations at various levels of economic development; the economic effects of level of investment in transformative knowledge in terms of the ability of knowledge indices to predict subsequent economic growth.
CHAPTER III

METHODS

Introduction

As an attempt to relate a variety of education measures to economic development, this study has made a concentrated effort to utilize the best global data available on the subject. This effort encountered all of the problems usually attendant in global surveys. The present chapter will describe the population of nations studied, the operational definitions of the variables, the specific sources of the data, and finally the analytic procedures involved. Most of the data for the study are taken directly from UNESCO sources, but several critical variables involve "unique" combinations of existing data. These involve a measure of political competitiveness developed by Cutwright in a 1962 study and a measure of the ratio between vocational and general secondary education (Bennett 1967). Still a third variable, the ratio between secondary and primary education was developed by the author solely for this study. Both of these ratios (VE/GE and SE/PE) are considered important steps toward the operationalization of "transformative knowledge" (Etzioni 1968) as discussed above.

Sources of Data

Ideally, of course, an investigation designed to explore the
role of "transformative knowledge" in economic growth would first seek out and evaluate every major source of knowledge within a culture; secondly, identify and analyze the effects of environmental influences on the development and use of that knowledge; and thirdly, attempt to discern the effects of various environmental mixtures on the development of economy. In any global investigation, however, these objectives are virtually impossible to achieve. Economic and time limitations prohibit the identification and evaluation of new knowledge indices with which to test theory. Thus the social scientist can only rely on existing statistics and is further limited to statistics that are readily available for nearly all nations, or at least a good sampling of nations for every world region. In most cases the only available data that fulfill these requirements are the educational statistics provided in a variety of United Nations publications. Social and physical environmental influences are similarly limited to a few major sources.

There are four major types of social data utilized in this study: educational, economic, political, and demographic data. Most of the economic data were obtained from the United Nations statistical yearbooks. In some cases, national economic data is not available in the yearbooks. In these instances, secondary data sources were consulted.


The secondary resources are Ginsberg's[^3] *Atlas of Economic Development* and B.M. Russett's[^4] *World Handbook of Political and Social Indicators*. Education data were obtained from UNESCO statistical yearbooks.[^5] Population data were acquired from United Nations demographic yearbooks.[^6] Data relating to national political structures were obtained from the results of an investigation conducted by Cutwright.[^7]

These data were compiled for every nation in the world. In this sense it is not a sample, but the entire universe of relevant cases, for the period 1955 to 1965. The only exception is the exclusion of any nation with a population of less than one million. In some cases, however, a nation has to be excluded from certain aspects of the study as a result of a lack of information on one or more of the variables. Missing data is especially problematic where political competitiveness is utilized as a variable. Political information is not available for African nations, and therefore this entire region has to be eliminated from parts of the investigation which include political regime as a variable. In a few cases, communist nations have to be


eliminated from the investigation because economic data are not
made available by them to the United Nations. However, in the
majority of cases, economic data is available for these nations in
secondary sources. Other than the above exceptions, all nations are
included throughout the entire investigation.

The Independent Variables

The VE/GE ratio

The VE/GE ratio is defined as the ratio between the rate of vocational
education and general education at the secondary school level. The
ratio is a combination of two education measures, the vocational
education level and the general education level. Vocational education
is

"any course of study directly related to vocational occupations
where a large part of the curriculum is devoted to learning
specific skills which a student is to use immediately upon
graduation." 9

Conversely, general education has:

"no immediate occupational application but prepares a student
in basic skills that can be used to learn many different oc­
cupations." 10

The operational definition of a ratio VE/GE is the percentage
of a nation's youth ages 15-19 enrolled in a vocational curriculum
at the secondary school level divided by the percentage of the

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9 ibid.
10 ibid.
nation's youth ages 15-19 enrolled in general education. Two different dimensions of the VE/GE are incorporated into the present investigation. The first is the direction of change, i.e., the increase or decrease in the ratio 1955 to 1965. The second dimension is the 1955 VE/GE level.

The SE/PE ratio

The SE/PE is defined as the ratio between the rate of secondary education and primary education. The ratio is a combination of two education measures, the secondary education level and the primary education level. Education at the secondary level is based on at least four years of previous instruction at the primary level. Education at this level includes either general or specialized instruction, or both. Education at the primary level entails at least four years of instruction in the basic tools of learning.

The operational definition of the SE/PE ratio is the percentage of a nation's youth ages 15-19 enrolled in secondary school divided by the percentage of the nation's youth ages 5-14 enrolled in primary school. Two different uses of the ratio SE/PE are included in the investigation. The first dimension is the direction of change, i.e., increase or decrease in the ratio, 1955-65. The second dimension is the 1955 SE/PE level. In some cases 1955 data are not available.

11 ibid.
13 Bennett, op.cit., p.171.
14 UNESCO, op.cit.
In such instances data are obtained, if available, from any year within three years of 1955.

The TE/GE ratio

The TE/GE is defined as the ratio between the rate of technical education and general education at the college level. The ratio is a combination of two education dimensions, the technical education level and the general education level. Technical education includes the natural sciences, engineering, medical science and agriculture. General education includes humanities, fine arts, law, education and the social sciences.¹⁵ The operational definition of the ratio TE/GE is the percentage of a nation's youth ages 20-24 enrolled in a technical curriculum at the college level divided by the percentage of a nation's youth ages 20-24 enrolled in a general curriculum. Two different uses of the ratio TE/GE are incorporated into the investigation. The first dimension is the direction of change, i.e., increase or decrease in the ratio 1955-1965. The second dimension is the 1955 TE/GE level.

The Dependent Variable

The dependent variable for this study is economic growth 1955 to 1965. Although several economic indicators are available, the most appropriate estimate of economic growth is probably a nation's mean annual change in gross national product (GNP) per capita. The variable is operationalized as mean annual change in GNP per capita 1955 to 1965 expressed as a percentage of 1955 GNP per capita. Gross national product per capita is defined as "the total volume

¹⁵UNESCO, op.cit., p.205.
of a nation's goods and services in American dollars divided by its population.  

The choice of GNP per capita as an indicator of economic growth is made on the basis of Bennett's findings. Bennett used three variables: GNP per capita, calorie consumption per capita and energy consumption per capita as measures of economic growth. The analysis revealed only small differences in the relationships between the knowledge variables and any of the three economic indicators. Hence, for the sake of economy and since GNP per capita is considered a good indicator of economic growth by both economists and sociologists, it is the sole economic indicator utilized in the present investigation.

Control Variables

For purposes of valid comparisons, several major controls seem necessary. The control variables are political regime, level of economic development and world region.

Political regime

As discussed in Chapter I, in recent years there has been a good deal of debate as to what form of government is best suited to the development of economy. Most debate has centered around competitive and non-competitive political structures. Cutwright has

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17Bennett, op.cit., pp.168-82.
created a political development classification scheme, based on the amount of political competition at the national government level. The more competitive a national political structure, the higher its political development score.

A nation's political competitiveness score was determined on the following basis:

"1. Legislative Branch of Government
Two points for each year in which a parliament existed in which the lower or only the chamber contained representatives of two or more political parties and the minority party or parties has at least 30 per cent of all seats. One point for each year in which a parliament existed whose members were the representatives of one or more political parties, but where the 30 per cent rule was violated. No points for each year no parliament existed or for years when either of the above types of parliaments were abolished or discarded by executive power. Parliaments whose members are not members of political parties are given a zero. Parliaments that are not self-governing bodies (e.g. the mock parliaments of colonial governments) are given a zero.

2. Executive Branch of Government
One point for each year the nation was ruled by a chief executive who was in office by virtue of direct vote in an open election where he faced competition or was selected by a political party in a multi-party system, as defined by the conditions necessary to get 2 points on the legislative indicator above. If the parliament ceased being a multi-party parliament because of executive action, the chief executive stopped getting points. One half point each year the chief executive was not selected by right of his hereditary status but was elected by criteria other than those necessary to attain one point as given above. Colonial governments receive one half point per year. No points if the nation was governed by a hereditary ruler."

Two dimensions of the political regime variable are included in the investigation. First, a nation's total score for the twenty year period, 1940 to 1960, is determined. Second, nations within each of the three economic control categories are classified as being

\[\text{ibid.}\]
either competitive or non-competitive depending upon their rank order position within their respective economic categories. Nations which score in the fiftieth percentile and above on the political classification scheme within their respective economic groupings will be labeled competitive; the remaining nations within the economic groupings will be labeled non-competitive.

**Level of economic development**

Nations are rated as to level of economic development based on GNP per capita level for the year 1955. Three classifications are created for control purposes: 1) $0-200 GNP per capita, 2) $201-500 GNP per capita, and 3) above $500 GNP per capita. These three levels were the ones used by Bennett in his study. Since a major portion of the present investigation is a replication of Bennett's 1967 study, the same three levels are utilized. Also, $500 GNP is a common "break-off" point between "developed" and "underdeveloped" nations.

**World region**

The reason behind the utilization of region as a control variable is exploratory rather than theoretical. Bennett found regional differences in the kinds of educational programs emphasized by nations regardless of level of economic development. It is for this reason

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21 Bennett, op.cit., p.175.

22 Bennett, op.cit., pp. 175-181.
that region is used as a control variable in the present investiga-
gation. The four regions considered are Africa, Asia, (North America,
Europe, Oceania) and Latin America. It is assumed that these regions
are differentiated on a cultural dimension as well as a geographic
dimension. For example, Europe, Oceania and North America are
grouped together because of their peoples' similar heritage. Although
there is less cultural homogeneity in Africa and Asia, the cultural
and social similarities are probably greater than their differences.

Data Limitations

The UNESCO data have certain identifiable limitations. The
first important limitation of the UNESCO statistics is the absence
of qualitative control dimensions. The educational statistics used
in the present investigation cannot compensate for many qualitative
differences in education programs across national boundaries. The
following examples exhibit some important differences.

Student-teacher ratios vary across national boundaries. The
statistics do not take into consideration this degree of presonal
interaction between instructor and pupil which influences the quality
of the learning process. The desire to learn rests upon personalized,
positive reinforcement from significant others. Therefore, a learning
situation that enhances personal interaction between the two will
foster this desire.

The amount and quality of materials essential to programs of
instruction, i.e., books, audio-visual aids, etc., are not reflected
in statistical findings. Teaching methods rely heavily on the

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availability of educational resources and are either negatively or positively affected by the use of these materials.

A second major limitation affecting the comparability of the educational statistics concerns the length of the instructional programs. Educational programs differ in respect to length of instruction. For instance, secondary school programs in some nations last for only four years, while in other nations they run for five, six, or even seven years. The length of the instructional programs affects the student's ability to function in his occupational role, which in turn affects national productivity.

A further limitation concerns the ability of our education-variables to serve as indicators of a nation's knowledge production. No doubt, a nation's educational system plays a major role in the development and spread of knowledge. However, it is a far cry from being the only source of knowledge within a nation. Two major sources especially relevant to modern economies are the public and private independent research centers. In the United States the RAND Corporation serves as a good example of a significant knowledge producer not affiliated with public education. Also corporations such as General Motors invest heavily in the production of knowledge that suits their specified needs.

By limiting our measure of a nation's knowledge production to public education, we run the risk of making one of two false conclusions. First, if there were little relationship between the education and economic variables, there is the risk of underestimating the role

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of knowledge in the development of economy. That is, the absence of
a strong positive relationship may be due to our failure to tap
the major producers of learning relevant to the development of economy.
Examples of such sources would be knowledge produced in a foreign
country and knowledge informally learned by individuals. Then again,
a strong positive relationship might lead one to falsely conclude that
a large investment in formal education is necessary to foster economic
growth. Formal structures may be simply symptomatic of and/or
dependent on informal structures.

These limitations aside, it is suggested that public education
plays an important role in the development of economically relevant
knowledge. It is proposed that at the very least, public education
develops within an individual the capacities to be economically
productive. That is, the specific knowledge necessary for the devel­
opment of atomic power may not have been produced in the school, but
the capacities to produce may have been. Would RAND Corporation exist
today if America had not put considerable faith in public education?

The final problem concerns the impact of foreign investment on
economic growth in developing countries. Increases in GNP resulting
from foreign investment cannot be determined. Poor nations rely
heavily on such investment for stability. In these countries the
relationship between investment in education and economic develop­
ment will be affected by this investment. That is, investors tend
to transfer their plants intact, including skilled labor, when they
extend their operations to a host country and thus the knowledge
necessary for the development and functioning of the plant would have
arisen in the guest nation and not the host nation. Interestingly enough, none of the studies using GNP as an important variable have looked into this critical question.

Analytic Procedures

The aim of the present investigation is to examine the role of transformative knowledge and economic growth. Two dimensions of this relationship have been selected for consideration. The first concerns the structural relationships between direction of investment (increase or decrease) in the indices of transformative knowledge and the level of economic development. The second concerns the relationship between the level of investment in the measures of transformative knowledge and the rate of economic growth.

In the first part of the analysis, the direction of investment, i.e. increase or decrease, by nations in the measure of transformative knowledge is examined. Secondly, the extent of association between these measures and subsequent short run economic growth is ascertained. Finally, where applicable, the amount of variance in the dependent variable, economic growth, explained by the independent variables is constructed.

Tables are constructed to examine the educational strategies of nations in reference to the ratio \(\frac{VE}{GE}\), \(\frac{SE}{PE}\), and \(\frac{TE}{GE}\). Specifically, the tables will be designed to test ideas advanced

by Bennett26 and Lewis27 as cited in the first chapter. These tables are designed to illustrate any structural relationships between the direction of investment in the education indices and the level of economic development.

In the first chapter it is asserted that the social system is a real system in which the parts interact in a reciprocal manner to enhance the stability and development of the system. Within such a system no one variable, neither education nor investment, nor economic growth, has precedence over the others, but must form an interacting system in some form of equilibrium.28 The most appropriate analytical tool available for empirical studies within the systems analytic framework is the correlation. More often than not, correlational studies yield fruitful clues which help point the way toward a more precise understanding of the social system.

In the present investigation, the Pearson product moment correlation will be used as the test of the predictiveness of the independent variables with reference to economic growth29. To accomplish this a series of correlational matrices are constructed. The matrices are designed to examine the interrelatedness of the independent and dependent variables by each of the control factors. Consequently, matrices are constructed examining the data by region, level of economic development, and type of political regime.

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26 Bennett, op.cit., pp. 168-82
27 Lewis, op.cit., pp. 135-38
28 Bennett, op.cit., p. 170.
The amount of variance in the dependent variable, economic growth, attributable to the independent variables, the ratio \((SE/PE)\), the ratio \((VE/GE)\), the ratio \((TE/GE)\) and national political competitiveness is determined through the use of multiple regression analysis where appropriate. A stepwise regression program\(^{30}\) is incorporated for this aspect of the investigation. Stepwise regression tests the relative power of the independent effects of each variable and also provides the multiple correlation \((R^2)\) attributable to all three variables in combination.

Summary

This chapter presents operational definitions and discussions of the variables included in the investigation, and the description of a statistical procedure incorporated for the analysis of the data. What follows is a brief description of the variables and the analytic procedure.

The independent variables are: 1) the \((VE/GE)\) ratio defined as the ratio between the rate of vocational and general education at the secondary school level; 2) the \((TE/GE)\) ratio defined as the ratio between the rate of technical education and general education at the college level; 3) the \((SE/PE)\) ratio defined as the ratio between the rate of secondary and primary education.

The dependent variable is economic growth 1955 to 1965. The variable is defined as change in GNP per capita 1955 to 1965 expressed

as a percentage of 1955 GNP per capita level.

The control variables are: 1) level of economic development defined as 1955 GNP per capita level; 2) world region; and 3) national political competitiveness which is based on Cutwright's political classification scheme.

The following procedures are utilized: 1) tables are constructed to ascertain the direction of investment, i.e., increase or decrease, in transformative knowledge by nations at the three levels of development; correlation matrices are developed to examine the interrelatedness of the independent and dependent variables. Finally, where applicable, multiple regression analysis is performed in order to determine the relative importance of the independent variables and the additive impact of these same variables in explaining the variance in the dependent variable, economic growth.
CHAPTER IV

RESULTS

Introduction

The purpose of this investigation is to examine the roles of three measures of transformative knowledge: the vocational-general education ratio (VE/GE) (secondary level)\(^1\) the secondary-primary school ratio (SE/PE)\(^2\) and the technical-general education ratio (TE/GE) (college level)\(^3\) in the development of economy. Two dimensions of investment in transformative knowledge are examined. The first dimension concerns the structural relationships between direction of investment (increase or decrease) in the indices of transformative knowledge and level of economic development. The second dimension pertains to level of investment in transformative knowledge as it is predictive of economic growth. These relationships are studied controlling for certain environmental variables cited in Chapter III.

Lack of data restricts the use of the (TE/GE) ratio in the present study. These data are not comparable for nations with incomes of less than $500 GNP per capita. Many of these countries provide no

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\(^3\) loc. cit., pp. 205-17.
higher education statistics whatsoever. The statistics that are available can not be compared on a temporal basis. The data are comparable for the advanced nations, but the developing economies and not the advanced economies are the major concern of the present study. Reference is made to the (TE/GE) ratio for advanced economies where appropriate.

The Ratio (VE/GE)

The first section of the chapter concerns testing Bennett's 1967 hypothesis as to the relationship between level of economic sophistication and change in the direction of investment by nations in the (VE/GE) ratio and economic growth. The findings imply that nations at the lower level of development require an increase in ratio as they develop. At the intermediate level of development there is a negligible correlation between the two variables. Nations at the upper end of the development continuum appear to require a decreasing ratio as they progress economically. The Bennett study was limited to one point in time. The present investigation examines the relationship between the 1955 level of development and direction of change in the (VE/GE) for the years 1955 to 1965. Tables are constructed to display the findings.

Hypothesis I

The (VE/GE) ratio is related to GNP per capita in a curvilinear manner. Developing nations (less than $500 GNP per capita) require an increase in ratio as GNP increases. Advanced nations

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4 Bennett, op.cit., p.168.
5 Bennett, op.cit., p.172.
($500 GNP per capita and above) require a decrease in ratio as GNP increases.

Table 1 indicates that the hypothesis is not borne out with data from the ten year period examined. There appears to be a rough curvilinear relationship between the direction of change in the (VE/GE) and level of economic development, but this relationship is precisely the opposite of what Bennett's findings lead one to predict. That is, most nations at the upper end of the development continuum are increasing or maintaining their ratios, (72%), while most nations at the lower end of the continuum appear to be decreasing their ratio, (57%). Finally, there appears to be no clear pattern to changes in the ratio at the middle level of development, however, most of these nations, (57%), have maintained or increased their ratios over the ten year period.

**TABLE 4.1**

Direction of Change in the (VE/GE) 1955 to 1965 by Level of Economic Development

<table>
<thead>
<tr>
<th>GNP per capita</th>
<th>Increase</th>
<th>No change</th>
<th>Decrease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$500 &amp; above</td>
<td>36%</td>
<td>36%</td>
<td>28%</td>
<td>25</td>
</tr>
<tr>
<td>$200 to $499</td>
<td>32%</td>
<td>25%</td>
<td>43%</td>
<td>28</td>
</tr>
<tr>
<td>Less than $200</td>
<td>14%</td>
<td>29%</td>
<td>57%</td>
<td>58</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>111</td>
</tr>
</tbody>
</table>

* A nation was placed in the no change category if its (VE/GE) did not change by more than five hundredths over the ten year period.
Whether or not these observed structural relationships represent the actual economic requirements of nations at the various levels of development is a matter of speculation. The answer, it seems, must be somewhat equivocal at this point. As with any hypothesis, the prediction of a curvilinear relationship between the (VE/GE) ratio and economic level is based on an all other things being equal assumption. In global studies, especially, there seem to be many "other things" which may not be "equal." In the short run, a great many things may temporarily inflate or deflate any particular educational measure. Political decisions may have particularly important impact on educational change. In short, although the results of this particular study clearly do not support Bennett's predictions, it should be recognized that the original prediction was based on a broad cross-sectional pattern and that the present data only reflect short run changes in educational measures. Furthermore, the time span involves a particularly hectic period of colonial and post-colonial upheaval throughout the third world. Only a long term study (probably at least fifty years in duration) could give any reasonable and convincing answers to the validity of the prediction. This in itself points up some of the vicissitudes of macrosociological research which may have been ignored by researchers.

In addition, it is very important to note that if the (VE/GE) ratio is a valid index of transformative knowledge, and if (all other things equal) it is important in generating economic growth in third world nations, and if political and other confounding variables may upset this relationship, then the fact that a majority of third
world nations are deemphasizing vocational education becomes an important observation in its own right. There is no way of knowing what a maximum rate of growth might be for a third world nation, but we do know that the rate of growth for many nations (e.g. India, United Arab Republic, Ghana, to name a few important examples) has been disappointing. It is therefore at least possible that the failure of nations to invest in transformative knowledge may be a critical factor in their very failure to develop and grow itself. Thus the somewhat unexpected findings of Table 1 may not be a clear refutation of the "transformative knowledge thesis" as developed by Etzioni, Bennett and others, but may in fact be a glimpse of a vicious cycle of poor economic growth, political chaos, and educational neglect which itself is an endemic part of the broader cycle of poverty in the "third world development." Higher investment in transformative knowledge may provide an important lever for breaking out of this cycle, but without any ideal typical example against which to measure short run progress, one is nearly helpless in trying to demonstrate this thesis empirically. Nonetheless, latter portions of this chapter will point out rather strong interactions between political variables and educational measures as they both relate to measures of economic growth (even in the short run period).

Finally the research of Bowman, Hansen, and others suggests


that large investments in vocational education are necessary if nations are to achieve economic growth and maintain economic stability. It does not seem that Bennett's assertion that developing nations require large amounts of vocationally trained manpower in order to realize moderate development is clearly negated; but what is negated is the assertion that these nations are in fact placing necessary emphasis on vocational education. Foster\(^8\) suggests (see Chapter I) that the reason developing countries are not investing in vocational training is to be found in the socialization of elites in the colonies prior to nationhood. Whatever the reason, the observed structural relationship between the direction of investment in the (VE/GE) and level of development does not approach that suggested by many social scientists as necessary for industrialization.

It is stated in Chapter I that rapid economic growth is a function of the quality of interaction between education and economic institutions. Here it is suggested that in many cases the educational institutions in third world countries are not interacting with their modern industrial sectors. This is evidenced in that the educational institutions are not meeting (complementing) the manpower needs of modern industry within their countries. As a result, modern industrial concerns, as Bowman points out,\(^9\) import manpower from ad-

\(^8\)Bennett, op. cit., p.173.


vanced industrial nations. This situation implies the existence of a chasm between the economic and education sectors in developing countries. A chasm that may prevent interaction between the two sectors necessary for national development.

It may be that this lack of investment in vocational training is confined to certain regions of the world. Thus it is necessary to examine the direction of investment in the (VE/GE) ratio by the various regions.

**TABLE 4.2**

Direction of Change in the (VE/GE) 1955 to 1965 by World Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Increase</th>
<th>No change</th>
<th>Decrease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>12%</td>
<td>12%</td>
<td>76%</td>
<td>33</td>
</tr>
<tr>
<td>Asia &amp; Near East</td>
<td>25%</td>
<td>58%</td>
<td>17%</td>
<td>24</td>
</tr>
<tr>
<td>European grouping</td>
<td>42%</td>
<td>26%</td>
<td>32%</td>
<td>31</td>
</tr>
<tr>
<td>Latin America</td>
<td>13%</td>
<td>30%</td>
<td>57%</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>111</strong></td>
</tr>
</tbody>
</table>

Table 2 makes it clear that the general tendency of third world nations to reduce their (VE/GE) ratios is mainly attributable to a strong tendency to do so among African and Latin American nations. Fewer Asian and Near Eastern nations decreased their investment in vocational education relative to general education (1955-1965) than did their counterparts in Latin America and Africa. Most Asian and Near Eastern nations (83%) have maintained or increased their (VE/GE)
ratios for the ten year period. The interesting finding here is that Asian and Near Eastern nations which were found by Bennett\textsuperscript{11} to be the slowest in raising vocational education in proportion to general education, are for the most part the only developing nations to have increased their relative level of investment in vocational education for the ten year period. Perhaps this issue can be clarified by examining the mean level of investment in the (VE/GE) by region for the years 1955 and 1965, Table 4.3.

Table 4.3 indicates that even though most Asian and Near Eastern nations have been maintaining or increasing their (VE/GE) ratios, they still tend to have much lower ratios than their economic equals in other parts of the world. On the average, Asian and Near Eastern countries prepare only 6\% of their secondary school students in vocational studies. The simplest explanation of this inconsistency is that some sort of "catch up" processes are operating. That is, those nations with the lowest (VE/GE) ratios are most impelled to bring up the relative investment in vocational education. But it is also possible that political and/or cultural influences are operating here. A number of Asian nations (Korea, Thailand, Phillipines, Taiwan, and so on) have been strongly influenced by American aid and advice and concomitantly may have been influenced by American interests in technical and vocational education. Similarly, during the last twenty years Latin American and African nations have been

\textsuperscript{11}Bennett, op.cit., p. 179.
most often influenced by European (especially continental) educational models; the Africans, because of their "intimate" colonial and post-colonial relationships, and the Latin Americans, because of their cultural ties with Europe, their virulent anti-Americanism and (ironically) the elitism which pervades their educational systems. In any case, the latter regions show massive tendencies to deemphasize vocational education at the secondary level. In these areas vocational education is losing ground in most nations. In Africa only four nations show an increase in (VE/GE) between 1955 and 1965. These four nations are Kenya, Nigeria, Sierra Leone and the Sudan. Even in these nations, the incremental growth of vocational education was relatively small.

TABLE 4.3

Mean Level of Investment in the (VE/GE) 1955 to 1965 by World Region

<table>
<thead>
<tr>
<th>World Region</th>
<th>1955</th>
<th>1965</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>.69</td>
<td>.26</td>
</tr>
<tr>
<td>Asia &amp; Near East</td>
<td>.14</td>
<td>.12</td>
</tr>
<tr>
<td>European grouping</td>
<td>1.40</td>
<td>1.07</td>
</tr>
<tr>
<td>Latin America</td>
<td>.65</td>
<td>.41</td>
</tr>
</tbody>
</table>

n= 111

Perhaps by examining the direction of investment in the (VE/GE) by type of political structure (competitive or non-competitive) one could unravel the complex association obtained between the variables by region and level of economic development.
TABLE 4.4

Direction of Change in the (VE/GE) 1955 to 1965 by Degree of Political Competitiveness

<table>
<thead>
<tr>
<th>Economic Level</th>
<th>Increase</th>
<th>No change</th>
<th>Decrease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
<td>67%</td>
<td>89%</td>
<td>25%</td>
<td>12</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>58%</td>
<td>8%</td>
<td>33%</td>
<td>12</td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
<td>45%</td>
<td>10%</td>
<td>45%</td>
<td>11</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>50%</td>
<td>0%</td>
<td>50%</td>
<td>10</td>
</tr>
<tr>
<td>III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competitive</td>
<td>33%</td>
<td>17%</td>
<td>50%</td>
<td>14</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>30%</td>
<td>20%</td>
<td>50%</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>69</td>
</tr>
</tbody>
</table>

It is apparent that national political competitiveness does not alter the relationships found at each economic level. Table 4 indicates that there is no difference in the direction of investment in the (VE/GE) ratio for competitive or non-competitive nations within any of the three economic levels. The work of Bowman and others assert the possibility of substantial differences in the educational investment strategies of democratic and non-democratic political systems. However, the present data indicate that type of political structure is not as important as the level of economic sophistication in determining the direction of investment in the (VE/GE) ratio. In the latter portions of the present chapter the significance of political structure is examined in greater depth.

What proportion of this overall pattern can be attributed to variables associated with region, such as cultural differences, and what proportion to economic differences is not easily determined. The differences can be rationalized through either cultural or economic generalizations. Bennett,\textsuperscript{13} Foster,\textsuperscript{14} and others have attributed the low vocational education levels found in Africa and Asia to cultural determinants, but it is also true that these two regions contain the world's poorest nations. Likewise, the moderate and high vocational investment levels found in Latin America and the European grouping respectively, can be interpreted through either cultural or economic determinants. Nonetheless, it appears that the economically developed nation is oriented to the maintenance and expansion of economy. The various institutions making up the culture are oriented to the achievement of this goal. Each institution contributes what is required of it for the development of economy as a whole. Whereas developing countries, although desirous of economic development, do not appear to have the institutional determination and coordination to achieve this goal. The transformative knowledge structures that have been suggested as necessary if these nations are to achieve moderate levels of development are just not there.

The Ratio ($\text{SE/PE}$)

Another proposed indicator of a country's investment in trans-

\textsuperscript{13} Bennett, op.cit., p. 174.

\textsuperscript{14} Foster, op.cit., pp. 614-16.
formative knowledge is its relative investment in secondary and primary education, \((SE/PE)\) ratio. If other measures of transformative knowledge, such as the \((VE/GE)\), are differently related to level of economic development among third world nations, so might the \((SE?PE)\) ratio. There is no previous empirical investigation with which to suggest exactly how the ratio is related to economy. However, in the theoretical orientation, it is predicted that the \((SE/PE)\) ratio will be positively associated with economic level. That is, nations at higher economic ranks will have a greater tendency to increase their investment in \((SE/PE)\) than poorer nations.

**Hypothesis II**

The ratio between the rates of secondary and primary education \((SE/PE)\) is a function of the level of economic development in a positive manner.

**TABLE 4.5**

Direction of Change in the \((SE/PE)\) 1955 to 1965 by Level of Economic Development

<table>
<thead>
<tr>
<th>Economic Level</th>
<th>Increase</th>
<th>No change</th>
<th>Decrease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>89%</td>
<td>4%</td>
<td>7%</td>
<td>24</td>
</tr>
<tr>
<td>II</td>
<td>93%</td>
<td>0%</td>
<td>7%</td>
<td>24</td>
</tr>
<tr>
<td>III</td>
<td>66%</td>
<td>27%</td>
<td>7%</td>
<td>56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>104</strong></td>
</tr>
</tbody>
</table>

Table 4.5 indicates that this prediction is borne out, at least in that developed and moderately developed nations have almost universally raised their investment in secondary education between

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1955 and 1965. Only four nations actually reported a decrease in the (SE/PE) during this period. Although the majority of nations in the lowest economic category also increased the (SE/PE) ratio, still 27% of these nations showed no change in (SE/PE) and four nations reported a decrease. In contrast to the (VE/GE) findings, there is no tendency for nations in any of the three levels of development to decrease their investment in the (SE/PE) ratio. Almost all nations at the upper and moderate levels of development and a clear majority of those at the lower level of development have been increasing their direction of investment in the ratio. The theoretical perspective, i.e., that as nations develop, the complexity and level of sophistication of both the education and economic sectors will increase, predicts that the greatest investment increases in the (SE/PE) would be found at the upper level of development; a more moderate increase at the middle level of development; and a lesser increase at the lower level of development. The predicted difference in investment is obtained between the moderate and lower levels of development but there is no distinction in the direction of investment between the moderate and upper levels. Although the data do not allow the creation of a college level-secondary education ratio, it is suggested that differential direction in investment would be found between the moderate and upper levels if this were the case. In other words, it is proposed that the economic sectors at both the upper and middle levels of development have reached a degree of sophistication that requires high levels of manpower trained through the secondary school level. And that there is a general maximal level of secondary education.
development for any level of economic growth. Finally, this suggests that at some point on the industrialization cycle developing countries must consciously project an increase in the (SE/PE) ratio.

Examination of Table 4.5 makes it obvious that regional differences in the direction of investment will not be obtained for advanced and moderately developed countries. However, regional differences may exist for nations in the $0-200 GNP per capita grouping. Table 4.6 examines the regional data.

**TABLE 4.6**

Direction of Change in the (SE/PE) Ratio 1955 to 1965 by World Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Increase</th>
<th>No change</th>
<th>Decrease</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>61%</td>
<td>30%</td>
<td>9%</td>
<td>33</td>
</tr>
<tr>
<td>Asia &amp; Near East</td>
<td>77%</td>
<td>9%</td>
<td>14%</td>
<td>22</td>
</tr>
<tr>
<td>European grouping</td>
<td>89%</td>
<td>4%</td>
<td>7%</td>
<td>28</td>
</tr>
<tr>
<td>Latin America</td>
<td>86%</td>
<td>14%</td>
<td>0%</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>104</td>
</tr>
</tbody>
</table>

Table 4.6 indicates that developing nations in the Near East and Asia are slightly more inclined to raise the (SE/PE) ratio than their economic counterparts in Africa. This tendency of a large minority of African nations (39%) not to increase their investment in secondary education relative to primary education supports Lewis.* Lewis, A., "Education and Economic Development." Readings in the Economics of Education. In UNESCO(Ed.). Paris: UNESCO, 1968. Pp. 135-37.

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assertion that many African nations, especially Sub-Saharan states, have not been developing their secondary education systems at a satisfactory rate.

Since no political information is available for African nations, there would be no value in constructing a table examining differences in direction of investment by political regime. Such a table would only reflect the findings already presented in the regional and economic level tables.

Summary: (VE/GE) and (SE/PE) Ratio Findings

In summary, it can be said that a majority of advanced nations (72%) for the period 1955 to 1965 have tended to maintain or increase their investment in vocational education relative to general education. In addition, virtually all advanced nations have expanded secondary education at a greater pace than primary education. For moderately developed nations there is no consistent trend in the direction of investment in the (VE/GE) ratio. About one-half have maintained or increased their investment in vocational education relative to general education, while the other half have placed more emphasis on general education. Like advanced nations, nearly all have tended to increase their investment in secondary education relative to primary education. On the other hand, poorer nations have tended to deemphasize vocational education relative to general education. Furthermore, even though a majority have expanded secondary education at a faster pace than primary education, a strong minority (33%) have either maintained their 1955 (SE/PE) ratio or have placed greater emphasis on primary education.
The regional analysis revealed that the tendency for nations to decrease investment in the (VE/GE) was for the most part confined to Africa and Latin America. The vast majority of Asian and European nations have maintained or increased their level of investment in the ratio. The possibility of cultural and/or political influences were suggested as factors here. In addition, a strong minority of African nations have decreased their level of investment in the (SE/PE). This is in contrast to the education policies of poor nations in other parts of the world.

Transformative Knowledge and Economic Growth

To this point data have been displayed in a fashion designed to describe the structural relationships between type of investment in transformative knowledge and level of national income. It has been found that level of national income is not clearly related to changes in (VE/GE) and (SE/PE) ratios. This does not, however, indicate that actual investment in vocational education or secondary education, when it does occur, does not have a marginal effect on growth in national income. Therefore, this thesis will now examine the latter assertion, that is, that a significant investment in transformative knowledge is necessary in order to realize economic growth. This final section will examine the associations between 1955 levels of investment in transformative knowledge and subsequent short run economic growth (1955 to 1965).

The Ratio (VE/GE) and Economic Growth

The basic hypothesis linking (VE/GE) ratio to income growth can
be stated as follows:

The greater the level of investment in the (VE/GE) ratio, the greater the rate of future economic growth.

Table 4.7 displays the association between 1955 (VE/GE) level and average annual growth in GNP per capita 1955 to 1965 controlling for the level of national income. The findings indicate that within the three broad economic categories, only at the upper level of development is there a moderately strong positive correlation between the variables. The correlations obtained for the middle and lower levels of development do not even approximate the expected findings as expressed in the hypothesis.

<table>
<thead>
<tr>
<th>Economic Level</th>
<th>Correlation</th>
<th>Mean (VE/GE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>+.37</td>
<td>1.51</td>
</tr>
<tr>
<td>II</td>
<td>-.14</td>
<td>.58</td>
</tr>
<tr>
<td>III</td>
<td>+.03</td>
<td>.59</td>
</tr>
</tbody>
</table>

Examination of the 1955 mean level of investment in the (VE/GE) ratio (Table 4.7) by nations at each of the three levels of development does not help explain the absence of association between the variables at the middle and lower levels of development. Although advanced economies prepare a large proportion of students for vocational occupations, countries at the lower and middle levels
of development certainly provided vocational training to a substantial number of students in 1955. Nations at both levels prepared about 25% of their graduates in "vocational" fields.

Nor does inspection of the associations between the (VE/GE) ratio and economic growth by world region, Table 4.8, clarify the relation between education and economic development. There is a virtual absence of association between the variables by region. The largest obtained correlation was a negligible .08 for Latin America. There is no apparent effect linked to region, e.g., cultural heritage or national proximity, that aids in the understanding of the correlations secured by level of economic development.

<table>
<thead>
<tr>
<th>Correlation</th>
<th>1955 (VE/GE) Level Correlated to 1955-1965 Economic Growth by World Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>+.03</td>
</tr>
<tr>
<td>Asia &amp; Near East</td>
<td>-.01</td>
</tr>
<tr>
<td>European grouping</td>
<td>.00</td>
</tr>
<tr>
<td>Latin America</td>
<td>+.08</td>
</tr>
</tbody>
</table>

Utilizing the present mode of analysis, it appears that investment in the (VE/GE) is unrelated to short run changes in income levels. However, it may be that the lack of association between the (VE/GE) ratio and economic growth is a result of a failure to bring in other
significant environmental dimensions to the analysis. As suggested in Chapter I, the political regime may have a particularly catalytic effect on \((\text{VE/GE})\) payoff. The last part of the present chapter will focus attention on the interactive effects of national politics. Before examining the effects of political structure, however, the relationship between investment in the \((\text{SE/PE})\) and economic growth will be discussed.

The Ratio \((\text{SE/PE})\) and Economic Growth

In Chapter I it was predicted that the \((\text{SE/PE})\) ratio would be positively associated with short run economic growth. The first section of the present chapter has reported that developed and moderately developed nations have almost universally raised their investment in secondary education between 1955 and 1965. Only four nations at both levels actually reported a decrease in the \((\text{SE/PE})\) during this period. Although a majority of nations in the lowest economic category also increased the \((\text{SE/PE})\) ratio, still 27% of these nations showed no change in the \((\text{SE/PE})\) and 7% reported a decrease. In the present section then, the 1955 \((\text{SE/PE})\) ratio will be correlated with economic growth (change in GNP per capita) 1955 to 1965. Is a change in \((\text{SE/PE})\) predictive of future economic changes? As a hypothesis, this has been stated as follows:

The higher the \((\text{SE/PE})\) ratio, the greater the rate of economic growth.

In contrast to the associations found for the \((\text{VE/GE})\) ratio and economic growth, Table 4.9 reveals a distinct positive association between the \((\text{SE/PE})\) ratio and economic growth at all three levels of
development. The hypothesis is partially supported. The pattern of relationships suggests that at the lower level of development economies do not require manpower with a great deal of academic preparation to be able to function and grow. However, as nations progress toward a moderate level of development, they require a more sophisticated manpower force.

**TABLE 4.9**


<table>
<thead>
<tr>
<th>Economic Level</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>+.39</td>
</tr>
<tr>
<td>II</td>
<td>+.42</td>
</tr>
<tr>
<td>III</td>
<td>+.12</td>
</tr>
</tbody>
</table>

It is suggested that further exploration in this area might indicate that advanced economies have a greater need for manpower with higher level training. That is, training beyond that associated with a secondary school. Inadequate higher education data for nations with GNP per capita of less than $500 prevented the development of a college level ratio, e.g., (TE/GE), with which to examine this idea.

Another way of interpreting the findings in Table 4.9 would be to attribute the associations to the types of education emphasized at the three levels of development. The development of a manpower force capable of promoting economic prosperity may be dependent on the kinds of training as well as the length and quality of prepara-
tion. That is, certain nations may be investing in the wrong kinds of secondary education. Many of the studies reviewed in Chapter I point out that poorer countries tend to overinvest in academic education and underinvest in scientific education. In the first section of this chapter, it was demonstrated that poor nations (with the exception of Asian nations) have tended to reverse their direction of investment in the (VE/GE) ratio. And in the case of Africa, Hansen has pointed out that even existing vocational programs in many cases do not relate to the needs of local economies.\footnote{Hansen, op.cit., p} Thus the absence of association between investment in (SE/PE) and economic growth for developing countries might be due to the type of secondary education emphasized within these nations.

The regional correlations between the level of investment in the (SE/PE) and economic growth tend to support a similar view. In African and Latin American developing nations, where there has been a tendency to decrease the level of investment in vocational education relative to general education, the association between (SE/PE) and economic growth is low, and in the case of Latin American nations, negative. In Asian and European countries, where there has been a tendency to increase the direction of investment in the (VE/GE) ratio, the obtained correlations between investment in (SE/PE) and economic growth are moderate in size and positive in direction. In addition, examination of the mean level of investment in the (SE/PE) by region (Table 4.10) indicates that Asian and European nations tend to have
a higher level of investment in the (SE/PE) ratio than African and Latin American nations.

TABLE 4.10
The 1955 (SE/PE) Level Correlated to 1955-1965 Economic Growth by World Region

<table>
<thead>
<tr>
<th></th>
<th>Correlation</th>
<th>Mean (SE/PE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>+.11</td>
<td>.16</td>
</tr>
<tr>
<td>Asia &amp; Near East</td>
<td>+.46</td>
<td>.43</td>
</tr>
<tr>
<td>European grouping</td>
<td>+.31</td>
<td>.67</td>
</tr>
<tr>
<td>Latin America</td>
<td>-.23</td>
<td>.28</td>
</tr>
</tbody>
</table>

Taken as a whole, the data suggest, although in no way prove, the possible importance of an educational program that prepares a moderate percentage of students in technical skills as well as general skills, and concentrates a significant proportion of its educational investment on the production of skilled manpower as opposed to mass education. It further suggests that this effect is operable only under conditions of a general strong advance in secondary education. When educational development is sluggish, any effect of (SE/PE) is washed out by the impact of many other powerful economic variables affecting economic growth. But these relationships still remain only speculations beyond the reach of empirical tests with the global data presently available.

In summing up the findings to this point, therefore, it must be admitted that there is no clear cut relationship between transformative
as defined here, and economic growth. High positive associations between economic growth and both measures of transformative knowledge were obtained only for advanced economies. Investment in the (VE/GE) ratio was not related to economic growth for nations at the middle level of development. There was an absence of association between the same variables at the lower level of development. Examinations of the regional associations between investment in the (SE/PE) and change in GNP per capita demonstrated that only where there had been a tendency on the part of nations to increase their investment in both measures of transformative knowledge was there a positive connection between investment in (SE/PE) and economic growth. This finding indicates that a measure of transformative knowledge that takes into consideration both the quality and kinds of instructional programs, as well as some of the "context" variables (like political regime), might provide a better indicator for studies investigating the relationship between manpower investment and subsequent economic development.

Indeed the most important implication of the above findings is that the models and formulas developed thus far by social scientists to study this problem have been overly restrictive. The modest and often confusing association between the measures of transformative knowledge and economic growth reported may reflect the exclusion of meaningful socio-physical environment variables, as well as additional educational indices, will have to be examined and included in theoretical models relating manpower investment to economic growth. This would certainly be true of any model that purported to be a systems model. The theoretical orientation developed from the present study (see Chapter I) which in turn was derived from previous studies in
this area is obviously too simplistic to explain the complex relationship between investment in transformative knowledge and development of economy.

The Political Context

One variable considered by many researchers to have significant impact on the development process is type of political regime. Even economists, such as Anderson and Bowman, are beginning to revise traditional developmental models and are willing to consider the impact of a nation's political elite on national growth. The present analysis was extended to take into consideration the effects of national political competitiveness, incorporating Cutright's well known political development classification scheme. It is assumed that political competitiveness and non-competitiveness are aspects of social systems that reflect different cultural beliefs and attitudes. Etzioni considers the same question in the broader context of man and his relation to his environment. Non-competitive systems are assumed to approximate what Etzioni terms "closure," in their orientations to the environment. That is, a system in which the established beliefs orienting man to his environment are accepted as truth and challenges to these existing beliefs are discouraged. Competitive systems are assumed to approximate the opposite; a system in which the development and use of transformative knowledge is encouraged.

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17 Anderson and Bowman, op.cit., p.121.
And a means for the alteration or substitution of outdated beliefs is inherent in the social structure. The latter system reflects a dynamic attitude toward the environment, the former a static attitude. Both of these systems are ideal types, and thus are unlikely to be found in reality. That is, one would be likely to find a mixture of both static and dynamic attitudes in any society. However, it is suggested that on the whole, competitive systems approximate the dynamic orientation, whereas non-competitive systems approximate the static orientation.

So much seems to be fairly obvious and to a large extent simply a matter of definition. However, at least one important theoretical question is suggested by this association of transformative knowledge with competitive political regimes. This question has to do with the implications of a mismatch between transformative knowledge structures and a non-competitive political regime.

Developing transformative capacities in the citizens of non-competitive systems may prove dysfunctional for the development of economy. This would be true to the extent that the newly developed capacities within the citizens could encourage transformation of the existing socioeconomic structures in which the elites have a vested interest. This may create a situation in which the transformative qualities of the spread of new knowledge to the citizenry may be thwarted by elitist resistance. Such resistance could lead to conflict between the elitist power structure and the newly educated out-groups desiring social transformation, creating a situation of disunity and conflict. This situation could at least temporarily inhibit

economic stability and growth. At least, that is, until the conflict became resolved.

Almond and Powell's discussion of the differences in democratic and non-democratic political systems (competitive and non-competitive) demonstrate the above stated distinctions. In discussing non-competitive systems as totalitarian, they point out that the political elites in such societies are unresponsive to the demands of the whole citizenry, and at the same time regulate and coerce the behavior of these citizens. This type of political system is considered traditional totalitarianism. Modern totalitarian systems differ somewhat from this traditional model in that they tend to distribute their national resources more equitably among the populace than do their traditional counterparts. However, the political inputs, i.e., the knowledge, beliefs, and demands that are channeled into the decision-making processes are initiated by the elites. In contrast, in democratic (competitive) political systems, the political inputs are initiated by various individuals and groups within the general population, and in most cases not by those directly involved in the decision-making processes. Almond and Powell point out that the political systems of the United States, Britain, the Scandinavian countries, and Switzerland are good examples of nations whose citizens approximate a high degree of active participation.

It should be noted that the definition of political outputs is not limited to tangible resources. Quite the contrary, political


\[22\text{ibid.}\]
outputs refer to the regulative, e.g. laws, extractive, e.g. taxes, functions of the political system as well as the resource distribution function. It is suggested that the political structures of competitive systems are more responsive to the general needs of the entire society than are non-competitive systems. Furthermore, a greater degree of responsiveness is reflected in the outputs of a competitive system.\textsuperscript{23}

This theoretical framework is entirely consistent with the notion than investment in transformative knoweldge, i.e., the spread of transformative knowledge, to the citizens in non-competitive political systems may prove at least temporarily dysfunctional for economic development. The proliferation of transformative knowledge among the populace of non-competitive systems could prove dysfunctional to the extent that new demands may confront the established systems which the existing political structures are not capable of mediating. This could create a situation of conflict in which national development would be temporarily impaired, at least until structural adjustments enhancing the responsiveness of the system are made. Thus, one could assume that for non-competitive nations, only that knowledge investment which complements the existing structures would be functional for the maintenance of the system. Investment in transformative knowledge will run against the grain of the existing system and will be negatively associated with economic stability and growth.

The findings of the present study tend to support this orientation. With the exception of the (SE/PE) ratio for economic level

\textsuperscript{23}Almond, G., loc.cit., pp. 28-29.
III nations, all the measures of transformative knowledge were positively associated with economic growth for competitive polities (see Table 4.11). And for the most part, the educational indices were negatively correlated with growth for non-competitive systems. The findings are discussed in greater detail below and together they suggest that investment in transformative knowledge is positively associated with economic growth in competitive nations and negatively associated with economic growth in non-competitive nations. These associations are examined controlling for level of economic development below.

Looking closely at Table 4.11, the attained associations between the indices of transformative knowledge and economic growth for economic level III competitive and non-competitive nations are inconsistent. The findings indicate that the (VE/GE) ratio is positively associated with economic growth for competitive nations and negatively associated with growth for non-competitive nations, consistent with the hypothesis. However, the correlations are not in the predicted direction with reference to the (SE/PE) ratio for the poorer economic level III nations.

<table>
<thead>
<tr>
<th>Economic level</th>
<th>(VE/GE)</th>
<th>(SE/PE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>III Competitive</td>
<td>r=+.23</td>
<td>r=+.24</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>r=+.57</td>
<td>r=+.42</td>
</tr>
<tr>
<td>II Competitive</td>
<td>r=+.11</td>
<td>r=+.85</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>r=+.61</td>
<td>r=+.15</td>
</tr>
</tbody>
</table>

TABLE 4.11
The 1955 (SE/PE) and (VE/GE) Levels Correlated with Subsequent Economic Growth (1955-1965) for Economic Levels II and III Competitive and Non-competitive Nations

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In contrast to the findings for economic level III nations, the findings for moderately developed nations (level II in Table 4.11) consistently support the hypothesis. The table reveals a consistent association between the measures of transformative knowledge and economic growth. The two indices of transformative knowledge are both positively associated with economic growth for competitive nations. On the other hand, for non-competitive nations, the data reveal a strong negative connection between the (VE/GE) ratio and GNP per capita; and only a negligible association between the (SE/PE) ratio and the dependent variable.

The (VE/GE) and (SE/PE) ratios each reflect the investment strategies of nations in two types of education. In this regard, they were thought to be more suitable measures of educational emphasis than SE or VE values independently. It may prove worthwhile, however, to examine the correlations between the absolute levels of investment in vocational education and secondary education and economic growth, for competitive and non-competitive moderately developed nations. Correlating the absolute level of vocational education, VE (Table 4.12) with economic growth yields a positive correlation (r=.63) for competitive nations and a negative correlation (r=-.68) for non-competitive nations. The connection between VE level and economic growth for non-competitive nations is almost identical to the findings for the (VE/GE) ratio; both are strongly negative. However, this is not the case for competitive nations. The relationship between the variables is in the same direction (positive) but the connection between VE level and economic growth is much stronger (r=.63) than it was for
the (VE/GE) ratio. This indicates that for competitive nations that
the vocational level itself is more highly associated with economic
growth than the (VE/GE) ratio. Examination of the latter half of
Table 4.12 indicates that the relationship between the SE level and
economic growth for non-competitive nations is significantly negative
(r = -.42). This is in contrast to the small positive association
between the (SE/PE) level in economic growth for these same nations.
Performing the same procedure for competitive nations does not alter
the correlations significantly. That is, the connection between both
the (SE/PE) and the SE and economic growth are both positive in direc­
tion and strong.

One might explain these effects of political regime on the asso­
ciation between transformative knowledge and economic growth as an
artifact of differential investment in the knowledge indices. However,
Table 4.13 indicates that both competitive and non-competitive mod­
erately developed nations invest quite heavily in transformative
knowledge. Both types of political systems seem to make similar
investments in the production of trained manpower.

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TABLE 4.12

The 1955 SE and VE Levels Correlated with Sub­sequent Economic Change (1955-1965) for
Economic Level II Competitive and Non­competitive Nations

<table>
<thead>
<tr>
<th></th>
<th>VE</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive</td>
<td>r=.63</td>
<td>r=.90</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>r=-.68</td>
<td>r=-.42</td>
</tr>
</tbody>
</table>

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TABLE 4.13
The 1955 Mean Levels of Investment in Transformative Knowledge by Economic Level Competitive and Non-competitive Nations

<table>
<thead>
<tr>
<th></th>
<th>VE/GE</th>
<th>VE</th>
<th>SE/PE</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive</td>
<td>.57</td>
<td>7.1%</td>
<td>.49</td>
<td>28.27%</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>.86</td>
<td>7.3%</td>
<td>.35</td>
<td>23.70%</td>
</tr>
</tbody>
</table>

A third measure of transformative knowledge is the (TE/GE) ratio, but as indicated above, it can only be used with advanced economies. The theoretical orientation of the present study assumes that educational investment at the secondary level has less significance for economic growth in advanced economies than investment in higher education. The parallel association between the (SE/PE) and economic growth (see Table 4.9) for both advanced and moderately developed nations lends support to this view. Therefore, the (TE/GE) ratio (see Chapter III) can be utilized as a second indicator of transformative knowledge, but for developed economies only. The (TE/GE) ratio is similar to the (VE/GE) ratio with the exception that the former is an index of differential investment in collegiate technical education, the latter of investment in secondary education.

Table 4.14 presents the relationship between the (TE/GE) ratio and economic change for competitive and non-competitive developed economies. The findings are supportive of the transformative knowledge thesis in the same way as are findings for moderately developed nations. Table 4.14, in fact, reveals a strong positive association between investment in the (TE/GE) and economic growth for competitive economies.
Although it would be desirable to have additional transformative knowledge indices for comparison at the advanced levels, it appears that in both the moderate and advanced levels of development investment in transformative knowledge is positively associated with economic growth for competitive nations, but negatively associated with economic growth for non-competitive nations. This finding now seems to be emerging as a consistent pattern.

TABLE 4.14

The 1955 (TE/GE) Level Correlated with Economic Change for Economic Level Competitive and Non-competitive Nations

<table>
<thead>
<tr>
<th></th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitive</td>
<td>+.48</td>
</tr>
<tr>
<td>Non-competitive</td>
<td>-.40</td>
</tr>
</tbody>
</table>

As a result of their complementary relationship with transformative knowledge, what advantage, if any, do competitive nations have over non-competitive nations in terms of economic growth? A comparison of the differences in change in GNP per capita 1955 to 1965 for both types of nations at the moderate and advanced levels of development would provide one answer to this question. One important qualification should be made in terms of comparing competitive and non-competitive nations on economic growth. That is, did the two groups of nations start out roughly equal in economic status. This necessity of similar development weakens the comparison for advanced economies. The 1955 mean GNP per capita for advanced competitive nations was $1165 and only $809 for their non-competitive counterparts. Such a
large difference makes a concise contrast of economic growth impos-
sible. However, the income levels for moderately developed competitive
and non-competitive economies in 1955 were identical. In 1955 the mean
GNP per capita for both competitive and non-competitive moderately dev-
eloped nations was $291 in both cases. But by 1965 the mean per capita
GNP for competitive nations was $532 as compared to only $438 for non-
competitive nations giving a $95 advantage to competitive regimes.
This further indicates that type of political regime does interact with
educational investment to affect economic growth, especially at the
middle levels of economic development (GNP per capita $200–$500).

Multiple Regression Analysis

The findings indicate that investment in transformative knowledge
by competitive nations is consistently related to growth and income.
It would now be of interest to know what the relative effects of the
various indices of transformative knowledge are. In short, which of
the measures of transformative knowledge is the best predictor of
economic growth. A crude estimate of the relative importance of the
variables can only be obtained by using multiple regression analysis.
Hence, after controlling for the apparent independent effect of poli-
tical competitiveness, a multiple regression analysis of the effects
of the transformative knowledge indicators was performed.

Regression analysis informs one of the percentage of variance in
the dependent variable (economic growth in this case) explained by the
independent variables, in this case measures of transformative know-
ledge. A stepwise regression program was incorporated into the study
to determine this question for moderately developed competitive nations where the zero order correlations show the most consistent patterning. Stepwise regression not only determines the percentage of variances in the dependent variable explained by all the independent variables but also the relative importance of each independent variable accounting for the variance given in the order of the magnitude of effects.

TABLE 4.15

Results of Stepwise Regression Analysis for Moderately Developed Competitive Nations

<table>
<thead>
<tr>
<th></th>
<th>F level</th>
<th>r=</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE/PE</td>
<td>23.93</td>
<td>+.85</td>
</tr>
<tr>
<td>VE</td>
<td>3.27</td>
<td>+.63</td>
</tr>
<tr>
<td>VE/GE</td>
<td>0.16</td>
<td>+.11</td>
</tr>
</tbody>
</table>

Coefficient of multiple regression = .90
Explained variance $r^2 = 81\% p<.01$

The stepwise regression analysis indicates that the three independent variables taken together explain a very high proportion, 81% of the variation in the dependent variable, economic growth, under conditions of political competitiveness. The ratio (SE/PE) is by far the most important factor in explaining the variance.


25Multiple regression analysis cannot be applied to the data for moderately developed non-competitive nations since the independent variables differ in the direction (sign) of their effects.
the most significant of the three indices of transformative knowledge in explaining the variation, F=23.93, r=.85. The VE level (the absolute vocational level), although not as important as the (SE/PE), also accounts incrementally for a significant amount of the remaining variation, F=3.27, r=.63. The third independent variable, the (VE/GE), contributes somewhat in explaining the remaining variation, but its donation is negligible relative to the other two measures of transformative knowledge, F=.16, r=-.11.

TABLE 4.16

<table>
<thead>
<tr>
<th>Actual</th>
<th>Predicted</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>12.43</td>
<td>11.88</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.13</td>
<td>3.99</td>
</tr>
<tr>
<td>Colombia</td>
<td>0.00</td>
<td>3.17</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>3.52</td>
<td>3.25</td>
</tr>
<tr>
<td>Ecuador</td>
<td>0.49</td>
<td>2.51</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>3.58</td>
<td>0.79</td>
</tr>
<tr>
<td>Panama</td>
<td>4.46</td>
<td>8.39</td>
</tr>
<tr>
<td>Japan</td>
<td>26.04</td>
<td>27.70</td>
</tr>
<tr>
<td>Phillippines</td>
<td>3.23</td>
<td>5.54</td>
</tr>
<tr>
<td>Greece</td>
<td>18.91</td>
<td>9.35</td>
</tr>
<tr>
<td>Italy</td>
<td>14.98</td>
<td>14.16</td>
</tr>
</tbody>
</table>
Taken as a whole, the findings for moderately developed, competitive nations indicate that transformative knowledge is strongly correlated with economic growth and that investment in transformative knowledge seems to realize a high dollar return. At the very least, knowledge of the transformative knowledge indicators leads to a greatly increased prediction of economic growth. This productive capacity is illustrated by Table 4.16 where the predicted rate of economic growth, based on the level of investment in raw measures of transformative knowledge, is compared to the actual rate of economic growth. The table indicates that only in a few cases were the combined levels of investment in the measure of transformative knowledge far off in predicting the actual rate of development.

Interpretation

Although this political competition hypothesis is strongly supported at the high and moderate level of economic development, the partial failure of the hypothesis at the lowest level of economic development remains to be explained. There are, in fact, several possible rationales for this discrepancy.

One possible explanation for the lack of support for the political hypothesis at the lower level of development is that the obtained correlations are distorted due to inadequate data for poor nations. (See Table 4.11). This is plausible in that much of the income realized by seriously underdeveloped nations results from foreign investment. Foreign investors "tend to transfer their plants intact, including labor, when they move to the host country." 26 The knowledge for the

26 Bowman, op.cit., pp.98-129.
development of such industry and thus the income derived from it originates in the investor's country. Therefore, the associations are thrown off by the failure to account for the income derived from foreign involvement in the economic growth variable. In addition, economic conditions in the poorest of third world nations are also notoriously vulnerable to changes in world market conditions.

The moderately developed and advanced nations seem to provide a more suitable situation with which to test the hypothesis. Although important questions must still be asked about capital sources, both moderately and advanced developed nations are not as affected by many of the extraneous influences that distort income growth in poorer nations, or at least the relative effect of these influences are less in the more developed economies. Foreign capital, for example, does not play such an important role in the moderately and advanced developed nations.

The negative associations between the variables found for moderately developed and advanced non-competitive nations implies that the static political orientation toward the environment that penetrates their cultures has the effect of thwarting the growth potential of transformative knowledge. The findings indicate that non-competitive political structures, to function smoothly, apparently require manpower with a low level of general knowledge which possibly complements their ideological orientation. That is, the negative correlations between the measures of transformative knowledge and economic growth for non-competitive nations are consistent with the notion that systems "maintenance,"27 as well as economic growth, are related to investment

in stable knowledge.

In conclusion it may be said that moderately developed and advanced economies with competitive political systems appear to benefit economically from investment in transformative knowledge. The $95 per capita advantage which moderately developed competitive nations enjoy over non-competitive counterparts (during the period 1955-1965) supports this conclusion. The findings support the thesis that investment in transformative knowledge is beneficial for growth in political systems that restrict neither the dissemination nor application of such knowledge. In non-competitive nations, it may be that only knowledge which complements the existing political system yields stability and growth. This pattern implies that where the political structure allows the established elite to reinforce their own elitist positions, they may act in ways detrimental to the economy as a whole and transformative knowledge may actually become economically counterproductive.

It would be possible to construct a crude educational investment formula for competitive nations from the results of multiple regression analysis. However, for reasons discussed in the following chapter, formal theory construction is beyond the scope of the present investigation. However, the final chapter will review the major points of the present chapter, including those of previous chapters, and will also make recommendations for further research, which may eventually lead to a more formal analytic theory.
CHAPTER V

SUMMARY OF THE STUDY

Aims of the Study

Simply stated, the objective of the present study is to help clarify the role of transformative knowledge in the economic development of nations. In Chapter I, the theoretical work relating to the role of education in national development was reviewed. From this review, basic orientations were developed for the purpose of guiding the empirical investigation (see Chapter I). Some limited hypotheses were selected for testing that bear on these general orientations (Chapter II). The hypotheses can be divided into two major categories. The first concern the structural relationships between the direction of investment (increase or decrease) in the measures of transformative knowledge and level of economic development. The second set of hypotheses concerns the predictability of the indices of transformative knowledge with reference to subsequent economic growth (change in GNP per capita). All of the hypotheses were tested controlling for the effects of region, level of economic development, and type of political regime.

Procedures

To empirically test the above proposition, education and economic data (Chapter III) were collected for all nations with a population of at least one million. The educational variables are: the ratio between the rate of vocational and general education, (VE/GE), at the
secondary education level; the ratio between the rate of secondary
and primary education, (SE/PE); and the ratio between the rate of
technical and general education, (TE/GE), at the college level. Inade­
quate higher education data for nations with incomes of less than
$500 GNP per capita prevented the empirical application of the (TE/GE)
for third world nations.

Gross national product per capita in American dollars was incor­
porated as the sole measure of economic sophistication. There are
other suitable measures of national development such as calorie con­
sumption and electrical power consumption which could have been
included as economic indicators. However, similar empirical investi­
gations incorporating various economic measures, including GNP, have
yielded only small differences in the correlations between indices of
education and any of the various economic measures. Thus, for the sake
of economy, GNP was utilized as the sole measure of national develop­
ment.

A large portion of the present investigation was a replication of
an earlier global study. The study, conducted by Bennett, revealed
regional variations in the types of education invested in by nations
at similar levels of development. Bennett also hypothesized that the
investment variations were determined by cultural differences at the
regional level. Because of these differences, region was incorporated
in the present investigation as a control variable. The regions are:
Africa, Asia and the Near East, Latin America, and the Soviet-Europe-
North America-Oceania bloc. Level of economic development based on

1Bennett, W., "Educational Change and Economic Development." In
M. Eckstein and H. Noah (Ed.), Scientific Investigations in
GNP per capita was the second control variable. Three levels of economic development were utilized: $0-200, $201-500, and $501 and above GNP per capita.

Analysis

The analysis is divided into two sections. The first section is designed to determine the structural relationships between the level of economic sophistication and direction of investment, increase or decrease, in the measures of transformative knowledge, (VE/GE) and (SE/PE). Bennett's findings suggest that the (VE/GE) is related to economic level in a curvilinear manner. The findings indicate that economies with per capita GNP's of less than $500 require an increasing investment in the (VE/GE) as they develop. Nations that have passed the $500 mark appear to require a decreasing ratio as they progress economically. The present analysis reveals that the direction of investment in the (VE/GE) does not follow that suggested by the hypothesis. A majority of nations at the lower level of development ($0-200 GNP per capita) are decreasing their level of investment in the (VE/GE). Nations at the moderate level of development ($201-500 per capita) are almost evenly divided in the direction they take toward investment in the ratio. Conversely, a majority of the advanced economies are maintaining or increasing their level of investment in the (VE/GE).

The regional analysis reveals that the tendency for nations to decrease the level of investment in the (VE/GE) is confined to nations

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2Bennett, op.cit., p. 175.
within the African and Latin American regions. A majority of Asian and European nations are maintaining or increasing their level of investment in the ratio. The possibility of cultural and/or political influences are suggested as factors in determining this differentiation with reference to direction of investment by region.

A number of Asian nations (Korea, Thailand, Philippines, Taiwan) are strongly influenced by American aid and advice and may be influenced by American interests in technical and vocational education. Similarly, during the past twenty years, Latin American and African nations have been most often influenced by European (especially continental) education models: the Africans because of their intimate colonial and post-colonial relationships, and the Latin American nations because of their cultural ties with Europe, their virulent anti-Americanism, and (ironically) the elitism which pervades their educational systems. In any case, the latter two regions show massive tendencies to deemphasize vocational education at the secondary level. In these areas, vocational education is losing ground in most nations. In Africa, only four nations have realized an increase in the (VE/GE) between 1955 and 1965. These four nations are Kenya, the Ivory Coast, Sierrra Leone, and the Sudan. Even in these nations, the incremental growth of vocational education is relatively small.

In contrast to the findings for the (VE/GE), a majority of nations at all levels of development are maintaining or increasing their levels of investment in the (SE/PE). Consistent with the theoretical orientation, moderately developed and advanced nations display a greater tendency to increase their level of investment in
the (SE/PE) than do the extremely poor nations. There is no difference in the tendency to increase the level of investment in the (SE/PE) for nations at the advanced and moderate levels of development. As noted above, inadequate data prohibited the development of higher education indices for third world nations. Although the data did not permit the construction of a college-secondary education ratio, it is suggested that such a ratio would reveal differential investment on the part of nations at the moderate and advanced levels. That is, advanced economies would have a greater need to increase their level of investment in the college-secondary education ratio. Region was not an important factor in determining the direction of investment in the (SE/PE).

The second section of the analysis is concerned with investigating the associations between investment in the measures of transformative knowledge and economic growth. The 1955 levels of investment in transformative knowledge are correlated with change in GNP per capita 1955 to 1965 for nations within each of the three economic categories. It was hypothesized that higher levels of investment in the (VE/GE) and (SE/PE) would be strongly associated with rapid economic growth. However, the zero order correlations provided very marginal support for the hypothesis. Only at the advanced level of development are the connections between both educational measures and economic growth positive in direction. But even at this level, the correlations are moderate in size. The regional correlations do suggest the possibility that in order to realize a substantial return from investment in transformative knowledge, nations may have to maintain a strong investment in both the (SE/PE) and (VE/GE). That is, the (SE/PE) is
positively associated with economic growth only for nations from regions that display a tendency to increase their level of investment in both measures of transformative knowledge, i.e., Asia and the European groupings. Nonetheless, even here correlations are not strong.

Although strong connections between investment in transformative knowledge and economic growth were hoped for, the findings were not entirely unexpected. Most previous empirical investigations in the area have obtained similarly ambiguous results. The findings of the present study suggest that the empirical models and formulas utilized by researchers in the area are somewhat naive. And that the modest and often confusing connections found between education and economic indices may be due to a failure to tap meaningful environmental variables affecting the relationships. For example, Anderson and Bowman, Curle, Cutwright, Etzioni and others (Chapter I) all suggest that the form of political structure may have significant impact on the development formula, but this has never been empirically established. The present investigation was, therefore, designed to consider the effects of political structure through incorporation of Cutwright's political competitiveness classification scheme as a major control variable (see Chapter III).

It is hypothesized that the type of political structure, competitive or non-competitive, has important implications for the development of economy. Competitive structures reflect the democratic model, while non-competitive structures reflect the totalitarian model. Based on the arguments of Etzioni and a theoretical analysis of democratic

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and totalitarian forms of government by Almond and Powell, the following hypothesis is suggested. (See Chapter IV for fuller description).

Investment in transformative knowledge is positively associated with economic growth for the competitive nations and negatively associated with economic growth for non-competitive nations.

The findings for the very poor nations neither confirms nor rejects the hypothesis. The obtained results are somewhat confusing for these nations as they have been throughout the analysis. Part of this confusion is undoubtedly due to a failure to control for income derived from foreign investment in the economic growth variable. A large proportion of the income realized by the most seriously underdeveloped nations results from foreign investment. Foreign investors tend to transfer their plants intact, including labor, when they move to a host nation. The knowledge for the development, the day-to-day operation and the income derived from such industry originate in the investor's country. Therefore, the correlations are distorted due to the impact of the income realized from foreign investment on the economic growth variable. In addition, Harbison and Myers have pointed out that many poor nations rely on the production of a few cash crops or natural resources for a major portion of their income. Thus, fluctuations in the demand for these products on the world market significantly alters national income and therefore distort the


relationships. Future studies utilizing data from poorer nations should obtain more precise knowledge of the source and type of capital development.

The correlations between the measures of transformative knowledge and economic growth for moderate and advanced economies support the hypothesis. The associations between investment in education and income growth are positive in direction and strong. Correlations between these same variables for non-competitive nations are both negative in direction and strong, with the exception of the (SE/PE) for moderately developed nations where there is no association. As a result of these findings, it is suggested that where the political decision making processes allows the political marketplace to be dominated by elites, they may act in ways to counteract potential economic benefits that result from investment in transformative knowledge.

A comparison was made of the mean income growth realized by both competitive and non-competitive moderately developed nations. Both competitive and non-competitive economies had a mean per capita of $291 in 1955. By 1965 the competitive nations gained $94 in income per citizen over their non-competitive counterparts. This finding lends further support to the transformative knowledge thesis as developed by Etzioni, Bennett, and others. (See Chapter I). Finally, a multiple regression analysis technique was incorporated into the analysis to ascertain the percentage of variance in the economic growth variable explained by investment in the educational indices. This part of the analysis is limited to moderately developed competitive nations. The
independent variables, VE, (VE/GE) and (SE/PE) explain 81% of the variance in economic growth. This further indicates that large investments in transformative knowledge are important for national development.

Suggestions for Further Research

Although the data suggest that investment in transformative knowledge does realize a large economic return, (at least for competitive economies), the results should be interpreted with caution. The data utilized for the present investigation were very crude, although the best available. The study was designed to provide valid leads to guide future research and not yield a precise education formula for national development. The ultimate goal of all research is to provide precise answers to formulated questions. Nonetheless, it is extremely doubtful that global research will yield the precise education formulas necessary for national development. Other variables, such as the degree to which educational programs meet the needs of local industry, must be incorporated into analysis if explicit answers are to be obtained. On the global level, such information is not available for most nations, and in the few cases that it is available, it is not comparable on an international level. Even the quantitative educational statistics incorporated into the present investigation are not strictly comparable from nation to nation.

The investigator believes that a comparative study of five or six nations could possibly provide a precise answer to the transformative knowledge question. Since the major concern is the development of poor nations, such a study would be restricted to economies with
incomes of less than $500 GNP per capita. Half of the sample could be made up of extremely poor nations and the other half moderately wealthy nations. The study should also control for the effects of type of political structure, i.e., democratic or totalitarian.

By limiting the sample to a few nations, the researcher enables himself to collect his own data. This advantage would not only result in more comparable cross-national quantitative statistics, but would also permit the collection of qualitative educational measures not available for global studies.

It is suggested that such an investigation should incorporate the quantitative measures of transformative knowledge utilized in the present investigation. Qualitative educational indices such as student-teacher ratio, quality of instructional materials and settings, would also be vital components of such an inquiry. Further, Hansen⁶ has identified variables worthy of consideration in studies assaying the effects of vocational education in development. Those factors include: the attitudes of students regarding the rewards of vocational education; the development of personal study habits relating to success in manual vocations; the existence of bridges over gulfs that divide schools from earning power; and the reinforcement that results from continued help after schooling.

Finally, the study would attempt to ascertain the environmental dimensions associated with political structure that result in the

apparent complementary connections between transformative knowledge and economic growth within democratic nations and the negative associations of these same variables within non-competitive states. One environmental dimension of interest would be the presence or absence of voluntary associations promoting both the development and application of transformative knowledge existing within both types of political structure. A study conceived from this perspective might provide solutions to many perplexing problems facing decision makers in third world nations.
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