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RESEARCH ON EDUCATION

IN DEVELOPING COUNTRIES

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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PREFACE

On May 13-15, 1983, a working conference was held on research needed to improve education in developing countries. The conference, held under the auspices of the National Research Council, was convened at the request of the U.S. Agency for International Development (AID) to identify research topics for the next decade, especially with respect to formal schooling at the elementary and secondary levels. An express purpose was to discuss the state of current knowledge in the field and formulate directions for additional research relevant to the development and improvement of education development, so that AID would be able to develop a research agenda to fit into the agency's long-term planning and budgeting for education. The conference was chaired by Hans N. Weiler, professor of education and political sciences, Stanford University, and included 16 experts from universities and agencies involved in development activities, as well as senior education and human resources officials from AID. A list of participants is given in the Appendix.

After welcoming remarks by the conference chairman, AID official Ruth K. Zagorin summarized current directions at the agency in the development of education and human resources. The agency expects to make a major sustained commitment over the next decade to human resources development in half a dozen countries in Africa; it is in great part to enhance the effectiveness of this effort that the agency is seeking to identify needed research.

As a means of relating the work of the conference to existing bodies of knowledge and research, eight participants summarized the current state of knowledge in several subfields: educational financing was discussed by Mary Jean Bowman, science education by Kenneth J. King, education and work by Martin Carnoy, communications development and education by Robert C. Hornik, nonformal education by George J. Papagiannis, language in education by Wallace E. Lambert, and research training in education by Miala Diambo a. Also, Robert G. Myers summarized the 1979 report on educa al research prepared by the

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Research Review Advisory Group (RRAG) of the International Development Research Centre, which dealt specifically with student achievement, teaching effectiveness, and the research process.

At the close of the conference, Chairman Hans N. Weiler presented an oral summary of the discussions to the participants. This report of the conference, incorporating that summary, was prepared by Senta A. Raizen.

SUMMARY

The research initiatives summarized below were identified as particularly important by researchers on education in developing countries during a conference held by the National Research Council at the request of the U.S. Agency for International Development. Additional steps needed to develop a research agenda in education for AID include the further synthesis of knowledge in some particular subfields, added discussions with researchers from less developed countries, and the prioritizing by AID officials of research topics to match the objectives of developing countries and the mission, programmatic direction, and budgetary and statutory constraints of the agency. The research topics that emerged as most important to address over the next decade are organized under six main headings: investment of resources in education and the effectiveness of their use, equity in access to different levels of education and in the distribution of resources, the conditions and determinants of learning, the role of education in furthering development objectives in other sectors, the planning and management of education, and the building of indigenous research capacity in education.

A. Resources

1. Develop more adequate notions of the real costs of education, specifically with regard to:

   --distinctions between fiscal costs and societal costs, e.g., accounting for community inputs,

   --the effects of different governance mechanisms on contributions from different sectors;

2. Study the cost-effectiveness of given educational arrangements and their alternatives:

--the administration of funds within education,

--the trade-offs between different levels and types of education,

--the real cost of teachers,

--the effects of privatizing educational costs;

3. Address longer-term resource issues:

--the increasing conflict over resource allocation, especially as between primary and post-primary education,

--demographic parameters that have potential cost relevance,

--meeting demands for educational expansion and reform under conditions of low or no resource growth,

--the political economy of the utilization of resources in education.

B. Equity and Distribution

1. Obtain better information on differential rates of enrollment, dropout, and retention across different social groups, to serve as measures of access and success;

2. Ascertain why some groups of people reach blockages in their educational careers and fail to make the transition to the next level of education;

3. Identify, beyond the usual correlations, the kinds of processes that make for differentiation in educational success and career patterns, particularly as regards the patterns and profiles of skills that are considered to be important outcomes of the educational experience for different groups;

4. Assess the relative roles of the state versus the private sector in education and their effects on equality of educational opportunity.

C. The Learning Process

1. Describe and analyze the cultural characteristics of the indigenous learning environment, including the possible utilization of indigenous technical knowledge and traditional pedagogy;

2. Extend and apply to multilingual situations in the third world existing research on learning through second and third languages;

3. Study the management of the individual school and how resources are used within the school;

4. Reexamine the role and significance of the teacher in the learning process, especially with regard to:

   --the dilution of the teacher's effectiveness by absenteeism or a second job,

   --the teacher's use of instructional time,

   --teacher characteristics and training and their effects on student outcomes,

   --the role of the teacher in determining the success of different kinds of educational technology;

5. Map and describe the actual nature of the learning process more carefully:

   --age of entry and exit, time spent at each level, and the significance of these time factors for the learning process,

   --the relative importance of standardized measures of educational outcomes, and the frame of reference for the standardization of such measures,

   --the motivational factors in learning,

   --the issue of the context-based nature of learning outcomes,

   --the degree to which existing resources (e.g., the indigenous technological environment) can be used in science education;

5. Study the effects of alternatives for delivering early intervention programs on narrowing disparities in later educational performance and enhancing the efficiency of the educational system;

6. Anticipate and plan for a possibly rather extensive expansion in the availability of microcomputers for instructional purposes, and the probably more immediate applications of microprocessors in administration and in educational research.

D. <u>Education and Development Policy</u>

1. Ascertain the development objectives of the population in question;

2. Identify and analyze the core set of technical skills relevant to all sectors;

3. Pay more explicit attention to the role of women in development activities, especially across sectors;

4. Focus not just on output and productivity related to educational outcomes, but also on the processes that might explain the relationships:

   --consideration of more effective curricula, e.g., the roles of theoretical versus practical science,

   --introduction at particular points in the educational cycle of curricula relevant to development,

   --the role of the teacher in developing and introducing curricular alternatives;

5. For agriculture, increase knowledge about the variables that mediate the relationships between educational and agricultural activities:

   --a more comprehensive conceptualization of what constitutes and what produces agricultural productivity,

   --assessments of alternative strategies for preparing people to live and work in agricultural communities, e.g., concerning levels of schooling or content,

   --the role of migration and its relation to education;

6. For health and family planning, review the substantial body of existing literature on educational interventions, including nonformal approaches to health education and family planning;

7. For vocational preparation, take advantage of current evaluations of vocational programs to synthesize what is known about their effectiveness, including:

   --differences between urban and rural contexts for vocational education,

   --the motivational factors in vocational training which lead to advancement in the world of work,

   --the role and potential contribution of multinational corporations in inservice training and retraining.

E. <u>Planning, Managing, and Monitoring Education</u>

1. Study management problems from the point of view of differences in cultural and historical traditions that may lead to different managerial styles;

2. Study administrative problems as a function of scale;

3. Try out alternative models and practices for public-sector management, as contrasted to the application of models derived from the private sector;

4. Study the managerial responsibilities and capacities at the micro level, especially those of teachers;

5. Identify necessary managerial and leadership skills, with attention to the specific information needs of administrators;

6. Develop a better understanding of the introduction of change into complex organizations.

F. Research on Research

1. Develop better knowledge on the structural conditions of research in the third world, including:

   --the precariousness of the resource base for research,

   --the successes and failures of various strategies for institution building,

   --the effects of the acceleration of forced indigenization of research;

2. Examine different models for involving researchers from the third world and the advantages and disadvantages of various models;

3. Reexamine and rethink the process of research utilization;

4. Examine different theories on which development research is based and facilitate communication among researchers and development specialists holding different premises.

RESEARCH ON EDUCATION IN DEVELOPING COUNTRIES

The discussion at the conference focused on six major topics: the investment of resources in education and the effectiveness of their use, access to different levels of education and the distribution of resources, the conditions and determinants of learning, the role of education in furthering development objectives in other sectors, the planning and management of education, and the building of indigenous research capacity in education. The following sections of the report summarize key points of the discussion on each topic and highlight suggested research questions.

RESOURCES AND THEIR EFFECTIVE USE

Research in this area has concentrated on calculating both private and social rates of return on investments in education. There is now a body of evidence on positive links between formal education and the type of work people do, the well-being of families, and the consumption of goods and services; these links appear to be stronger for every level of education in less developed countries than in industrialized countries. Indeed, demand for education in less developed countries is still growing, while supply is slowing down. It appears unlikely that governments will implement any serious reductions in public spending on education, yet current and future resource constraints might well have deleterious consequences for the quality of education. Under these conditions and given the state of knowledge on the consequences of raising a population's level of education, the key question is no longer whether education is a good investment, but how to make educational investment more productive. For less developed countries, this is a critical issue. Though the condition of the world economy has affected all countries, it has widened the gap in investment in education, as demonstrated by the fact that the ratio of education expenditures per child in OECD countries as compared to IDA countries rose from 16:1 in the 1960's to 50:1 in 1977.

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The first requirement for developing a better understanding of resource use is to gain improved knowledge about the real costs of education. To begin with, the traditional budget accounting for government spending on education may not include moneys from ministries other than education, for example, the costs of transporting school children. More importantly, to the common fiscal accounts for the costs of education must be added social accounts. Research is needed on the extent of the investment of latent resources, i.e., who contributes what on what terms? What affects the ability to mobilize resources at the community level or from the private sector? Specifically,

- What are the community inputs and resource contributions in labor, in materials, in moneys spent on equipping the students or the school in a particular locale? What are the contributions of private employers? And what are the effects of changing local or private participation from a voluntary contribution to a requirement?

- How do different governance mechanisms affect contributions by different sectors to the costs of education, and who benefits or loses by changes in governance? Participation can take different forms: Delegation of taxing authority, decentralization in various ways, privatization of educational costs through a variety of mechanisms. Each of these and the particular form it takes may have different implications for the costs and benefits of education. For example, if cost recovery through privatization is encouraged, the likely effect will be to discourage participation by the lowest income group. It is important, in this connection, to distinguish between private funding of education and government financing of private education.

A second issue concerns the effective use of resources. Instead of calculating general rates of return, on which ample evidence is now available, researchers should turn their attention to a better understanding of the process by which educational alternatives generate different results. How are the moneys allocated to education actually administered so as to produce observed outcomes? Who makes decisions about the use of resources? How can resources be allocated differently so as to make education more productive?

- How are funds allocated to education actually administered? In some instances, moneys budgeted for education are redirected by the governmental unit responsible for local administration to the building of roads, health centers, the civil service, or political activities. What happens at the central level, at the local level, as funds actually get spent?

- What are the proper time periods and productivity measures (as opposed to labor earnings) that should be used in assessments of payoffs to education? Using appropriate measures, what are the findings regarding trade-offs between investments in different

levels of education? Resource conflicts among levels and types of education have been studied to some extent, with evidence pointing to significantly higher social rates of return for primary than for secondary education, but there are also some findings that the risks of unemployment of the "overeducated" seem to be connected to extended job searching, with unemployment limited to a short period after graduation, say, from secondary school. Similar conflicts exist between the proponents of formal and of nonformal education. Estimates for investments in nonformal education in some instances run as high or higher than investments in formal education, even though the former is generally considered a cheaper method of attaining certain educational goals. What are the real costs of nonformal education, what are the payoffs, and for whom, as compared to formal education?

- Regardless of the level of education or amount of resources being invested, a major cost factor is salaries for teachers; for example, the ten-fold rise (four-fold in constant dollars) over the last 20 years of per-pupil expenditure in Mexico has been largely due to this cost component. Yet, there is evidence from some less developed countries that increasing the size of classes (one means of increasing access while restraining teacher costs) actually leads to improved learning. To what extent are increasing teacher costs a factor in the rising costs of education in a given country? What is the real share of education funds going into the costs of teachers, considering the effects of such nonsalary expenses for teachers as subsidized housing in rural areas? To what extent can the costs of training teachers be recouped through required service for stipulated periods of time and/or in less desirable locales?

A third set of issues concerns longer-range planning for resource utilization in education. Two questions specifically are important to address:

- How can investment strategies be adjusted to match new conditions? By 1990, there will be fewer children in 20 countries than there are today, including China, Sri Lanka, Cuba, and Jamaica. In other countries, there will be an uneven demographic pattern for the school-age population, with poorer groups experiencing continuing growth, while fertility rates for other groups are decreasing. Already, the supply of teachers seems to have more than caught up with demand in some countries, for example, in Thailand, yet teacher colleges there continue to produce graduates. Current coping mechanisms include transferring teachers to the nonformal or lifelong learning sector and transforming teacher colleges into junior colleges. What demographic parameters have implications for the future costs of education, and what are appropriate strategies for adjustment? What kind of technical assistance is needed to make such strategies effective?

- Even decreases in population growth or in actual numbers of school children will not necessarily result in lessened demand for education or in the ability of governments to reduce allocations for education, despite the likelihood that resources will continue to be constrained, especially in the poorer countries. By contrast, past experience with educational reform and innovation has largely been based on periods of growth. Taking a long-term perspective, what are the possibilities for widening access and improving the quality of education under conditions of a resource base that is not growing very fast and may be seriously limited (i.e., "steady state" conditions)?

ACCESS TO EDUCATION AND DISTRIBUTION OF EDUCATIONAL BENEFITS

Some equity issues have been studied fairly extensively, and certain barriers are reasonably well understood: home language when it is different from the language favored by the teacher or the dominant group in the community, notions of class, and gender--often an important barrier in the labor market which affects decisions about investments in the education of females. Yet, there is also considerable evidence that in developing countries children from the poorest population groups benefit most from education, at least at the primary levels, and that the education of females in any country improves the lives of their families and the life chances of their children. Moreover, in some countries, females have an important place in agricultural production and in some market economies, but these roles are often not recognized in the distribution of educational benefits. Research about such barriers as language, class, and gender that limit access to education should be synthesized, together with successful examples of reducing or overcoming them. Further empirical research, however, probably will do little to resolve these inequities; rather, it will take the right climate and political will to expand access to education or to redistribute the resources for it so as to serve excluded groups more adequately. But there are more subtle symptoms of barriers to educational access and success about which much less is known and where further research is needed to describe and identify the causes of the problems.

- In any given country, what are enrollment and reenrollment rates among different population groups? What are the different patterns of absenteeism? What are the repetition and drop-out rates, and who completes school at what age? What are the reasons for differences among groups and among individuals from the same group? Are there differences in patterns among nations, and what are the reasons for such differences? Achievement is often, but not always, associated with socioeconomic status (SES). Under what circumstances is high achievement attained in schools serving poor children (e.g., mathematics achievement in schools serving poor children in Hong Kong)?

- Why do certain groups of people reach blockages in their educational careers and fail to make the transition to the next level of education? What discourages people so that they drop out? Evidence from some countries (e.g., Tunisia) indicates that failure to attain necessary achievement levels may not be the determinant keeping certain groups (low SES groups, females in all groups) from attending secondary schools; rather, it may be societal and family expectations. Such attitudes when shared by the student are likely to affect learning, quite apart from cognitive ability. What are the processes and practices that lead to different levels of educational attainment for different population groups? Though the outcome of such stratifying practices has been commonly observed, the process by which inequalities happen is not sufficiently well understood to institute rectifying practices that will maximize output for all children.

- A related set of questions concerns the factors that make for differentiation in educational success and career patterns. What are the profiles of skills that are considered to be important outcomes of the educational experience for different groups? How do individuals and groups get to know societal expectations concerning schooling and careers and proceed to follow the prescribed patterns? Research must go beyond the usual correlations found in the U.S. and elsewhere between SES and school achievement and seek improved understanding relevant to poorer countries regarding extra-school and in-school conditions that set outcome expectations and that enable individuals to meet or surpass such expectations.

- As noted in the preceding section, current efforts to increase the privatization of education may have considerable impact on the equality of educational opportunity. To what extent is the state the most effective mechanism for equalizing educational inputs? Some research shows that state distribution mechanisms may not produce equality. In poorer countries, for example, such material inputs as textbooks are a potent variable affecting learning. In comparisons done in Kenya, Tanzania, and Indonesia, the access to textbooks (a proxy for school quality) was more equitable when distribution was through the open market than when it was left to the state. The creation of private schools may be a response to decreased access to public schools, which may have come about because further expansion of education through public funding is no longer deemed feasible by a government. Alternatively, certain population groups may see themselves as not well served by the public schools and decide to create alternative schools with nonpublic support. Such responses may have positive or negative equity consequences. Under what circumstances can privately supported schools relieve the burden of educational demand on the public budget without increasing inequalities?

THE LEARNING PROCESS

The traditional method for assessing successful learning has been through large-scale surveys that try to relate some proxy measures of school quality to student achievement. Such research should be deemphasized in favor of developing a better understanding of the learning process itself. Knowledge is lacking that would allow a more appropriate gauge of the quality of what happens in a school than such simple measures of input as school buildings, number of students per teacher, textbooks, or per-pupil expenditures. What is meant by the quality of the instructional process, and how can it be assessed? Research is needed that will provide more satisfactory methods for identifying the variables--though they may be more difficult to quantify than the inputs studied so far--that materially affect the quality of the instructional process and its results in student learning. Important issues concerning the learning process that need research include the community and family environment as a learning resource, the management of the individual school, the role of the teacher, individual cognitive development and motivation, the potential of early intervention, and the role of microelectronic devices in education.

Largely neglected in their effect on the educational process have been the cultural characteristics of the community from which students come. The community provides an indigenous learning environment which may support or hinder a student's progress in formal schooling, depending in part on the school's response to the environment. More often than not, formal instruction precludes utilization of indigenous knowledge and learning processes, usually to the detriment of the student who comes from a cultural and family milieu that values different learnings from those of the school.

- In a given setting, what are the attitudes of the community, of the family, toward different aspects of education? To what extent does the pedagogy of the school match or contradict the informal learning processes of the individual family and of the community? What indigenous technical and other knowledge exists in the community that could be used to support and enhance the educational objectives of the school? To further effective learning, which party needs to adjust, and to what extent, in the juxtaposition of formal education to the indigenous learning environment? What are the most effective combinations of adjustment by the school to the environment of a given community and by the community and its families and students to the demands of the school?

Research evidence is accumulating from industrialized countries that a critical determinant of effective education is the management of the individual school. It appears likely that the improvement of the educational process is at least in part contingent on how resources are used within the school and on the environment established and maintained by the principal and the teachers. (This issue relates also to some problems discussed below in the section dealing with the management of education.)

- How are moneys spent and materials distributed within the school? How well is the physical plant maintained? How are standards of discipline and expectations for student performance set? How are the curriculum and teaching strategies determined? What are the professional interactions among the teachers and with the principal? All these factors have been shown to be important in creating a more or less productive learning environment, yet little attention has been paid to the management of the individual school by researchers concerned with education in less developed countries.

The role and significance of the teacher needs to be reexamined. Probably the single most critical school variable in learning is "time on task." Hence, better information must be collected on how much time teachers actually spend performing their teaching and other responsibilities. Regarding other variables associated with teachers, most of the research on teacher characteristics and effects on student outcomes has been done in developed countries. Where there are research findings from less developed countries, they are not necessarily consistent. Caution must be exercised in transferring conclusions derived from industrialized and information-rich situations to the very different conditions in poorer countries.

- A special problem for poorer countries is the dilution of the teacher's effectiveness by absenteeism, the shift system, or moonlighting. Indeed, many teachers hold a second job or engage in such competing activities as farming or trading, leading to reduced time spent with students. The schooling situation is especially confounded when the second job consists of tutoring for pay some of the same students that teachers are instructing in public school. How does this affect their in-school teaching and their attitudes toward students who receive no tutoring? (This practice also has implications for the real costs of education and for educational equity, since presumably the poorest parents cannot pay for such tutoring despite the obvious pressure to do so.)

- Inventories of the use of instructional time are important in establishing to what degree students are in fact exposed to what they are expected to learn. What is the teacher's instructional "budget," that is, how much time does he/she devote to instruction, as contrasted to administrative, disciplinary, and other noninstructional activities? How is instructional time allocated to different learning areas? How much time is spent on homework, as an adjunct to instructional time in school which can be used to extend time on task with little further investment of resources?

- What characteristics of teachers and types of teacher training show positive effects on their teaching behavior and student performance? The research done in Europe and North America on

this question is unlikely to have much application to poorer countries, considering the great disparity in availability of textbooks and materials, home background of the students, and general educational levels of the teachers. The Research Review and Advisory Group of the International Development Research Centre has recommended that various combinations of preservice and inservice training be evaluated (especially the lasting effects of inservice programs) and that innovative efforts to recruit, train, and utilize teachers be studied systematically, including such examples as the "barefoot" teachers in Thailand, involvement of community members in teaching in India, and peer teaching in Indonesia .

- The role of the teacher in the effective use of such long-distance teaching technologies as radio and television also needs clarificaton. In Nicaragua, radio lessons were used as an adjunct to the teacher and significantly improved student performance. An experiment with an air-correspondence high school in the Republic of Korea eliminated classroom instruction, lowering the average cost per student to $50 instead of $230 for the traditional high school. Under what conditions is technology best used as an alternative or as an adjunct to the traditional classroom teacher, and what teacher characteristics and special training further the success of different kinds of educational technology?

Regarding the individual and the learning process, there are many research gaps concerning both cognitive development and motivation for learning, not only with respect to less developed countries but also in industrialized societies. Some relatively simple questions have to do with age and time for learning, others with the learning context, still others with specific pedagogic techniques.

- What is the age of entry into and exit from school in a given country, and what is the significance of that for learning? What time is spent at each educational level? What time is spent on different tasks in the course of the school year (see above on the teacher's instructional budget), in the total time spent at each level?

- What are the best strategies for dealing with multilingual situations? Research from North America and Europe indicates the importance of using the child's home language for early instruction, especially when it is not the dominant language. What are the implications of this research for the teacher of a multilingual classroom?

- What makes for effective instruction in science and mathematics, often considered--next to literacy--the most important areas of school instruction? What is the relationship between indigenous technical knowledge (including learning through apprenticeship) and classroom learning? To what extent can such knowledge be

used in the formal instruction of science? Some research indicates that there is little transferability between the ability to use mathematics for indigenously learned tasks (bartering in the market or the measuring used by tailors, weavers, etc.) and performance in school mathematics. Similar findings come from comparing people's effective use of arithmetic in U.S. supermarkets to their poor performance on formal arithmetic tasks. Yet, when children have experience with a variety of technological functions (as in Hong Kong and India where children are sometimes employed in relatively sophisticated settings), they appear to do better in science and mathematics. Are there differences in active and passive learning in both formal and informal learning settings? To what degree does the technological sophistication of the environment enhance school learning? How much are learning outcomes tied to the context of learning?

- In general, how is school learning assessed? Can standardized measures of educational achievement be used to affect the curriculum in a positive manner? What is the frame of reference for the standardization of measures--a region or population group within a country, a country, a region within a continent (or a related language group), or a group of unrelated countries, i.e., an international standard? Which of these is appropriate for what purpose, and what is the relative utility of measuring educational outcomes in these different ways?

- The motivational factors deriving from family and society influences and expectations and the structural conditions affecting them have already been noted. There are, in addition, individual motivational factors that are poorly understood. What motivates individuals to achieve beyond expectations, to transcend structural barriers? In some cases, for example, in Viet Nam, the value put on education by society was reflected in the atttitudes of parents who made their children's education their number one goal. How can an individual be motivated to achieve where societal and family values may be in conflict with increased school learning, especially for girls and women?

The potential of preschool intervention programs for enhancing the efficiency of later learning and therefore of the whole educational system remains underexplored and underexploited. Preschool interventions can deal with nutrition and health deficiencies and stimulate the child's cognitive development in directions that will smooth his transition into elementary school. In countries that have introduced preschool programs, they vary from the highly academic (in Kenya and Botswana) to play schools which make entry into formal school something of a shock. The wide range of experiences with preschool and alternative arrangements for the delivery of early childhood intervention programs needs to be assessed and knowledge about such programs syntnesized.

- What forms of intervention--working with mothers, home-based programs, preschools--are most effective in narrowing disparities in later educational performance? What components--emphasis on health, nutrition, cognitive development, social experience--have the greatest effects on the child's ability to take advantage of formal school or other later learning opportunities? What are the cost trade-offs between early intervention programs and later inefficiencies in school such as need for remediation, repetition, or drop-out? What alternative support mechanisms for preschool are most appropriate in a given situation: financing through the government, location in a university or at the workplace, or provided through cooperatives?

The likely presence, within the foreseeable future, of microelectronic devices in many educational settings raises some distinctive questions. Research should anticipate and prepare for a possibly rather extensive expansion in the availability of microcomputers for instruction. Computers may not be the best answer to educational needs (e.g., improved transportation to school, even bicycles for older children, might make a much bigger difference), but given the probability of their presence, appropriate studies and timely planning are more likely to improve access and utilization.

- What are the potential and the limitations of such a development? Under what conditions can microcomputers be used effectively in education? For example, what training must be provided so that the necessary software and courseware can be developed within a country? It may be possible, through experimentation with different applications, to find more effective uses for microprocessors than in instruction, specifically, in the administration and management of educational systems, and in expanding the research capacity of local and independent researchers, especially in nonmetropolitan areas.

EDUCATION AND THE DEVELOPMENT OF OTHER SECTORS

A key reason for investment in formal education is to increase the productivity of other sectors of the economy and improve the general standard of living. Links between literacy and greater poductivity in agriculture are well established, in part explained by the increased willingness of farmers with at least primary education to consider and adopt new practices and such nontraditional farming inputs as chemicals. Increased productivity due to education is harder to measure for other sectors because of the use of wages as a proxy for productivity. There are indications of some health and family benefits, including changes in population growth, reduction in infant and child mortality and improved nutrition, increased demand for education and better educational performance by children of educated parents, and more informed consumption behavior. Research on the effects of education has tended to be segmented by sector; this somewhat artifical fragmentation has led to some important gaps in knowledge that might be applicable to a country's development efforts across sectors.

- What are the development goals of a particular nation? Who defines them and by what methods? To what extent can these goals be furthered by investment in human capital rather than by other types of investment or changes in macroeconomic policy?

- Is there a core set of technical skills relevant to performance in all economic sectors? What are the key cognitive and motivational variables that mediate improved production? What is the transfer of educational skills and benefits (or deficits) from one sector to another? How do people learn such skills most effectively? At least one study (from Brazil) has shown that specific technical training can enable people to acquire basic concepts and general skills, rather than following the more traditional path of taking the learner from the general to the specific. In many development projects, enhancing self-reliance through participation is seen as an important component of education and as a necessary condition for increased productivity. What empirical evidence supports this assumption, and what is the importance of such attitudinal factors in different settings and for different types of production?

- To what extent can requisite skills and attitudes be taught outside the school setting, through informal apprenticeships or on-the-job training? Related to this question are the roles of theoretical or formal school science versus indigenous science learned in practical settings. Which furthers specific development objectives more effectively? And, on the other hand, what development activities carry an educational component that could be explicitly recognized and strengthened?

- What is the role of women in different types of productive activities in a given setting, and what does this imply for their education? Even when women play a key part in agriculture or in the market economy, formal education tends first to be made available to males, especially in many African countries. This inequality in education not only affects productivity, but also the health and well-being of families and the educational future of the children.

- In general, what are the processes by which relationships between productivity (including family productivity) and education are enhanced? Research should focus not just on outcomes and correlations between education and productivity, but on the processes that might explain relationships. Which particular educational experiences relate to productive or unproductive types of behavior and performances in a given field of development? Some of the questions that need to be addressed include: At what point should a particular curriculum relevant to development be introduced to be effective? What is the role of the teacher in developing and introducing curricular alternatives? How do the ways an educational intervention is formulated, carried out, and evaluated affect the end results?

There are, in addition to general questions on how educational alternatives and development affect each other, issues specific to each sector. For agriculture, the relationship between education and migration needs to be far better understood, as does the effect of literacy and of higher levels of education on particular aspects of farm production. Specifically,

- What is the impact of four years of schooling on farming practices, pace of change, and occupational options available to individuals? If literacy is the most critical schooling outcome for improving farm production and the life of farmers, can it be as well taught through less expensive informal methods? How is numeracy best acquired? There is some evidence that, while literacy may require formal instruction, numeracy is learned effectively in the performance of practical tasks. What other skills are important, and where and how can these be learned most efficiently? Also, how should agricultural productivity be measured? For example, rate of change may not be an appropriate measure; an educated farmer may be behaving rationally when he resists an innovation promulgated by outside experts. In order to gain a better understanding of educational mechanisms that further effective farming behavior, one may wish to use individuals or families as the unit of observation, rather than aggregated farm production and practices.

- More advanced levels of training are resulting in "diploma agriculture" in some countries. Individuals with more advanced education are likely to become public-sector workers, rather than better farmers. There are some educational interventions intermediate between traditional minimal literacy programs and diploma-level training: Agricultural practice schools usually operate at the elementary level; at the secondary level, agricultural training--as contrasted to theoretical science--may be inserted into the curriculum. There is little information on the effctiveness of such alternative strategies for preparing people to live and work in agricultural communities in different types of settings. A possible research approach might be to use cohort analysis over time of groups exposed to alternative educational experiences, paying particular attention to qualitative as well as quantitative variables.

- The effects of establishing a school in a rural community independent of specific educational outcomes are poorly understood. What are the organizational consequences for a village of building and maintaining a school and establishing the necessary logistics and administrative system? Does the school serve an integrating or leadership role in the community, and how does this affect agricultural productivity, the establishment of subsidiary economic activities, and the welfare of the local population?

- Though some good research has been done on the effects of education on rural-to-urban migration, the findings appear to be contradictory. Does establishing a school (especially lower secondary) slow the rate of migration, or do the greater skills and expectations resulting from formal education encourage migration to the city? Is there migration to seek further education as well as better employment? At what age and level of schooling is migration least disruptive to the individual--before local values, possibly maladapted to a new setting, are well established in an individual or later in life?

The area of educational effects on public health and family well-being has received substantial research attention, especially with respect to fertility, child health, and household management and consumption. Drawing on the existing body of literature,

- It would be useful to assess the appropriateness of alternative educational interventions for delivering information specifically related to health and family planning. When are nonformal approaches, such as barefoot doctors and a variety of extension services, more effective than formal curriculum units? At what ages and times are specific materials best introduced? Should the focus be on science knowledge or on demonstration and practical experience?

There is limited research on the effects of vocational training other than with respect to the acquisition of specific skills. Skill training, however effective it may be, has little chance to contribute either to the individual's or to society's benefit unless there is demand for the newly learned skills in the form of jobs. In Venezuela, technical training and vocational programs have been successful, being sponsored by the government and paid for by industry. On the other hand, in El Salvador, the manpower that was trained in a special effort to attract new industry remained underutilized because what new industry came into the country was not labor-intensive. Possibly because of the connection between jobs and the benefits of vocational training, many countries have shifted vocational programs from ministries of education to ministries of labor. In the U.S. in particular, there has been a decrease in enrollment in the vocational programs of public schools and increased questioning of their value, but vocational training in proprietary schools and at production sites is gaining in strength. The fundamental issue is not only the site but the balance between general education and vocational training, a political and philosophical issue as well as an educational one in industrialized and poor countries alike. The current boom in the evaluation of vocational programs in less developed countries provides ample material for developing a better understanding of what kinds of vocational training are likely to be productive under given circumstances.

- Distinctions must be made between training for industry and training for service-related jobs, between teaching specific job skills and teaching entrepreneurship including the abilities

needed for successful self-employment or the creation of jobs for others, between vocational training for work in urban or industrial settings and trainig for off-farm work in rural settings. For some countries, there may be a greater growth rate in the service occupations and in agriculture than in the industrial sector. What different types of training are effective for these differing purposes? When is on-the-job training appropriate for the remediation of basic skills as well as for the teaching of vocational skills; when are these better provided in school? What can be learned and adapted from the experiences of newly industrialized countries, and in what ways are these experiences an inappropriate guide for the poorer countries?

- What are the motivational factors that enable individuals to broaden their training so that they can move either horizontally or vertically within an industry, thus providing a spur to indigenous industrial development?

- What is the role of the multinational corporations in inservice training and retraining? As equipment and products become more highly automated and sophisticated, how can local workers be helped to acquire the servicing and follow-up skills they need to maintain and expand the local markets?

THE PLANNING, MANAGEMENT, AND MONITORING OF EDUCATION

Next to macroeconomic policy and the overall allocation of resources to education, the quality of planning and management of schools and the way in which educational policy is implemented are key to the effective and efficient delivery of education. There is a big gap between the management capacities in developed and in less developed countries, yet research has not dealt with these differences in a way that leads to more apropriate management styles and training for school administrators faced with the special problems of the poorer countries. There is, in fact, little known about how schools are managed at the municipal or local level or in rural communities; nevertheless, attempts to decentralize school governance--based on theories developed in industrialized countries--are gaining currency before existing practices and capacities in less developed countries are understood. Moreover, management models imported from the U.S. tend to be based on private-sector management, whereas not only education but in many countries a considerable share of the economic activity are part of the public sector.

- What are the level of development in a particular country and the likely consequences for the planning and management of education? What are the country's cultural and historical traditions that may influence the effectiveness of alternative managerial styles? What is the scale of the educational system being planned and managed, and what is the country's likely support system for improving managerial capacity? The problem of

scale may be independent of other economic factors; for example, in a country of two million people, there will probably be only one university, making experimentation with and training in diverse management styles not very feasible.

- What models and practices are appropriate for public-sector management? In the U.S., management of public enterprises is not commonly taught, with the sole exception of the management and administration of educational systems and institutions. What techniques are transferable to other countries from the management of U.S. education? What other models of public-sector management provide promising approaches that should be tried out and assessed? What techniques from the management of the private sector are applicable to the management of education in less developed countries?

- What are the specific managerial responsibilities at the school level, for example, of the teacher-principal? The management capability of the school leader (and to some extent of the whole staff) may make the difference between a successful and an unsuccessful school. What skills do such persons need? A set of case studies would yield important information. Are there ways in which schools can be structured so as to reduce managerial demands? For example, the use of radio can help organize the school day and passage through school in such a way as to ease managerial burdens on the teachers and the principal. Consideration of such changes may be an attractive alternative to using training as a way of increasing the management capabilites of local school staff.

- What are the appropriate management and leadership skills needed at different managerial levels and in different settings? In some programs, the main skill taught is accounting. How does this help the teacher or principal who may want to evaluate and monitor the school's performance so as to make improvements? Where and when is training most effective, on the job as problems arise or in formal educational settings? What knowledge do administrators need to do their job effectively? As noted, the microprocessor has the potential of expanding administrative capacity considerably, provided its introduction is carefully matched to those management functions where it can be utilized effectively, and appropriate training is given.

- What is known about the introduction of change into such complex organizations as educational systems? There is a large body of literature covering research and experience with innovation and change in the U.S. One of the recurring findings is that innovation requiring marginal change on the part of managers and staff is more likely to be adopted than innovation requiring large-scale change. To some extent, this experience has been born out in the introduction of educational technology in less developed countries: Radio was an adjunct to teachers in the

successful Nicaraguan experiment; the Korean experience provides a counterexample, however. It may be useful to follow carefully the introduction in some less developed countries of educational change through pilot projects to determine the parameters of successful planning, organizing, and implementation and the skills needed by the indigenous managers.

- What are the implications of increasing participation in its various forms--deconcentration, decentralization, devolution, privatization--for planning, management, implementation, and evaluation of educational systems and programs? Who will need what kinds of skills under these different forms of participation? What is the relationship of these governance strategies to the governance structures commonly found in less developed countries, and what gaps do they create between demands for new management skills and those traditionally developed?

RESEARCH ON RESEARCH

The structural conditions of research in poorer countries need to be better understood to avoid errors made in the past in attempts to build indigenous research capacity supporting educational endeavors. Common ways of involving researchers from less developed countries through training in sophisticated research universities or through short-term contracts with development projects have had some deleterious side effects, such as the use of inappropriate research designs and methodologies, ignoring the importance of creating an in-country network of researchers, and the exacerbation of internal inefficiencies within local universities, for example, in Africa.

- What is the human, financial, and institutional resource base for research in a given country or region, and what are the consequences of scarce research resources and the precariousness of the resource base? What have been the successes and failures of past attempts to strengthen the base and of the various strategies for building research institutions? What have been different models for involving and training researchers from the less developed countries, and what are the advantages and disadvantages of each model? What have been the consequences in the poorer countries of the policy of accelerating forced indigenization of research? What is the appropriate balance between "insider" and "outsider" research in a given setting and for a particular research undertaking? These are some of the questions requiring answers before further progress can be made in helping countries become more self-sufficient with respect to educational research.

- How are research projects and methods best defined and carried out? What is needed to help countries identify their own research agenda and encourage investigators to use the most suitable research methods? What is the proper locus for a

particular type of research? For example, theoretical or empirical research intended to uncover and accumulate knowledge may be most appropriately housed in an academic institution, action research intended to change the behavior of participants in a local support or assistance agency, policy-oriented research in a government office of research. The problem of defining the type of research needed and its locus enters critically into the utilization question. Who is the intended audience for the research being proposed? How does research, whether intended to do so or not, find its way into the decision process in education? A review of the considerable literature (largely but not exclusively dealing with developed countries) on the policies and sociology of utilization and nonutilization of research as well as on strategies for encouraging utilization should provide some guidance for research planning and implementation in less developed countries.

- Research and development projects are based on specific theoretical premises. Most education projects, for example, are based on the premise that the development of human resources will lead to economic development and productivity growth (i.e., the human capital theory). Are there alternative theories that might be applicable to education and to development activities in education? Might such alternatives provide more satisfying explanations for some of the observed phenomena that have proved difficult to fit into current paradigms? Specific efforts need to be made to encourage communication among researchers and development specialists operating from different theoretical frameworks to explore such questions.

CONCLUDING OBSERVATIONS

The identification of the research topics in education development which were discussed at the working conference and are summarized in this report represents a first step in the laying out of a research agenda and the development of specific research projects. Several additional steps are needed: Wider discussions involving researchers in less developed countries need to be held, preferably in conjunction with the long-term AID development projects in education planned in Africa. Second, reviews of certain research areas identified during the discussion, but not already synthesized by such agencies as the World Bank or the International Development Research Centre, can provide useful guidance, including appropriate cautions regarding the translation of research findings from one setting, say the U.S., to other settings, say in Africa. Relevant examples are research on cognitive development, on individual motivation for learning, on local school management, on the introduction of innovation into complex systems, and on the utilization of research. Also, it should be observed that many of the questions that were identified as needing to be addressed can be clustered when specific research projects are designed at a finer level of detail. Moreover, certain issues appear in a number of different contexts, for example, the

effectiveness of instruction in school versus training through practical experience, the use of indigenous technology in the curriculum, and the need to understand not only educational outcomes but the processes through which the outcomes are produced. In developing a research agenda, it may be well to plan projects in such a way that they yield knowledge which can be accumulated on these recurring questions. Lastly, any agency such as AID concerned with the support of research to inform development activities in education will need to select those questions most pertinent to its development plans and the development objectives of the country it wishes to assist, although the types of research to be funded should range from university-based investigations intended to increase the knowledge base to applied research likely to have short-term payoff in improved development projects.

APPENDIX

CONFERENCE ON RESEARCH ON EDUCATION IN DEVELOPING COUNTRIES
May 13-15, 1983

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