

EDUCATION POLICY

SIMULATION

EPICS: Investing in Basic Education for Development

A Decision-Making Model

to

Improve Access to Schooling

Coordinator's Manual

by Claire Brown, Haroona Jatoi

and

Christina Rawley, Coordinator

Preface

To have universal basic education by the year 2000 has been the concern of development efforts in low income countries during the past decade. Yet many countries are unlikely to reach this goal because of depressed economies, high population growth rates, high unit costs of education, and inefficient use of resources. Schools in these countries have few books, no labs, overcrowded and unfurnished classrooms led by teachers from the city whose experience has taught them little that is relevant to children whose first needs are food and shelter.

Universal basic education is fundamental for sustained development, but current delivery systems are inadequate. Many policymakers are willing to try new techniques, but so far little understanding exists of how these work, or of the organizational requirements for their implementation. Many countries now have trained researchers and the beginning of networks that link researchers within and across countries (and to policymakers); but planners and policy makers lack the means to make most effective use of the information that could be made available to them.

EPICS was developed to model and simulate the dynamics of educational policy making and planning in a low income country. The simulation provides a realistic environment in which to experience and experiment with fundamental concepts and issues in planning for educational change. The simulation provides an opportunity to explore the relationship of education and development at the national, regional and community levels.

The challenge of the simulation is for participants to integrate and apply their skills in conducting policy research and planning using innovative technologies. The goal of the game is to gain universal literacy for primary school education in the fictitious country presented in the scenario. Participants can succeed or fail to achieve this goal with varying affects on agriculture, health, and industry within the country.

No simulation can model more than part of the reality of an experience. Practicality requires that the model be a simplified version of actual life. Policymakers, planners and students from many different countries who have participated in the simulation over the past year have told us that *EPICS* is a realistic simulation of the experience of planners and policy makers in ministries of education. As the title suggests, *EPICS*

is an attempt to characterize some approaches to modeling that must be understood in order to carry out the heroic actions — large or small though they may be — necessary to achieve universal primary education.

Acknowledgements

We would like to express our gratitude to the people who have been most influential in the development of the simulation at Harvard University. Professor Noel McGinn, Principal Investigator of Project BRIDGES, initiated and supported the development of the simulation. Russell Davis first encouraged the early explorations of the simulation. Catherine Krupnick and Frank Dall have also been encouraging.

We owe special debts to several pioneers in gaming simulation who met with us during early conceptual stages: Cathy Stein Greenblat and Dennis Meadows, who have both concentrated on intra-cultural dynamics of international development. Greenblat's *CAPJEFOS* and Meadow's *STRATEGEM* initially influenced our understanding of the different approaches and gaming styles. The style of this game most closely resembles the AIDS game by Fiddaman and Meadows; the *EPICS* gameboard was adapted from the AIDS gameboard. Fred Goodman demonstrated metaphorical games illustrating the social dynamics of the game players, which only become apparent after the game is played. William A. Gamson, a pioneer in behaviorally played simulations, influenced us through *SIMSOC*, the simulated society game. These people have inspired and encouraged us.

We are also grateful to all the professionals and students at Harvard University who have played the game from the trying preliminary versions to its current stage. Mary B. Anderson wrote the research review on access to schooling and presented a framework for policy research upon which the initial model for this simulation was constructed; Thomas Cassidy, Ernesto Cuadra, Armando Loera-Varela, Andrea Rugh and Jim Williams gave their time in the conceptual modeling process. We owe special thanks to Dan Gasteiger who was particularly generous in providing the technical support that turned our crude Lotus model into poetry. Numerous others have given their suggestions and advice after the more than 20 simulation runs during 1989-90 at

Harvard University and at the Comparative and International Education Society Conference.

The simulation design process has been iterative and participatory. This first edition of *EPICS* reflects the careful consideration of many people over a period of two years. We expect the list will grow as time goes on and especially when we are able to test the simulation in the countries it is meant to simulate.

*Claire Brown, Haroona Jatoi
and
Christina Rawley, Coordinator
Cambridge, Massachusetts
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Section One

EPICS Introduction and Background

Introduction

EPICS is a dynamic simulation that explores the complexities of education policymaking and planning at the national level (within a ministry of education). As the system is complex, so too is the simulation. You probably won't be able to remember the roles, information and rules of the game on the first or even the second reading. At times we ourselves must refer back to the role sheets and the manual. Mistakes that may be made during the run of the simulation can either be absorbed or corrected. Our advice is to be as prepared as you can while understanding that, as is true in life, mistakes happen. In the simulation, mistakes are recoverable. Depending on the number of people playing and the number of gameboards you will be using, you may want to have more than two people coordinating, though the game can be run for two tables by one person.

The *Coordinator's Manual* contains information and materials necessary for running the game, including a description of the model assumptions, a review of events and feedback materials, guides for conducting the pre-simulation briefing and post-simulation debriefing, and sample case study material.

Background

Recognizing that the past has everything to do with the present and affects the future, we begin this guide with some general information about the history of the development of the simulation. Included are the reasons for selecting this technique and the purposes of the simulation. The process of developing this simulation model has been a fascinating one that has included many people from many countries and cultural perspectives. Though this information may be interesting,

it is not essential to understanding the running of the game. The basic information for running this model is presented on pages 19 to 25 and you may want to turn directly to those pages to begin your reading.

The development of *EPICS* began with a desire to help practitioners and students of education policy and planning to learn about the development of education systems in low-income countries* through active participation. *EPICS* focuses on decisions made at the national level about access to primary schooling.

Many low-income countries are trying to achieve universal primary education by the year 2000. Over the past decade, and particularly during the past five years, a great deal of research has been conducted in low-income countries that helps us to understand the factors that create or contribute to children's access to schooling and to their retention rates in education systems. There is now an extensive body of knowledge upon which to formulate policies and plans.

However, while understanding the factors is a necessary condition to devising and implementing effective policies, it is not sufficient. Informed policymaking depends upon understanding individual factors *as well as* the relationships among the factors and the patterns that connect them. Often when policies are made with an understanding of one or two factors alone the unintended effects can be detrimental to the overall stability of the system. An understanding of the whole system and the relationships among various elements within it increases the likelihood that the factors selected for policy choices will be beneficial. This belief is an integral part of the *EPICS* simulation.

Various modeling techniques are used to forecast or project the short- and long-term consequences of policy options. Computers synthesize large amounts of data quickly. Education ministries are beginning to use microcomputer-based simulation models for projecting enrollment

* The term "low-income" countries will be used throughout this text rather than "Third World" or "developing."

and repetition rates. These packages are extremely useful but do not take into account the social or cultural elements inherent in any planning process. Decision simulations placed in a gaming format are able to incorporate the social and cultural components, which is why we have chosen this modeling technique. In this simulation people play roles, have goals, and make decisions that have consequences on access to education as well as on other areas of life such as health, agricultural production, etc.

Gaming simulation functions to:

- Demonstrate the effects of different policies
- Allow policy experimentation without risk
- Convey general principles of system behavior
- Allow research into the behavior of a system
- Gather and exchange information among the participants themselves
- Provide participants with a shared experience to aid them in discussing problems
- Convey insights about impacts on the economy, society and political system

EPICS is based on several reviews concerning access to education that were conducted by Project BRIDGES in 1987–88, including: *Access and Retention in Primary Education in Latin America* by Carlos Muñoz Izquierdo and Sonia Lavin de Arrive; *Variables Affecting Policies, Programs and Program Implementation in Access to School* by Weining C. Chang, Anna Madison and Bella W. Higdon; and *Improving Access to Schooling in the Third World: An Overview* by Mary B. Anderson. Dr. Anderson presented the framework of analysis that we used in *EPICS*. Within this framework, we applied Pakistani data collected from UNESCO, The Research Triangle Institute and the Government of Pakistan through Project BRIDGES.

As the simulation developed, we explored the relationships that exist between the quality and quantity of data collection and how it is used

or made available for use through the Education Management Information System (EMIS) Office. Therefore, the simulation approaches organizational relationships within ministries as well as the effects their policy decisions may have on various population groups. The construction of particular aspects of this part of the model was based largely on observations and experience of EMIS implementation in Egypt. Case studies and other data sources used in the model are listed in the references in Section Six.

Summary of the EPICS Simulation

Subject Matter and Purpose

EPICS simulates the way that relationships among variables within the education system can hinder or promote access to and retention in basic education. Specific attention is given to countries that are decentralizing and diversifying their education systems. The simulation focuses on policies that have an impact on four explicit population groups: urban, rural, boys and girls. Socioeconomic status is represented by a hierarchy of opportunity in the four population groups; urban males represent the most advantaged group, rural girls the most disadvantaged group, with urban girls and rural boys in the middle range.

Objectives of EPICS

The objectives of *EPICS* are to:

- Encourage discussion about resource allocation under budget constraints
- Illustrate the need to identify sets of factors that affect demand for education and increase access among particular groups within their own context (girls and boys in urban and rural areas)
- Emphasize the importance of understanding the effects of multiple factors in designing a policy
- Emphasize the importance of multiple strategies
- Show the delays involved in setting up programs

- Demonstrate the qualitative and quantitative effects of different policies
- Give practice in communication, negotiation, and cooperative group strategy to promote participatory planning

Context of Use

This simulation is designed to be used in professional meetings, conferences and training sessions, as an “opener” or “finale” in a workshop or course and is intended for professionals and lay people alike. The simulation can be used for planners within ministries of education as part of in-service training. It can also be useful to academics and researchers studying education systems in low-income countries.

Framework of the EPICS Model

The model underlying *EPICS* is based on a framework presented by Mary B. Anderson in BRIDGES Research Report No. 1: *Improving Access to Schooling in the Third World: An Overview*. The framework considers three pairs of policy interactions that affect educational opportunity at the primary school level:

policies to increase supply

vs.

policies to increase demand

policies to increase overall enrollments

vs.

policies to increase enrollments of groups currently underrepresented

policies to improve opportunities to enroll

vs.

policies to increase retention of those who are already enrolled

Policy interactions in these areas are shown to have differential impact across four population groups:

Rural girls • Rural boys • Urban girls • Urban boys

Figure 1 illustrates the conceptual model of factors associated with access to schooling following the supply/demand framework. This model indicates that the provision of educational opportunities depends on resources and governmental factors while the response (or demand) to educational opportunities depends on household factors. Between these two categories we have a negative feedback loop indicating that supply and demand are affected by each other. The model seeks to maintain equilibrium between supply and demand. Equilibrium is affected by factors in each category. On the supply side resources available to the government are affected by economic factors at the household level; economic factors are in turn affected by sociocultural factors; sociocultural factors also affect policy, and so on (details of the conceptual model are contained in the appendix).

With this conceptual model in mind, a set of policy options were selected and modeled as shown in Figure 2. A brief description of the policy options are presented in Figure 3 (p. 10). A complete description of the policy options and assumptions begins on page 11.

Conceptual Model School Access and Retention

Figure 1

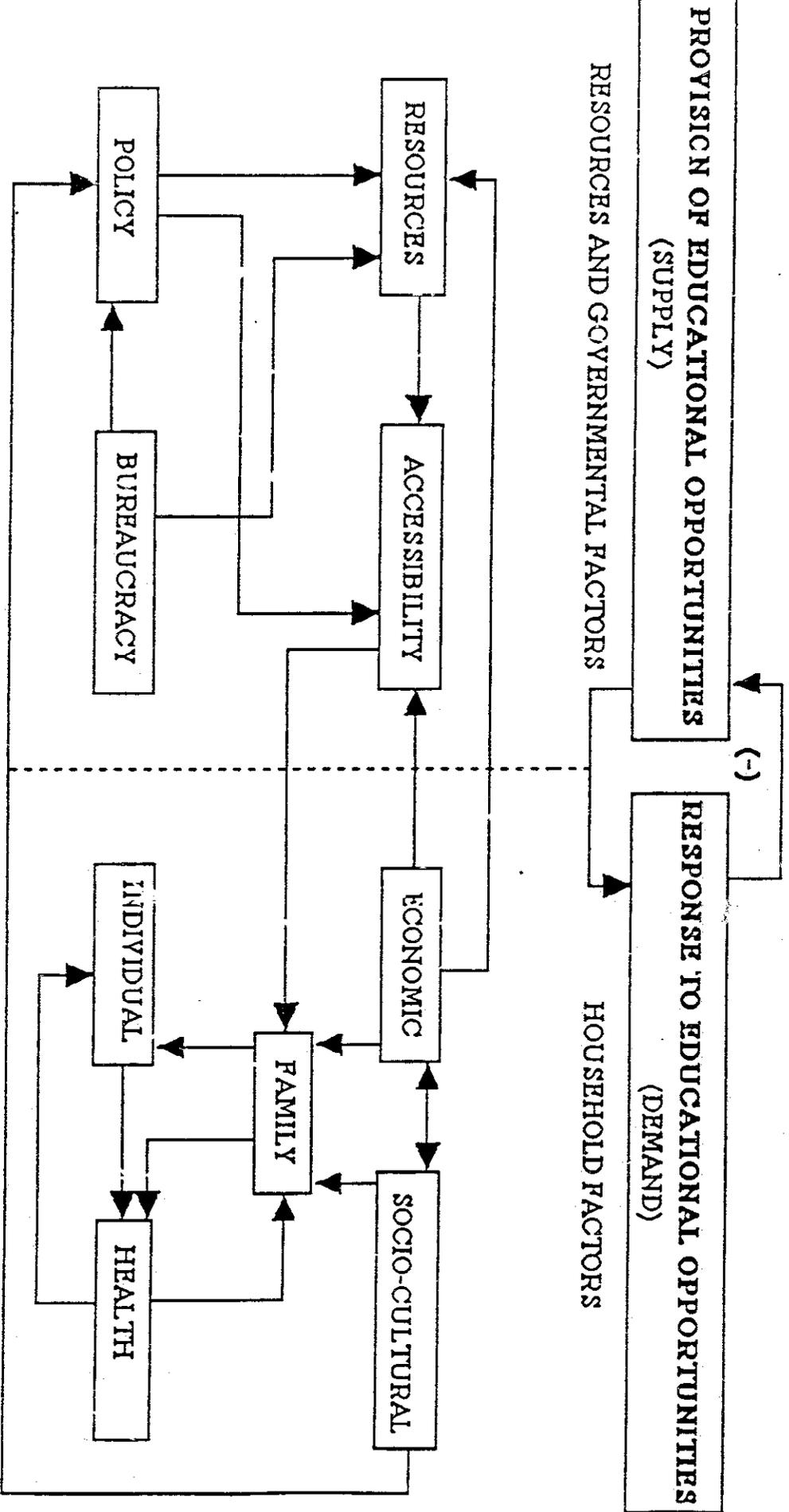


Figure 2

Education Policy Model

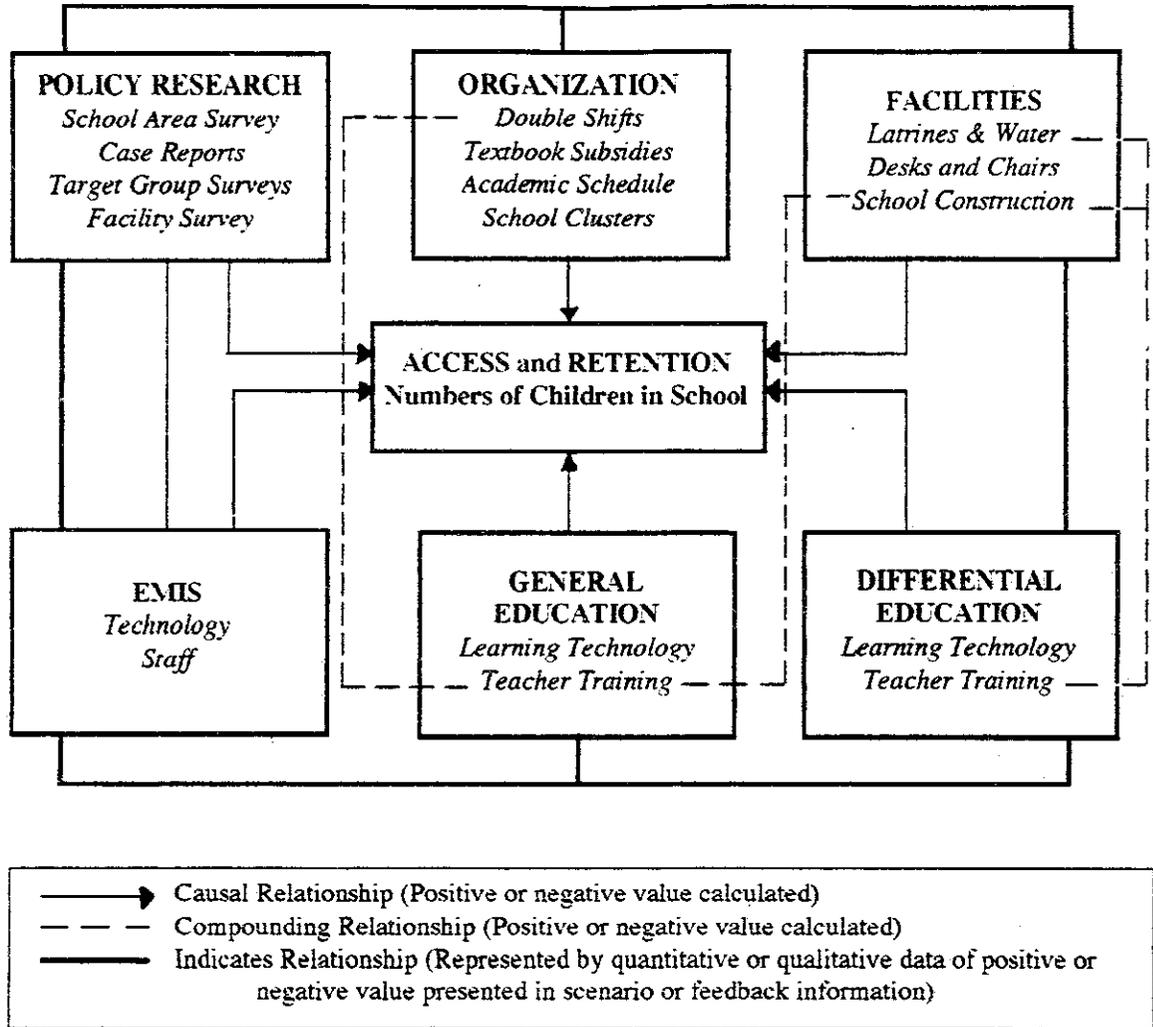


Figure 3

POLICY OPTIONS

POLICY RESEARCH: *Applied research to determine specific policy recommendations.*

- School Area Survey - Collects data on the number of school age children in the country, general demographic information, and on school organization.
- Case Reports - Collects longitudinal or in-depth data about a specific topic such as family norms or school conditions.
- Target Group Survey - Collects information about educational norms within specific population groups.
- Facility Survey - Collects information about the number, location, and quality of schools in different parts of the country.

GENERAL EDUCATION: *Provides funds for a broadly based national education program.*

- Materials & Learning Technologies - Includes textbooks, materials such as pencils, chalk boards and curriculum development.
- Teacher Training - Pre-service and in-service training for teachers.

DIFFERENTIAL EDUCATION: *Provides funds for reforms to benefit specific population groups.*

- Materials & Learning Technologies - Includes textbooks, materials such as pencils, chalk boards and curriculum development.
- Teacher Training - Pre-service and in-service training for teachers.

FACILITIES: *Provides funds to build new facilities or improve the quality of existing facilities.*

- School Construction - Build new school buildings.
- Water and Latrines - Improves the quality of existing schools.
- Desks and Chairs - Improves the quality of existing schools.

ORGANIZATION: *Redistribution of resources within the school system to increase efficiency.*

- Academic Schedule - Takes into consideration seasonal changes that affect enrollments.
- Textbook Subsidies - Issues textbooks free of charge.
- Double Shifts - Allows two groups of students to attend one school.
- School Clusters - Allows several schools to share resources and management (such as a library, a headmaster or specialized teachers).

EMIS: *Education management information systems to create computer networks for the collection, processing and analysis of school data.*

- Staff - Hiring and training for development and use of EMIS.
- Technology - Provide mini-computers and software for development and use of EMIS.

Policy Options and Assumptions

Investments can be made in six categories of policy options in the *EPICS* model: (1) facilities and materials, (2) organization, (3) policy research, (4) EMIS, (5) general education, and (6) differential education. Each of these areas has subsets of activities in which to invest. Policy options and assumptions presented in the model are listed below. A summary of policy options is presented in Figure 3 (p. 10).

Facilities and Materials

There is always a need for places where children and teachers can meet for formal education. The supply and quality of these facilities can affect opportunities for children. Policy choices in the category of facilities provides funds to build new facilities or improve the quality of existing facilities. Policy options in the category of facilities include school construction, desks and chairs, and water and latrines.

School Construction: The distance between schools and students' homes is a critical factor in access, especially for girls. Building schools increases opportunities for children to enroll over all populations. Immediate investments will affect urban areas first and later the rural areas, since schools are built first in the cities and then in the countryside.

Desks and Chairs: Desks and chairs increase the quality of existing schools..

Water and Latrines: Water and latrines increase participation by their effect on health and welfare across all populations, but especially for girls.

Organization

Organization increases efficiency of the system through redistribution of resources.

Double Shifts: Double shifts can increase the number of children that one school can accommodate, provided that the distance to school is reasonable and that teachers are not overburdened. Double shifts can increase participation in densely populated areas where facilities already exist, and therefore benefit urban areas first.

Academic Schedule: Academic scheduling acknowledges seasonal changes that affect enrollments. A flexible academic schedule creates more educational opportunities for rural population groups, both male and female.

School Clusters: School clusters allow several schools to share materials, teachers and managers; improves the quality of school management in rural areas where qualified personnel are not available to work as school heads .

Textbook Subsidies: The supply of free textbooks to schools or students increases retention rates and the quality of teaching. Increases retention of poor children in schools and therefore quality of education for disadvantaged groups in both rural and urban areas (Bhatti, 1986).

In addition to the above policy options, there are two other groups of options that affect the internal efficiency of the system: *policy research* and *management information systems*.

Policy Research

Policy research refers to research that describes the state of the primary school system and, most importantly, the relationships between aggregated and disaggregated data. This is not research for its own sake, but research intended specifically for policymakers.

Facility Survey: A facility survey will provide information on the location, numbers and quality of existing schools. It provides a map of school locations that can be extremely helpful in planning for increasing access for all population groups.

School Area Survey: A school area survey will provide demographic information on the numbers of school-aged children, migration patterns, and school organization.

Target Group Surveys: A target group survey will provide information about educational norms of specific population groups (Anderson, 1988; Lockheed, 1989). Investments in this area will provide better information about the needs of the female and rural populations.

Case Reports: Case reports will provide in-depth data about a specific topic such as family norms or school conditions.

Education Management Information Systems (EMIS) Office

Investments in the EMIS Office increase the system's capacity to gather and synthesize information. The Farziland country scenario presents a case for the establishment of this office based on the fact that the ministry currently depends on a single mainframe computer. The basic assumption made here is that the greater the investments in EMIS, the more technology in the form of personal computers becomes available for use at the district or local levels. The establishment of computer networks becomes possible, thereby increasing the quality and quantity of information available at all levels of the education system.

Technology: Investment in technology results in the purchase of equipment related to the EMIS. Investment over the long-term provides computers at the local level (a single investment never reaches the local level), thereby improving efficiency at both federal and provincial levels. Investment here equally benefits all population groups.

Staff: Investment in staff training at the federal and provincial levels assures proper usage of computers. Investments must be consistent over time to compensate for the high turnover rates of well-trained

people who find higher paying jobs in the private sector. This investment affects all population groups equally.

General and Differential Education

The categories of general and differential education refer to two fundamentally different ways of approaching education programs.

General Education provides funds for a broadly based national education program that supports the status quo. Therefore, this approach favors those who currently have greatest access to education: urban males.

Materials and Learning Technologies: This includes curriculum development, textbooks, chalkboards, visual aids and alternative technologies .

Teacher Training: This category includes both pre-service and in-service training for teachers.

Differential Education provides funds for reforms to benefit specific population groups. Investment in this category will change the status quo and has the greatest impact on the most disadvantaged group: rural girls.

Materials and Learning Technologies: Includes special curriculum and materials for rural populations, minority groups, and especially for girls .

Teacher Training: Provides both pre-service and in-service training for teachers in disadvantaged areas of the population.

according to the investments made. (It is possible to collect 16 pieces of research information during the course of the simulation.) However, if players invest in certain policy options in organization, facilities or reform education without having first conducted policy research affecting the area, they will not receive optimum results because they do not have enough information for informed decisions. For example, investments made in educational reform without case reports or target group surveys will have less impact because the model assumes that the policy decision is made without knowledge of local context. Therefore, though the intention of the policymakers may be good, it is less effective in achieving its purpose — to make education available to currently disadvantaged populations.

effects of schooling. Here the path model shows the direct (causal) effects of independent access variables of gender and residence on quality of life as expressed by increased productivity in industry, food and agriculture, and health.

This model theorizes what the direct effects of education on specific population groups will be on the overall development and quality of life. The low-income country simulated in this model has a division of labor associated with gender (girls/boys) and residence (rural/urban).

Figure 4 also shows the direct relationships existing between the education of (1) urban boys and industrial development, (2) rural boys and agricultural development, (3) rural girls and food production, and (4) urban and rural girls and quality of health in the country (where health is a function of decreased fertility rates and increased food production). Thus, the education levels of the four population groups have a direct effect in the *EPICS* model on four areas of development within the country.

Examples of Submodels

The Relationship Between Policy Research and EMIS: The relationship between policy research and EMIS determines the level of internal efficiency of the Ministry of Education. The hypothesis here is that investments in EMIS make it easier to use information gathered by policy research. (It is possible to collect four pieces of information on EMIS during the course of the simulation.) As investments in EMIS continue through the rounds, the technology becomes available at increasingly more decentralized sources, and information networks can be formed to make information available at the national and local levels. As information is more efficiently processed and distributed, it is more likely to be used in planning and decision making.

The Relationship Between Policy Research and Organization, Facilities and Reform Education: Policy research makes it possible to make informed decisions, and players will receive information

Relationships Among Policy Options

EPICS is a complex model of policy relationships and outcomes; Figure 4 (p. 16) illustrates two primary models. The left side of Figure 4 shows the interrelationships of policy choices affecting access. The right side of Figure 4 illustrates a path model that shows the effects of access to education on the quality of life, as it is calculated in the computer component of *EPICS*. *EPICS* contains many submodels, and it is not possible to specify them all here. However, the following section will discuss some of the relationships among the policy options.

Access Policy Model

Dynamic modeling methods are used to simulate a system that displays characteristics of positive and negative relationships, delays and change over time. Figure 4 illustrates the relationships among policy options as they exist in many parts of the entire simulation, including (1) those that are specific to computer calculations, (2) others that are represented in feedback information and (3) possible relationships that represent cumulative values.

(1) Causal relationships specific to computer calculations are indicated by the solid lines with arrows. As indicated, all policies have a direct impact on access.

(2) Solid lines without arrows indicate relationships among policy options represented in information given in role descriptions and research feedback.

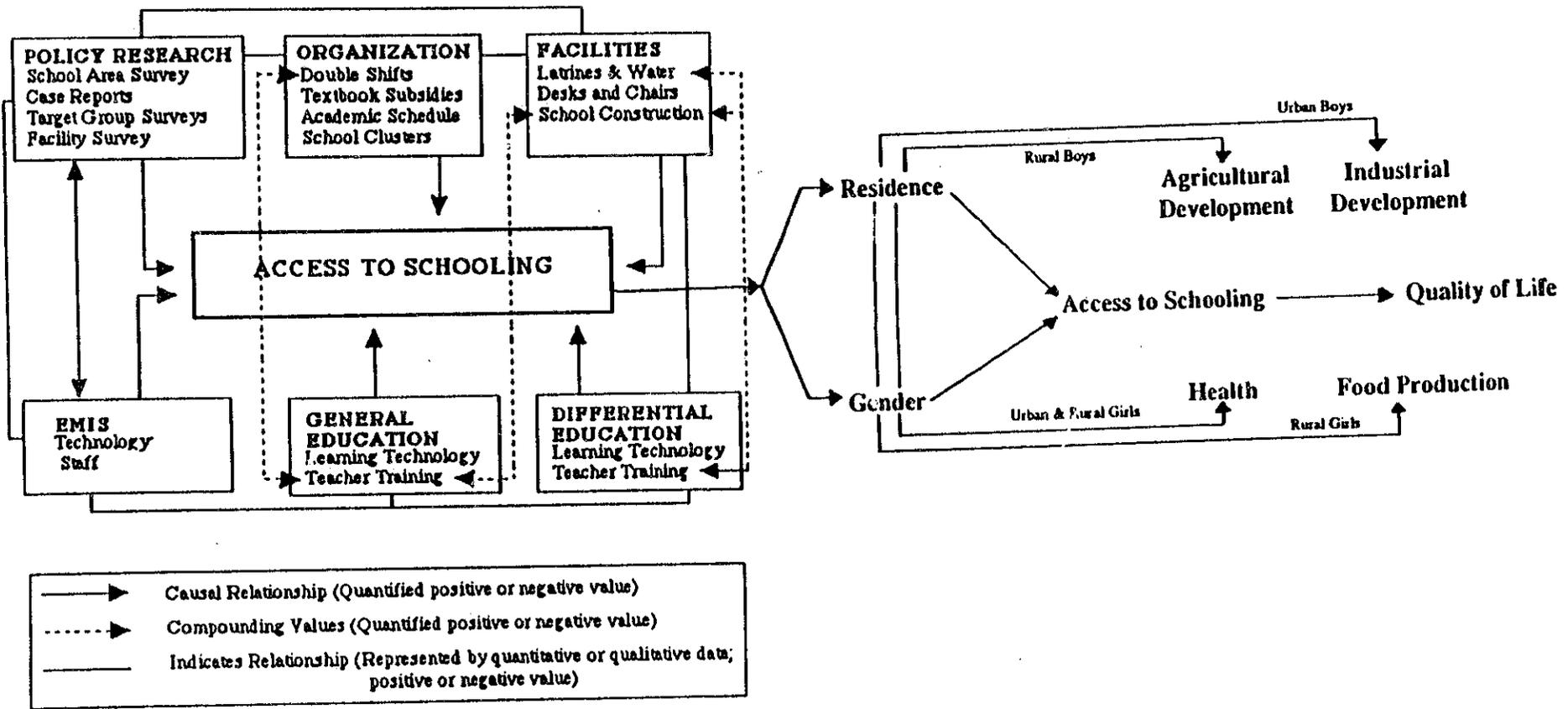
(3) Broken lines with arrows indicate relationships of policy options where combined effects are larger than the sum of the two investments.

Path Model

A path model depicts a functional relationship between a set of independent variables and a dependent variable that analyzes the

Figure 4

EPICS Education for Development Model



Instructions for Running the Simulation

Contents of the EPICS Game Kit

The game kit consists of a gameboard, chips, overhead transparencies, the coordinator's manual, and the *EPICS* software.

Time Frame

The entire simulation, including the introduction and debriefing, can be run in three hours.

Facilities Needed

EPICS has been run during conferences and classes in a variety of settings, and it can be run in any place that has tables and chairs and access to a computer. We have run the simulation in large and small rooms, with between 6–30 players.

Each *EPICS* kit is designed to accommodate six players. Three roles can be shared if there are a few extra players (Director of Research, EMIS Officer, and Director of Planning). More than nine players per table is not recommended.

One coordinator can run up to four game tables simultaneously. If you are running more than one game table, it may be helpful to have an assistant. For large groups, be sure to plan ahead for computers, electrical outlets, and an overhead projector for the briefing and debriefing.

Preparation for Play

Setting up *EPICS* for a game run requires 30–60 minutes, depending on the number of tables being set up. Each table requires:

- (1) Computer
- (2) Gameboard
- (3) Investment Chips (placed in middle of gameboard)
- (4) Timer (placed on gameboard)
- (5) Player's Manual and Role Cards

(6) Policy Definition Sheet

(7) Investment Decision Sheet and Pencil or Pen

Materials for Players

The coordinator's manual contains the master copies of the materials that should be given to the players.

Each player should receive one Role Card, one Country Scenario, one Statistics sheet, and one Policy Options description sheet. These four sheets should be stapled together for each player.

In addition, each table should receive one Decision Sheet.

The chips (totaling 1000 khazanas) should be placed in the center circle on the gameboard.

Starting the Simulation

The simulation begins with the briefing. Introductory materials on overhead transparencies are included in the game kit. (Refer to the pre-simulation briefing section of this manual to review those materials.)

The introductory materials include a description of the rules of play and directions for how the simulation will proceed.

After the introduction, the players should be prompted to begin round one.

The Minister of Education should begin the round by asking each player to identify her/himself and report the information she/he has about the state of the primary education system in Farziland. Each player should also propose a strategy for action.

The Secretary of Education is responsible for filling out the decision sheet and setting the timer for each round.

The EMIS Officer then enters the investment decisions into the computer (see instructions for computer software on page 22).

Timing of the Rounds

- Introduction.....25 minutes
- Round one.....30 minutes
- Round two.....20 minutes
- Round three.....15 minutes
- Round four.....10 minutes
- Round five.....10 minutes
- Debriefing.....70 minutes

- TOTAL.....3 hours

Time Periods and Stages of EPICS
(Total time: 180 minutes)

Briefing	Simulation Run					Debriefing	
time in minutes	Round 1	Round 2	Round 3	Round 4	Round 5		
25	30	20	15	10	10	30	40
Introduction	Phase 1	Phase 2	Phase 3			Experience	Analysis

Entering Investment Decisions into Computer

The EMIS officer must enter the policy investments into the computer before the timer goes off at the end of each round. The penalty is the loss of 200 khazanas for that round. The EMIS officer would enter only zeros for that round, and the next round would begin.

Special Event Cards

Event Card 1: Given during round one 20 minutes into the round.

This is a reminder for the Minister of Education that Parliament requires investment decisions in order to calculate the budget for the

next five-year plan. This is the time to remind the players that they must enter their decisions before the time is up, or lose 200 khazanas.

Event Card 2: Given during round three 5 minutes into the round.

Due to a war on the border, 50 khazanas are going towards defense funds.

Event Card 3: Given during round four.

A World Bank official offers a loan of 250 khazanas at an interest rate of 8% for distance education. (Please note that facilitator and assistant(s) should be prepared to play this role.)

Instructions for Using the Software

EPICS software is a LOTUS 123 spreadsheet called ***EPICS.WK1***.

Hardware Requirements

EPICS can be run on any IBM compatible personal computer that can run LOTUS 123 versions 2.0 or 2.1 with or without a hard drive. A printer that is properly hooked up to the computer is also required.

One computer and one printer is required for each game table.

Special note about hardware: It is imperative to test the hardware well in advance of the run of the simulation. A trial run of the software should be performed on each computer.

Software Requirements

LOTUS 123 versions 2.0 or 2.1 are required for running ***EPICS***. LOTUS 123 is not included in the ***EPICS*** game kit.

About the EPICS Game Disk

The ***EPICS*** game kit includes both a 3.5 inch disk and a 5 1/4 inch disk so that it can be played on computers with either size disk drive.

Each disk contains the spreadsheet EPICS.WK1, which should be retrieved the same way as any other LOTUS 123 spreadsheet.

As part of the preparation for the simulation run, the coordinator should retrieve the file and test the hardware. After testing the hardware, you can return to the *EPICS* opening screen by hitting the keys ALT and M at the same time.

Step by Step — EPICS Software

EPICS software is menu driven. Participants playing the simulation respond to instructions on the screen. They do not need to be familiar with LOTUS to play the game.

The person who plays the role of the EMIS officer will be responsible for inputting the investment decisions into the computer after each round.

The following is a list of the menu prompts that the EMIS officer will follow:

- (1) "Please sign in": Player will enter her/his name.
- (2) "Make sure the printer is on and ready, then press ENTER."
- (3) "Can your computer display graphs? (Y/N)": Enter Y (yes) or N (no).
- (4) "ROUND 1: GRAPHS": Choose "ROUND 1."
- (5) Refer to the decision sheet. Enter the amount of the investment registered on decision sheet after each policy choice prompted at the top of the screen and press ENTER. If no investment is made in a policy choice, enter 0.

Continue for all 17 policy choices. **Any mistakes can be corrected at the next step.**

- (6) The instruction "Press Up Arrow or Down Arrow to highlight an input. To make a change, simply enter a new value. Press ENTER when finished." Enter changes at this time. Remember to use the up and down arrow keys on the number pad to make these changes.

After all changes have been made the prompt "Stop editing? Are all entries correct? (Y/N)" will appear at the top of the screen. Enter Y when all editing is completed.

The feedback sheets will now be printed. At this point, if the computer can display graphs, the EMIS officer can choose to view them and share them with team members.

To view the graphs, simply cursor to "GRAPHS" selection and press ENTER. Use the up and down arrow keys on the number pad to view the next graph. When finished viewing graphs, go to the next round.

(7) Repeat all the above with Rounds TWO through FIVE.

Troubleshooting

Lotus will give you an error message if your printer is not on or is out of paper. If this occurs, follow the prompts.

What to Expect: How EPICS Typically Develops

The simulation typically runs in phases that can be characterized by (1) confusion, (2) rise in performance indicators, and (3) plateau.

Phase One — Confusion

During round one and continuing into round two, the players may demonstrate a certain amount of confusion and uncertainty. During this phase, participants become acquainted with their roles in the Ministry and begin to process the initial information they have received. Players must learn how to communicate with each other under time pressures and budget constraints. They are forced to make decisions on policies about which they have incomplete knowledge and information. For some people, this is not a comfortable experience. A range of behaviors can occur: Some people become more assertive while others withdraw. The participants must proceed through this phase and settle

into a way of working together to attain their personal and country goals.

Phase Two — Rise in Performance Indicators

During the second phase (rounds 2, 3 and into 4), the relationships between investments in policies and the performance indicators on the country reports become more obvious. The ministry members should be analyzing the outcomes in terms of their strategies and discussing how their decisions are affecting the state of the system.

Phase Three — Plateau

During the third phase (rounds 4 and 5), the experience of the participants stabilizes. Usually performance indicators are on the rise. Groups who have obtained substantial increases in enrollments feel a sense of accomplishment. Groups whose ministries have been less successful may experience frustration and disappointment. It is important to give all the groups a chance to describe their experiences during the debriefing.

Section Two

Events and Feedback Materials

Special Event for Round One

To: The Minister of Education

From: The Prime Minister

Re: Education Policy

I await your decision for the current five-year plan to present in my report to Parliament. Please prepare your report and deliver it to me promptly.

Special Event for Round Three

To: Finance Officer, Ministry of Education

From: Finance Minister

Re: Budget Allocations

The escalation of military activities in the North makes it necessary to increase budget allocations for defense. Budget cuts will be necessary across all sectors. You must prepare for reduction of funds toward education. Please give 50 khazanas to the game coordinator.

Special Event for Round Four

World Bank Loan Option

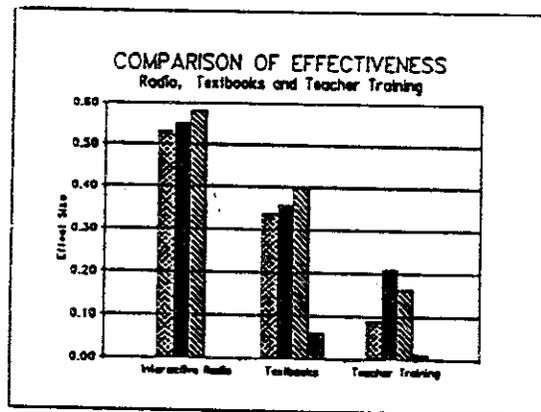
The World Bank is offering a loan of Kf250 at 8% interest. Loan payments will begin in 5 years. The loan agreement stipulates that it must be spent for investment in radio technology for the development of distance education capabilities to increase access to basic education within the country.

Research has shown that interactive radio instruction is effective and cost efficient.

Figure 1 below shows the relative impact on achievement of the interactive radio programs, textbooks and teacher training. Each bar on the figure represents a different study.

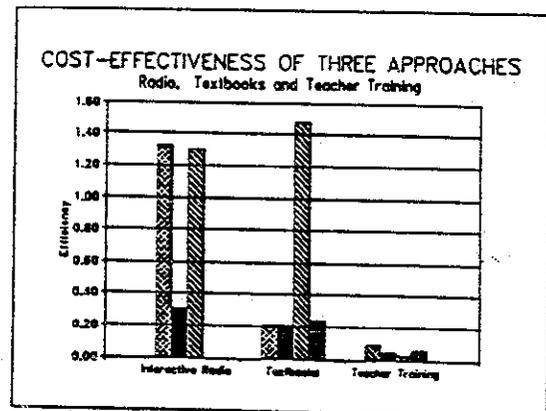
Figure 2 shows the cost-effectiveness per U.S. dollar. The efficiency measure is calculated by dividing the effect size by the per-student cost. Figure 2 shows that, overall, interactive radio provides the greatest cost effectiveness, followed closely by textbooks.

Figure 1



Comparing Effectiveness: Interactive Radio, Textbooks, and Teacher Training

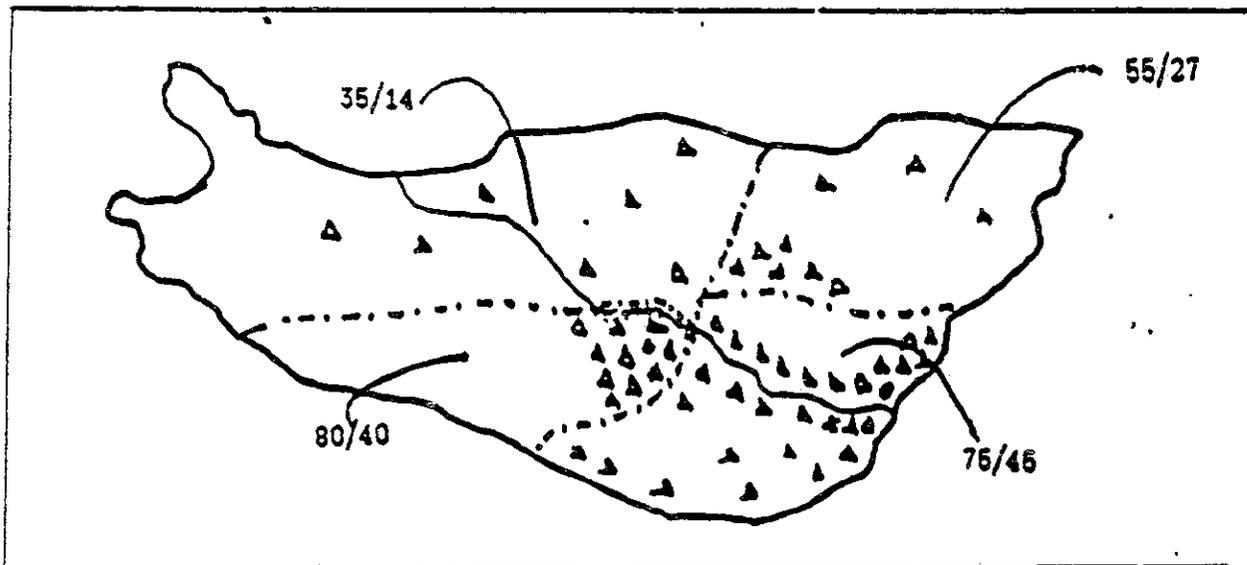
Figure 2



Cost-Effectiveness: Interactive Radio, Textbooks, and Teacher Training

Facilities Report One

Location of Primary Schools (= 100 Schools) and Participation Rates (% M/F) in Four Provinces



Most primary schools are located in the southern provinces near the capital and port cities and along the Main River where the agricultural and industrial production is highest. The northern provinces are not developed, however. The northeast province is arid and there is a large population of nomads. The northwest province, while fertile in areas along the river, is not developed. Agricultural production in this province is low compared to the southwestern province. Migration rates are also high in the northwest.

Facilities Report Two

Recurrent Costs

As per your request, we have investigated the costs of facilities and organization options. According to our findings, budget allocations would be more efficiently spent in the area of organization than in facilities. According to figures from the Director of Planning, we have over 90,000 schools, and since the costs of building and materials transportation are so high, our school system could be improved immediately through low-cost organizational changes such as double shifts, school clusters and perhaps changes in academic schedules. We might also argue that direct subsidies are a more cost-effective disbursement of allocation than facilities development.

Facilities Report Three

Textbooks

Textbooks are the single most important determinant of learning. Test scores of students who have access to textbooks are significantly higher than those without.

The availability of textbooks affects the demand for education. Free textbooks reduce direct costs to the families of school aged children.

Facilities Report Four

Desks and Chairs

The majority of schools throughout the rural areas do not have desks and chairs for students or teachers. Children usually sit on dark earth floors, and their clothes become soiled.

Desks are rarely provided for teachers, who must direct class standing throughout the day.

EMIS Report One

EMIS Report One

The EMIS department is designing a system to transfer the collection and processing of the data listed below from a manual system to a computer-based system.

The Ministry of Education currently collects and processes the following information at the district level:

- (1) Estimation of Student Enrollments
(new students, repeaters, drop-outs, and transfer students)
- (2) Annual Personnel Needs — Teachers and Administrators
- (3) Facilities Assessments
(new school construction, maintenance of existing schools, schools located in rented spaces)
- (4) Purchase of Equipment and Materials
- (5) Teacher Evaluations
- (6) Student Class Examinations and Promotion

Continued investments in microcomputers and staff training are needed to put the newly designed EMIS system in use.

EMIS Report Two

Initial investments in EMIS have produced a system where the accuracy of data on students, classrooms, schools, and teachers has greatly increased. Annual statistical reports are now being published though the information they contain comes out one year after it is collected.

However, the EMIS department is operating in complete isolation from the planning and research departments, and from all the operational units of the ministry.

The information generated is not being used in decisionmaking processes in the MOE. Senior management in various departments are indifferent to the usefulness of EMIS. They perceive that their information needs do not coincide with what is now being produced by EMIS.

EMIS Report Three

EMIS staff has a high turnover rate due to increased demand for their skills in the industrial and service sectors. More investments in staff training are required.

EMIS Report Four

The usefulness of the EMIS system is becoming more widely known by various departments and decisionmakers at the district and national levels.

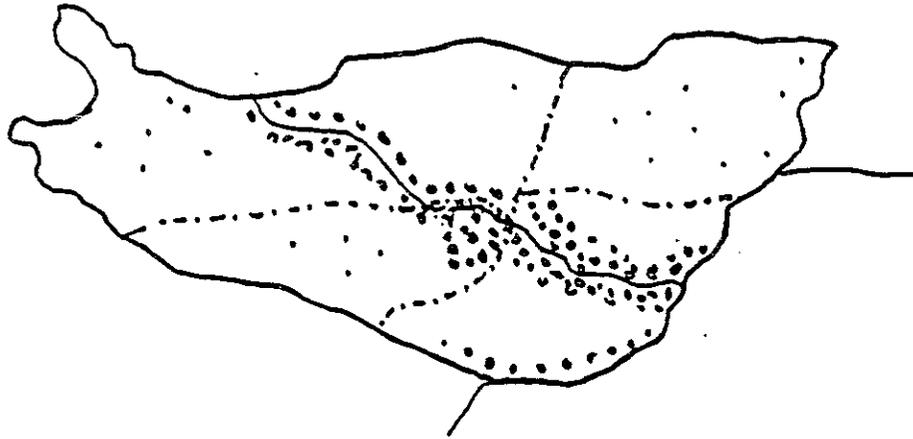
Continued investment in EMIS has allowed for the development of a network of information systems on microcomputers, which collect data from the district level and feed into the national data collection system. The information collected is used both locally and nationally. Because of its flexibility, the system is able to provide data to help solve problems that change from year to year.

You now have a well-trained staff that are enhancing the overall effectiveness of the system.

Support is now coming from the highest levels of the Ministry for the work you have accomplished in EMIS over the past years.

School Area Survey One

Population Density by Region



Population density is highest along the Main River that runs from the Northwest Province through the Southwest Province and out to the ocean by the Port City of the Southeast Province. Population density is also high in areas by the ocean. The Northeast Province is inhabited largely by tribes that practice shifting agricultural methods in hamlets located throughout the province.

School Area Survey Two

Population Migration

Currently, many people migrate to urban areas for temporary employment; as a result, hill areas and villages are stagnating and are not meeting the growing socioeconomic needs of the populace. People from the hills are also moving to the more fertile valley. Between 1971 and 1981, the population of the valley increased at the rate of 4.19 percent per annum. As a result, even though the valley areas occupy only 23 percent of the land, it is now home to 44 percent of the people. This increasing population pressure is putting higher demands on existing school facilities.

School Area Survey Three

School Clusters

Research has shown that changes in institutional structures are necessary at local and national levels in order to improve access and quality of education.

School clusters provide a means of involving principles, teachers and parents in the educational process.

School clusters can allow for the distribution of resources such as libraries, special education needs and curriculum development, adapted to the sociocultural and economic reality of the region.

School Area Survey Four

Water and Latrines

Health and nutrition levels within any population group are critical in determining access and retention rates. Water is a basic determinant of health and nutritional standards.

In schools where water is not available, drinking water is often obtained directly from drainage canals. Without a safe water supply, children are less likely to attend school, or to be healthy when in school.

Latrines are also a determining factor in girls attending school.

Target Report One

To: Director of Research

From: Staff Advisor

Re: Education for Females and Their Economic Roles

Because of a gender-based division of labor in families, girls perform tasks that often keep them away from school. Girls' tasks are usually located in the home: They care for other children, fetch water and fuel, and do household chores.

While parents may be willing to send young girls to school, as girls get older their attendance rates drop. Parents do not believe that the education of their daughters will result in economic returns.

Since their daughters will move into their husbands' homes when they marry, any gains in productivity or income due to education will accrue to the husband's family rather than to them.

Target Report Two

To: Director of Research

From: Staff Advisor

Re: Education in the Rural Areas

The first factor that limits education in rural areas is the remoteness of schools. Schools have generally been built in the urban areas first, where population density is greatest and more children can be served. Rural children have to travel farther than urban children to reach their schools.

The lack of many resources in rural areas also affects school attendance. Teachers, materials, facilities and equipment are in short supply.

Many children in rural areas speak local languages and dialects, while the school curriculum is taught in the national language.

Children's parents do not encourage them to go to school because they are needed at home to work and because their parents did not attend school themselves.

Target Report Three

To: Director of Research

From: Staff Advisor

Re: Teacher Training

You have developed a research data base for determining an efficient design of in-service teacher training programs.

Results of your data analysis show that there is a correlation between student performance and teacher qualifications.

Through various surveys you have also learned that teachers learn most from in-service teacher-training programs that involve teachers in the identification and articulation of their own training needs.

When programs sponsored through central government agencies foster the adaptation of training based on local needs, school staffs are encouraged to develop a sense of ownership in the training process, thereby increasing their commitment to its success.

Through these training programs, your educational efficiency can increase substantially.

Target Report Four

To: Director of Research

From: Staff Advisor

Re: Demand for Education

A District Education Officer made the following observations about difficulties with primary education in his district:

“One large drawback is illiterate parents. As illiterates, they see no reason for education and do not send their children to school.

Another problem is poverty. People need their children to do whatever they can to earn money, whether by working on the farm or selling items. The tribal chiefs are also opposed to education, even those who themselves have been educated.

The greatest factor that determines whether a child goes to school is the parents', especially the fathers', attitude towards education.”

Case Report One

To: Director of Research
From: Staff Advisor
Re: Results of First Case Report

Results of first surveys conducted in the rural areas:

School A is in an isolated mountainous area that is very densely populated because of an important integrated rural development project.

The school enrollment rate among 7–12-year-olds is 32%.

The school was built in 1979 under a World Bank project and is in good condition. The six teachers in the school are considered qualified according to national standards. They receive six days of in-service training each year.

The school does poorly on the national examination. Our study indicates that teachers are little engaged and have a high absenteeism rate. When they are absent, there are no substitutes.

Case Report Two

To: Director of Research

From: Staff Advisor

Re: Results of Second Case Report

Women are the main producers of food in the Northwest province.

Women and children distribute fertilizers over the crops using direct broadcast methods.

The third highest cause of death among women and children in the region is due to indiscriminate use of fertilizers and pesticides.

Uneducated women pay twice as much for fertilizers and pesticides and use twice as much in crop production.

Case Report Three

To: Director of Research

From: Staff Advisor

Re: Results of Third Case Report

School B is in a densely populated area one hour outside the capital city, easily accessible by road. Near the school is a church, small shops and a health center, though there are no doctors for the 23,000 inhabitants of the community.

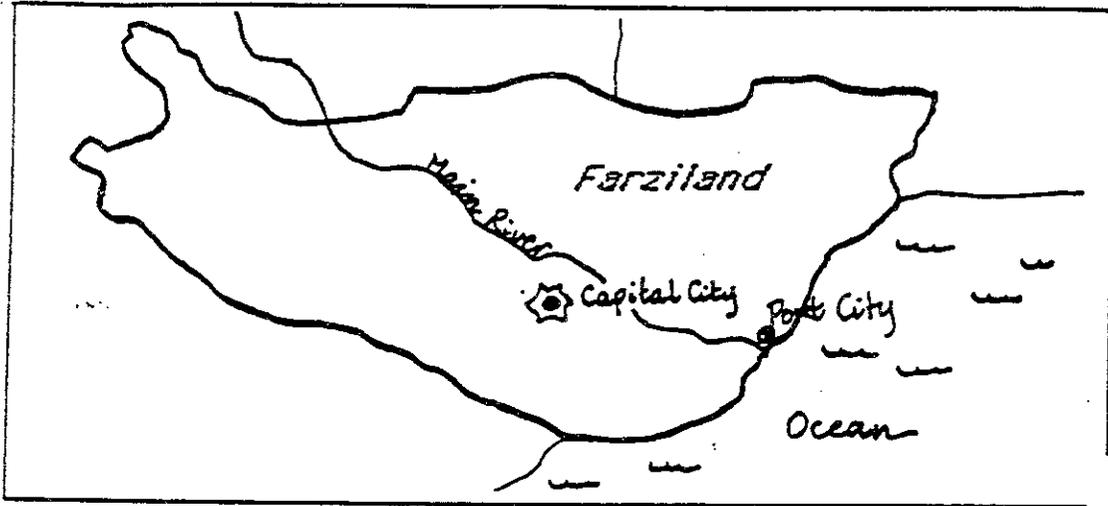
The school buildings are in generally satisfactory condition, but very crowded. The school has a very high success rate on the national school entrance examination, 30% compared to the national average of 10%.

One explanation could be the leadership of the principal, who makes three class visits per week, inspects student work, and gives demonstration lessons to teachers.

The principal directs the visited school and two satellite schools for a total of 1,433 students and 22 teachers.

Section Three

Participants' Materials



Country Scenario

Farziland is a country with a per capita income of \$350. Economic development is concentrated in two of its four provinces where most of its agriculture and industrial production take place.

The majority of its people live in villages or hamlets in its fertile plains and valleys. The urban population constitutes about a quarter of the total. In urban areas, most households live in makeshift housing. Between 1956 and 1972 the population increased by half. Family organization is strongly patriarchal. Women do not take part in the cash economy. In the rural areas women maintain the homestead gardens which are the source of most of the family's food produce.

The last census took place 10 years ago.

Statistics
Federal Republic of Farziland

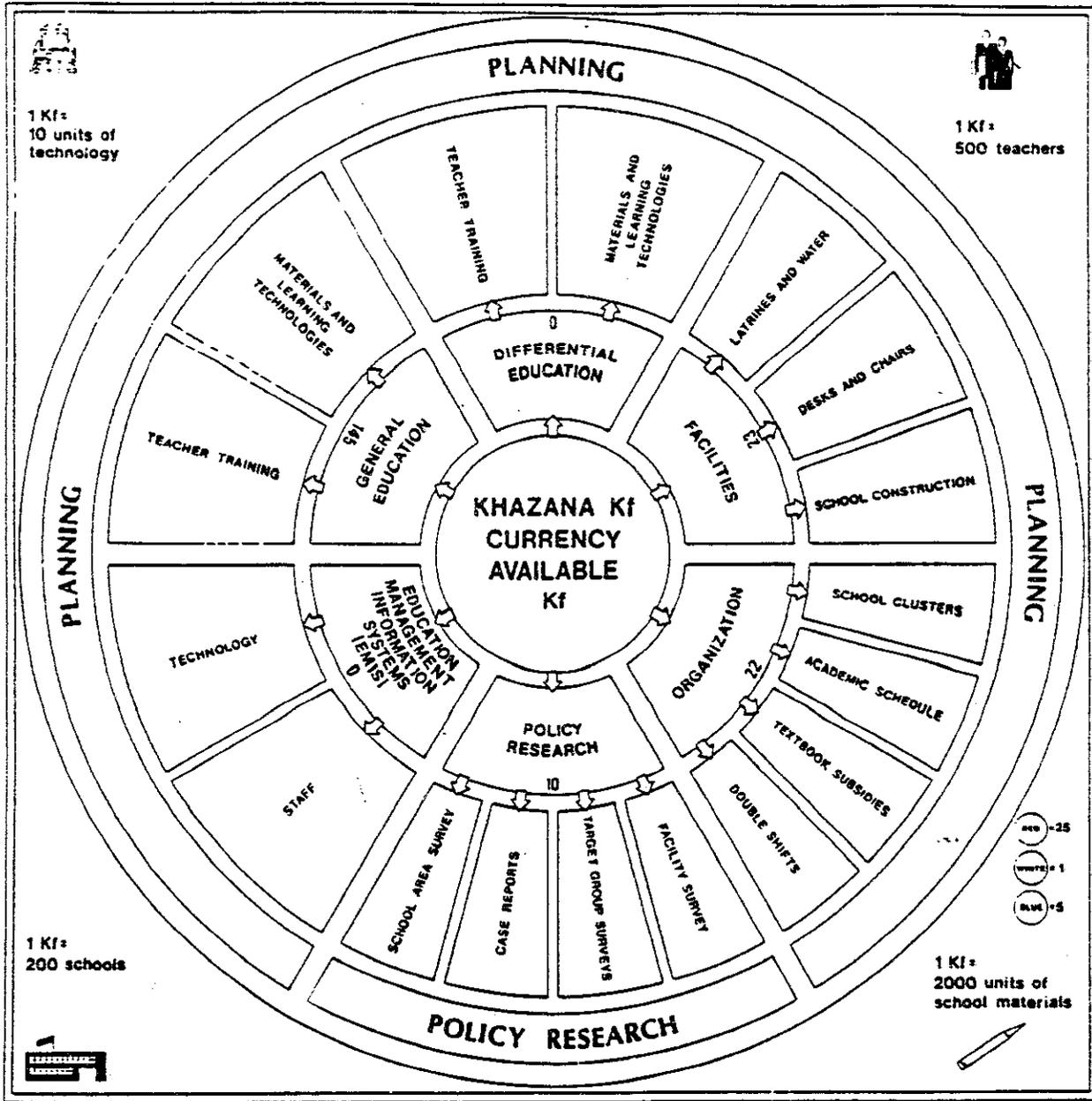
(Estimates based on the 1979 census)

Total population:	100 million
Total school-aged children (7-16):	25 million
Number of literates:	32 million
Male literacy:	35 %
Female literacy:	16 %
Percent of age group enrolled in primary school boys/girls	55/32
Annual population growth:	3.1%
Life expectancy at birth:	50 years
Birth rate:	47/1000
Death rate:	21/1000
Infant mortality rate (under 1):	135/1000
Under 5 mortality rate:	210/1000
Maternal mortality rate per 100,000 live births):	600

Estimated percentages of labor force:

Agriculture	Industry	Services
55%	15%	30%

EPICS Game Board



Minister of Education

The Prime Minister of Farziland is newly elected and you are newly appointed as Minister of Education. Until this year, you were a member of Parliament and have a degree in law. This is your first post in the Ministry of Education.

You are responsible directly to the Prime Minister for all the education policies and budgetary allocations that occur within the Ministry of Education. Your subordinates in the Ministry act principally as your advisors. Although they can suggest policy and expenditure options to you, the final decisions are yours alone.

The Prime Minister is concerned about the lack of advances in the overall literacy rate and the low level of basic education throughout the country and links this with the low quality of life in Farziland. According to recent assessments made by an international agency, current indicators show that on a scale of 1-10 (1 being the lowest and 10 being the highest) the general health of the population and agricultural production each rank number 3. Because of severe monetary constraints in your country there is little chance that more money will be allocated for education beyond the 2% increase represented by the Kf 1000 currently allocated.

The Prime Minister is ambitious for the economic advancement of the country and expects education to play a primary role in preparing the population for the changes that are foreseen. Your ambition is to please the Prime Minister with the hope of further political advancement within the leadership of the country. To that end, you intend to maintain a high profile and visibility in order to affirm your role in creating an education system that will trigger the development of the country.

Secretary of Education

The Prime Minister and Federal Minister of Education are both newly appointed. You have been the Federal Secretary of Education for the last five years. You are the Executive Head of the Ministry, while the Minister is the political head of the organization. You are directly responsible to the Minister and you have to keep a check on the administrative and financial matters.

You have been selected through competitive services and have long years of experience. The Minister of Education is responsible to the Prime Minister for the education policies and budgetary allocations but you have to justify the expenses to the Accounts Section of the Government, where lies the supreme authority.

You are loyal to the Minister of Education, but you know that the Minister's decisions are highly influenced by political aspirations and therefore you find yourself in the position of helping to create and maintain the balance within the political and administrative environments.

You have the authority to hire and fire people with the formal approval of the Minister. You are having difficulty because the Minister wants to hire people from his electoral constituency, who are not at all qualified to work in the Ministry.

The Director of Finance is related to the Minister and is ready to reallocate funds within the Ministry to unimportant work but you feel that you cannot let them do it because ultimately you are responsible to the Chief Secretary.

You are enthusiastic about the development of the country and realize the importance of education, but you are also fully aware of the rules and regulations which are usually ignored by people high political aspirations.

Director of Finance and Administration

You are newly appointed to the position of Director of Finance and Administration. Though you have been trained in financial analysis, your last posting in the military service was administrative and did not require any direct financial training. In your new posting in the Ministry of Education, however, you are responsible to the Minister of Education for recommendations on financial policy and administrative procedures. You oversee and direct the financial and administrative activities of the M.O.E. at the national level.

It is your responsibility to balance the budget at the end of the year. Because of overspending in some areas, often there have been unexpected cuts in the amount of funds that have already been allocated to certain sectors. The budget is Kf1000 which is a 2% increase over and above the previous budget.

Although there is little data on the costs of education, you know that the educational system is inefficient and with the scarcity of financial resources and the threat of further budget cuts your priority for the coming years is to develop the institutional infrastructure of the M.O.E. You would like to use new technology to create a management information system. For this purpose, you have recently hired a new Education Management Information Systems Officer.

Your position carries very heavy weight with the Ministry. You are related by marriage to the Minister of Education who regards your opinions highly and meets with you regularly.

Director of Planning

You report directly to the Minister of Education. You have worked your way up through the planning department, and are familiar with figures on the school population and the numbers of schools and teachers. General survey data is collected by the planning department.

You are particularly concerned about the fact that access to education is low and there is high disparity between male and female, urban and rural populations. Your priority is to increase the amount of money allocated to general education because of the new Prime Minister's concern with increasing the general level of education throughout the country. Your goal is to achieve universal primary education in the next 10-15 years.

Primary School Population
(in millions based on 1979 census data)

	Urban Girls	Urban Boys	Rural Girls	Rural Boys	TOTAL
In School Population	1.1	1.4	1.0	3.0	6.5
Out of School Population	.7	.5	3.8	2.2	7.2
Total Population	1.8	1.9	4.8	5.2	13.7

Total number of schools: 92,294

Total number of teachers: 160,000

Director of Research

You have recently been appointed to your position. You have worked in other government departments and received your training in sociology. Many of the members of your staff were recently hired and have also come from various government jobs.

Your department has received little attention or support from the Minister's office in past years. In fact, the research office has not been able to complete any studies satisfactorily because of lack of staff and insufficient budgetary allocations. You do not know how the new Minister of Education will view research activities. The Minister of Education is a political appointment and this new Minister is known as a person of action who has higher political ambitions. You know that the new Prime Minister, to whom the Minister reports directly, has a high regard for research due to years of study abroad. You heard this from a relative who is a secretary to the Prime Minister.

You work with the technology that was purchased by the Department of Finance and Administration. Currently there is one central computer office which has been developed in preparation for the new national census, but you do not have access to this facility.

General survey data is usually gathered by the planning office. You believe that the general data available to you now is incomplete and you suspect that it is not accurate. Currently you estimate that the total primary school participation rate in Farziland is 60%, of which 60% are boys and 40% are girls. You are concerned about the high disparity between male and female participation and you need specific data on these populations in the urban and rural areas which has not been adequately provided to you by the planning office.

Education Management Information Systems Officer

You have just been hired by the Director of Finance and Administration to help set up a new management information system for the Ministry of Education. You recently returned from graduate training abroad, and have many new ideas about how an Education Management Information System (EMIS) can be structured and utilized. You want to establish a computer information network throughout the country to allow for more accurate information gathering and analysis at the local provincial levels that can be accessed at the national level. The greater the investment in microcomputer technology and the staff to work with the new technology, the more decentralized the system becomes.

You realize, however, that most people in the M.O.E. are confused about the meaning and function of EMIS. The Ministry already has access to a large mainframe computer which was state-of-the-art when it was first installed. Investments in other systems are considered a waste of money.

Your goal is to convince other members of the ministry that a lot is to be gained by investing in an EMIS system: in both computers and staff training. If the Ministry collects accurate information, you believe they will be better prepared to make sound investments that will increase the access and retention rates in primary education throughout the country.

The Director of Finance and Administration is your ally. The Director of Research is also sympathetic to your views.

DECISION SHEET		MINISTRY _____				
	ROUND 1	ROUND 2	ROUND 3	ROUND 4	ROUND 5	
POLICY RESEARCH						
School Area Survey						
Case Reports						
Target Group Survey						
Facility Survey						
GENERAL EDUCATION						
Materials						
Teacher Training						
DIFFERENTIAL EDUCATION						
Materials						
Teacher Training						
FACILITIES						
School Construction						
Water and Latrines						
Desks and Chairs						
ORGANIZATION						
Academic Schedule						
Textbook Subsidies						
Double Shifts						
School Clusters						
EMIS						
Staff						
Technology						
TOTAL EXPENDITURES						
Bank Loan						

POLICY OPTIONS

POLICY RESEARCH: *Applied research to determine specific policy recommendations.*

School Area Survey - Collects data on the number of school age children in the country.

Case Reports - Collects longitudinal or in-depth data about a specific topic such as family norms or school conditions.

Target Group Survey - Collects information about specific population groups.

Facility Survey - Collects information about the number of schools in different parts of the country.

GENERAL EDUCATION: *Provides funds for a broadly based national education program.*

Materials & Learning Technologies - Includes textbooks, materials such as pencils, chalk boards and curriculum development.

Teacher Training - Pre-service and in-service training for teachers.

DIFFERENTIAL EDUCATION: *Provides funds for reforms to benefit specific population groups.*

Materials & Learning Technologies - Includes textbooks, materials such as pencils, chalk boards and curriculum development.

Teacher Training - Pre-service and in-service training for teachers.

FACILITIES: *Provides funds to build new facilities or improve the quality of existing facilities.*

School Construction - Build new school buildings.

Water and Latrines - Improves the quality of existing schools.

Desks and Chairs - Improves the quality of existing schools.

ORGANIZATION: *Redistribution of resources within the school system to increase efficiency.*

Academic Schedule - Takes into consideration seasonal changes that affect enrollments.

Textbook Subsidies - Issues textbooks free of charge.

Double Shifts - Allows two groups of students to attend one school.

School Clusters - Allows several schools to share resources and management (such as a library, a headmaster or specialized teachers).

EMIS: *Education management information systems to create computer networks for the collection, processing and analysis of school data.*

Staff - Hiring and training for development and use of EMIS.

Technology - Provide mini-computers and software for development and use of EMIS.

Section Four

Coordinator's Role and Materials

The Coordinator's Role

The coordinator's role is to facilitate the run of the game. She or he will play an active role in the pre- and post-game briefings, but while the game is in process, the coordinator's role is kept to a minimum. The coordinator will also keep watch over the time for each round. She or he will not perform actions that will arbitrarily make the game more difficult.

If questions about the rules arise after the simulation is in progress, the coordinator will only refer back to the manual or to instructions given in the pre-simulation briefing. The coordinator should avoid interpreting the rules, and advising on how to deal with situations that arise in the game. Any issues not covered by the manual or pre-simulation instructions can be defined by the group.

Pre-Simulation Briefing

The pre-simulation briefing is an important time to review the basic rules of the game. All players should know that the *Participant's Manual* provides them with the information they will need during the simulation, and that it is worth reading and rereading before the simulation. However, a personal introduction to the game by the coordinator to go over the basic elements of the gameboard and the rules is extremely valuable. Here we will outline and describe the actions you should take to introduce the participants to *EPICS* after they have read the simulation materials.

The primary objectives of the pre-simulation briefing are to:

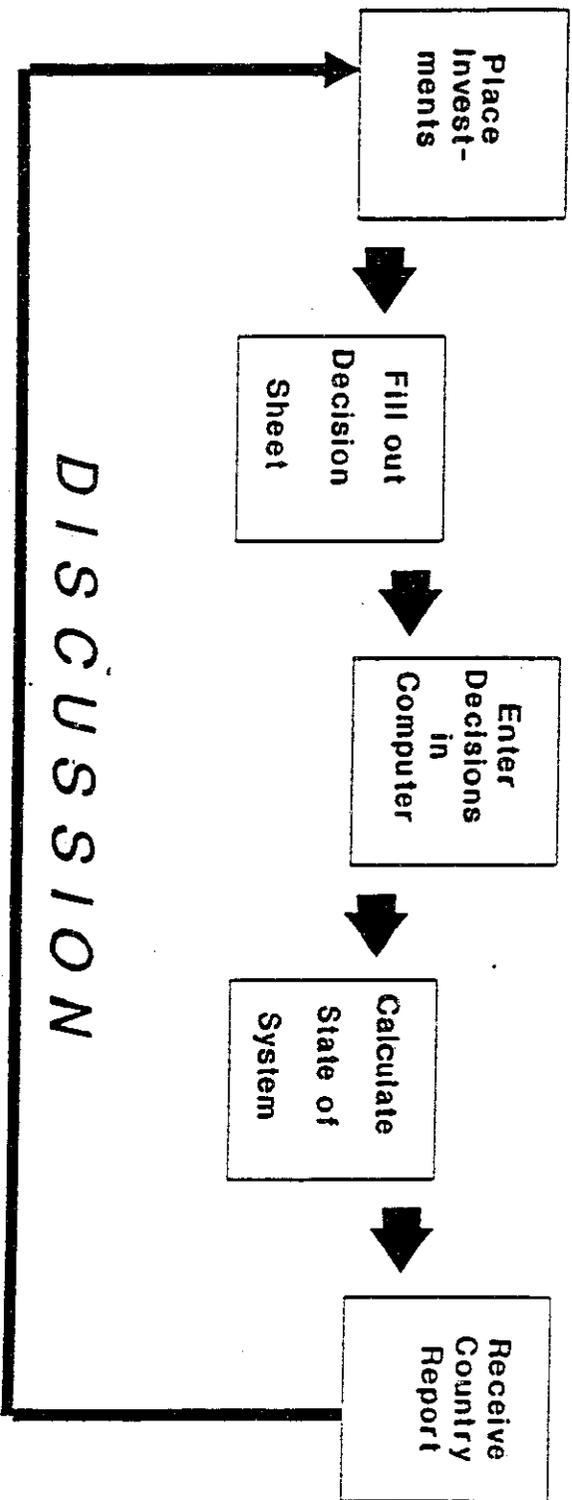
- Describe the structure of the simulation
- Describe the basic linkages of the simulation
- Review the rules of play
- Field questions about the simulation

- Identify the role assignments for all participants

Though a full understanding of the simulation will probably not be gained until players actually participate in the simulation run, a review of these basic points will help them to understand and feel more comfortable with the components of the simulation and the steps of play.

Section Five of this manual provides you with materials outlining the objectives for you to review during the pre-simulation briefing. The acetates for overhead projections serve as an effective way to focus the group's attention quickly. The pre-simulation briefing should not last more than 25 minutes, so you will want to be very organized and quick in presenting the materials.

Structure of Simulation



Structure of EPICS

During this part of the pre-simulation briefing, you should review the basic information needed to engage the participants in the simulation. The following checklist is a reminder of the points to cover.

(1) ***EPICS*** simulates elements of the decision process within a Ministry of Education (M.O.E.) in a fictitious country named Farziland. Though it is a representation, not the real thing, it replicates a M.O.E., and participants will experience some of the realities of planning within the context of the scenario presented.

(2) The goal is to plan effectively to increase participation rates of primary school-aged children in the fictitious country of Farziland.

(3) Some of the known information on Farziland is presented in the country scenario. In order to help provide a realistic environment in which to play out this simulation, a description of the fictitious country of Farziland is provided as well as a sheet of statistics (pp.). The description is purposely vague. Players will have to gain further information through their investments in policy research to know where to invest their funds most effectively. (A review of the known statistics presented on the information sheet can be discussed here.)

(4) The structure of the Ministry is defined by six roles:

- Minister of Education
- Secretary of Education
- Director of Planning
- Director of Finance
- Director of Research
- Director of EMIS Office

Role-play within the simulation emphasizes the functions performed by different people within the Ministry of Education. Each player acts

as part of the working environment of the group. Participants will be asked to play one of six roles throughout the simulation.

At the beginning of the simulation, each will be given a role. Role descriptions provide frameworks within which players can characterize the function or purpose of the role. The roles also characterize somewhat the social behavior and norms and social or political pressures of the group within which the individuals in the M.O.E. must operate.

(5) There are six areas within which policy options exist for investment purposes. These areas are:

- Education Management Information Systems
- Research
- Facilities
- Organization
- General Education
- Differential Education

There are minimum investments that must be allocated to each area in order to effectively implement them. The investments of the previous administration are listed on the board. (It is helpful to have a copy of the gameboard projected or pasted up on a wall during the briefing.)

(6) The game operates as follows:

Funding Allocation

Khazana (Kf) serve as the basic currency within the country. Initially, each ministry is allocated a total of Kf1,000 to invest throughout the entire period of the simulation run (25 years). This amount represents a total amount of government allocations given to the ministry *over and above* the recurrent costs. Amounts are distributed to designated areas of investment on the board during each period of play according to rules specified in the manual. Khazana (Kf) is represented by three different colors of chips representing different amounts. Red

chips have a value of 25, blue chips have a value of 5, and white chips have a value of 1.

Steps of Play

Step One: Decisions must be made by the group on which categories to invest Kf and place the Kf chips in the inner wheel. It is not required that funds be allocated to every category.

Step Two: The group must then distribute all the allocated funds to programs within each category on the second wheel of the board (move Kf chips in the inner wheel out to outer wheel). Again, they are not obliged to spend funds on every option in the second wheel.

Step Three: Decision sheets are filled in according to the decided budget allocations and given to the EMIS officer. The EMIS officer enters the allocations into the computer.

Step Four: Results of decisions are given in a feedback report. The nature and quality of the information received depends on the investments made. The results measure the status of the country and the primary education system at the end of each time period.

Step Five: Clear Kf allocations from the gameboard, check the remaining chips in the center of the board and begin another round with Step One.

Time Period

Each period of play lasts a specific amount of time. The first period lasts 30 minutes, and each successive period is allocated less time. At the beginning of each time period, the timer is set on the gameboard. The ministry will be expected to have made decisions by the time the bell rings at the end of each period. If decisions have not been made then the ministry will forfeit its decisions, and investments from the previous round will automatically be registered.

Country, Group and Individual Goals

It is recommended that all players have personal as well as ministerial and country goals to make the simulation more realistic. Some role descriptions provide goals of a personal nature, others don't.

Player's Objectives

The objective of each player should be to achieve personal goals, to help the ministry achieve its educational goals, and to help the country achieve its development goals. If these goals are achieved, the larger objective of learning about particular dynamics of planning and policymaking will be achieved.

Question and Answer Period

The coordinator should open discussion of the simulation to the participants once the rules and structure of the simulation have been described. The time and extent of the question and answer period can vary according to the circumstances.

Role Assignments

The role assignments should be given at the end of the briefing. In order to maintain neutrality in role assignments, the roles should be given by random selection.

Performance Indicators

Numerical values for ministerial performance indicators are calculated at the end of each period of play. These indicators may be raised by investing in particular policy options (pp 11-14).

Efficiency Function

The efficiency of the system is regulated by investments in research and EMIS.

Special Events and Information Feedback

The coordinator may announce the occurrence of certain external events that may affect the ministry's operations. Players will not be

informed in advance when they will occur (if at all) or what their nature will be.

Information feedback will be given to participants as a result of investments in policy research options. Feedback material and events are given in Section Two (pp. 28-44). Options are given in Section One (pp. 11-14).

Post-Simulation Debriefing

The debriefing session after the simulation has ended is an essential part of the learning process of the exercise. Discussion of the experience of the simulation, analysis of the model and comparisons to real-life experience are essential to linking theory with practice.

Discussion

Discussion during the debriefing may initially focus on the experience itself. Players will need to be allowed to comment on their experiences. As the debriefing begins, results can be posted on a board to refer to as points arise, and participants can begin to talk about their performance. Performance can be discussed on the basis of the style or level of participation — how the members of each ministry functioned as a group (e.g. competitive, cooperative or hierarchical). Participants' emotions may run high, depending on the intensity with which the game was played. It is important to hear player's responses and also to avoid allowing one or two people to dominate the discussion. Give each player and/or table of players an equal amount of time to share their experience before getting on to an analysis of the model and how it functioned.

Analysis

After participants have discussed initial experiences, you can move on to an analysis of the run of the simulation. The coordinator might focus the discussion on one of several areas, depending on the context of the simulation. For example, we suggest that the coordinator lead off with

a discussion of the framework of the model (p. 6) and then move on to a comparison of results among the participants. Sometimes it is useful to compare tables if more than one group is playing the simulation, or to discuss the results of other groups. We present comparison data on two extreme outcome scenarios Section Six for discussion. The following section provides an example of the use of *EPICS* to demonstrate some issues concerning access to education by gender, particularly as it involves the most disadvantaged group in the *EPICS* scenario: rural girls. To begin the analysis, we provide a simple description of the gender issue in primary education and relate it to the country of Pakistan. References to case studies in other countries are also made to illustrate particular parts of the analysis. Also provided is a suggested reading list on the subject of girls' access to education. This material is presented as an example of the way that *EPICS* can be used. According to the context, there will undoubtedly be other more useful material available, and we encourage you to use whatever will enhance the simulation process to make it as meaningful for the participants as possible.

Summary Note

EPICS is a complex game and some time and effort are needed to study the rules and simulation materials in order to acquire a working knowledge of the simulation. If the simulation could be understood fully by one person after a couple of readings, the complex system that the simulation embodies would not be needed. It is not necessary to master the details of every player. The uncertainties of *EPICS*, to a large extent, characterize the uncertainties of the policy and planning environment of every ministry of education. However, within the uncertain environment there are ways to increase the effectiveness and efficiency of the educational system. To plan effectively, it is necessary to gather as much useful information as possible and communicate clearly with team members. Agreement is necessary

among members of the ministry as to *the state of the educational system and the needs of the people* — the boys and girls to whom educational access is being offered — to achieve the goal of universal primary education. If the ministry is gathering information useful to policy and planning decision making, and it is able to process information effectively, then the system will improve. After the simulation has been completed, participants evaluate their individual and group performance during the debriefing session. During that time they compare their personal progress with the progress of the ministry and, finally, with the overall development of Farziland.

Section Five

Briefing Overheads and Script

Introduction

This section of the Coordinator's Manual contains copies of the overhead transparencies provided in the *EPICS* package. They are presented here with a script to help the coordinator introduce *EPICS* to the participants and to help in the debriefing of the simulation run.

Part I: Pre-Simulation Briefing

Introduction and brief discussion of purpose and uses of simulations

Introduction to the *EPICS* simulation

Part II: Post-Simulation Debriefing

Country Reports

- Outcomes
- Process

EPICS Model

- Framework
- Conceptual Model
- Simulation Model

Contrasting Scenarios

- General Education
- Differential Education

Empirical Data

Policy Guidelines

- Delays
- Common Problems
- Improving Performance
- Guides for Policymakers

Part I: Pre-Simulation Materials

Pre-Simulation Script for Overhead Transparencies

1-1. We begin the *EPICS* run with this quote from H. G. Wells: "Human history becomes more and more a race between education and catastrophe." During this simulation you will be asked to do your best as policymakers and planners to increase access to education in the fictitious country of Farziland.

1-2. Functions of a simulation . . . (*read the overhead*).

1-3. Purpose . . . (*read the overhead*).

1-4. The functions of *EPICS* . . . (*read the overhead*).

1-5. Goals: The goals of *EPICS* are to increase access and participation rates in primary education.

1-6. Why is access to primary education important? . . . (*continue reading the overhead*).

1-7. The policy options that players will invest in are as follows: . . . (*Review the overhead. After reading General Education and Differential Education, add:*) . . . General Education refers to training programs and material development that will be applied **uniformly** across all primary schools throughout the country.

Differential Education refers to training programs and material development that will be **targeted** to increase access and retention rates for **specific groups of primary school children**.

1-8. The *EPICS* Simulation Model: This diagram illustrates how the policy options are linked to access to education and to each other. Many policy variables have reinforcing links that work together to compound the impact the policy choices have on access.

1-9. Player Roles . . . (*read the overhead*).

1–10. Population Disaggregation . . . (*read the overhead*).

1–11. Structure of the Simulation: Each round will proceed in the following manner:

1. As a result of your discussion, **place investments** in the outer wheel.
2. The Secretary of Education will **fill our the decision sheet**.
3. The EMIS Officer will **calculate the state of the system**.
4. The Minister will **receive the country report**.

1–12. The simulation will cover 25 years. You will play five rounds that cover five years each. The 1000 khazanas are special funds dedicated to policy investments for the 25-year period. These funds are available for investment **outside the normal operating budget** of the education system.

1–13. The Country Scenario . . . (*continue to read the overhead*).

1–14. These are the most recent statistics available officially in the country of Farziland.

1–15. Here is a view of the gameboard that is on the table before you. The 1000 khazanas for the five rounds are located in the center of the board. Red chips have a value of 25, blue chips are 5, and white chips are 1.

As you begin each round, you must allocate funds to the general categories located in the inner circle.

You must then move your chips to the outer wheel, where you will decide which policies to invest in. You do not have to invest in all the policies, or in all the categories. That is for you to decide as a group.

The numbers in the inner circle represent the amount of money that was allocated to each category by the previous administration.

To begin the first round, the Minister of Education will call a meeting. This is the first time that members of various departments in the Ministry have met. The Minister will request that each player introduce her/himself, summarize the information available in the role sheet, and make suggestions for a plan of action to improve the primary school system in Farziland.

1-16. This is a list of the policy options that are available to you with a brief description of each.

1-17. This is an example of the decision sheet that you have on your table, which the Secretary of Education will fill out at the end of each round.

1.18 and 1.19. Country Report: This is an example of the kind of information you will receive in your country report. Participation rates by gender and location; ranking of access and disparity; quality ratings on the school system and quality of life. The quantity and quality of the information you receive will depend directly on how much you invest in research and EMIS.

1.20. Here are some of the policy issues to consider . . . (*continue reading the overhead*).

1.21. Ask yourself the following questions as you make your decisions . . . (*continue reading the overhead*).

And now it is time to begin to play **EPICS**. The Secretary of Education should note that all the decisions in the first round should be made and entered into the computer within 30 minutes time.

The Minister of Education will begin by calling the meeting to order.

1-1. We begin the *EPICS* run with this quote from H. G. Wells: "Human history becomes more and more a race between education and catastrophe." During this simulation you will be asked to do your best as policymakers and planners to increase access to education in the fictitious country of Farziland.

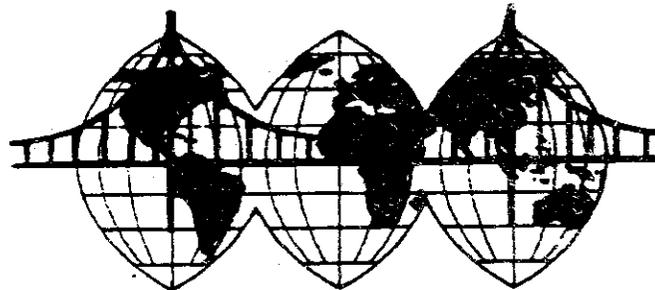
1.1 EPICS

"Human history becomes more and more a race between education and catastrophe."

H.G. Wells
The Outline of History

EPICS

EDUCATION POLICY SIMULATION



by
Claire Brown, Haroona Jatoi
and
Christina Rawley, Coordinator
Harvard Institute for International Development

1-2. Functions of a simulation . . . (*read the overhead*).

1.2 **◆◆ EPICS**

Functions of a Simulation

- **Demonstrate the effects of different policies**
- **Allow policy experimentation without risk**
- **Convey general principles of system behavior**
- **Allow research into the behavior of a system**
- **Gather information from the participants themselves**
- **Provide a shared experience to aid in discussing potential problems**
- **Convey insights about impacts on the economy, society, and political system**

1-3. Purpose . . . (*read the overhead*).

1.3  **EPICS**

Purpose

EPICS simulates the dynamics of educational policy making and planning to improve access to schooling among diverse populations in a low income country.

The simulation provides an environment in which to experience and experiment with fundamental concepts and issues in planning for educational change.

The interrelationships among factors concerning access and retention rates at the national, regional and community levels using qualitative and quantitative data are explored.

1-4. The functions of *EPICS* . . . (read the overhead).

1.4 EPICS

The Functions of EPICS

- **Illustrate the need for researching and targeting educational groups.**
- **Emphasize the importance of multiple strategies.**
- **Demonstrate the quantitative and qualitative effects of different policies.**
- **Facilitate discussion about resource allocation under budget constraints.**
- **Show the delays involved in setting up programs.**
- **Give practice in communication, negotiation, and group strategy design.**

1–5. Goals: The goals of *EPICS* are to increase access and participation rates in primary education.

1.5  **EPICS**

GOALS

Increase access

Increase participation rates

1-6. Why is access to primary education important? . . . (*continue reading the overhead*).

1.6  **EPICS**

Why is access to primary education important?

- **Access is the key to educational opportunity and participation**
- **Education is a means of achieving several goals:**
 - **Economic**
 - **Social and Political Development**
 - **National Integration**
- **Education for all children is valued as a basic right**

1-7. The policy options that players will invest in are as follows: . . .
(Review the overhead. After reading *General Education and Differential Education*, add:) . . . General Education refers to training programs and material development that will be applied uniformly across all primary schools throughout the country.

Differential Education refers to training programs and material development that will be targeted to increase access and retention rates for specific groups of primary school children.

1.7 EPICS

Policy Options

•General Education

- Training Programs
- Material Development

•Policy Research

- School area survey
- Facility survey
- Target group survey
- Case reports

•Facilities

- School construction
- Desks and chairs
- Water

•Differential Education

- Training Programs
- Material Development

•Organization

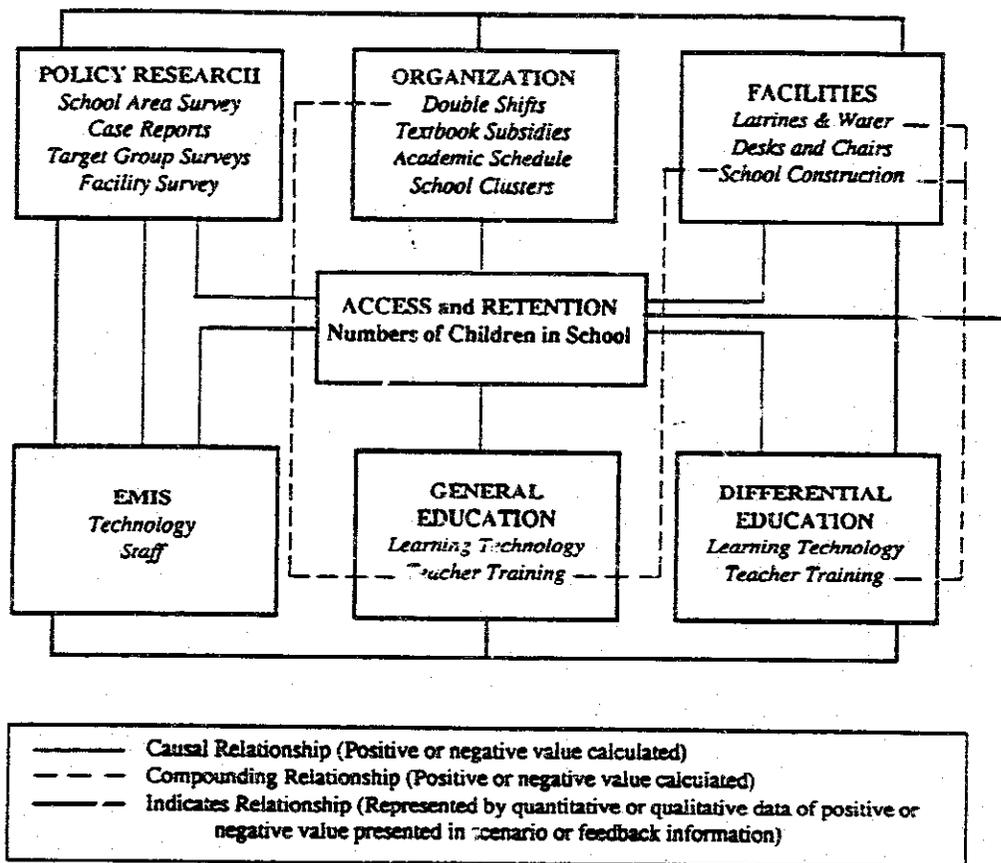
- Academic schedule
- Double shifts
- Subsidized textbooks
- School clusters

•Education Management Information Systems

- Technology
- Staff

1-8. The *EPICS* Simulation Model: This diagram illustrates how the policy options are linked to access to education and to each other. Many policy variables have reinforcing links that work together to compound the impact the policy choices have on access.

1.8  EPICS



1-9. Player Roles . . . (*read the overhead*).

1.9  **EPICS**

Player Roles

- **Minister of Education**
- **Secretary of Education**
- **Director of Finance and Administration**
- **Director of Planning**
- **Management Information Systems Officer**
- **Director of Policy Research**

1-10. Population Disaggregation . . . (*read the overhead*).

1.10  EPICS

Population Disaggregation

Players design and implement policies that impact on several populations. Explicit disaggregated populations are:

- Urban
- Rural
- Male
- Female

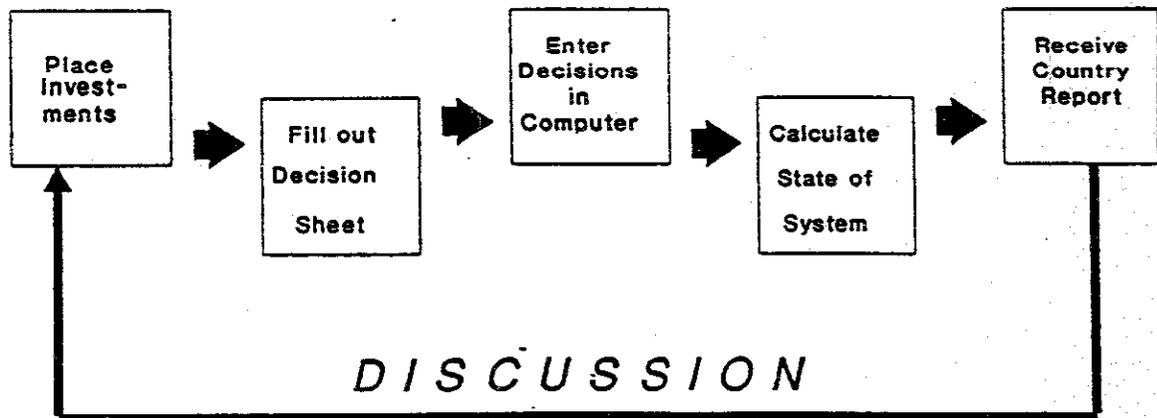
(Socio-economic status is implicit in the model)

1-11. Structure of the Simulation: Each round will proceed in the following manner:

1. As a result of your discussion, **place investments** in the outer wheel.
2. The Secretary of Education will **fill out the decision sheet**.
3. The EMIS Officer will **calculate the state of the system**.
4. The Minister will **receive the country report**.

1.11 EPICS

Structure of Simulation



1-12. The simulation will cover 25 years. You will play five rounds that cover five years each. The 1000 khazanas are special funds dedicated to policy investments for the 25-year period. These funds are available for investment outside the normal operating budget of the education system.

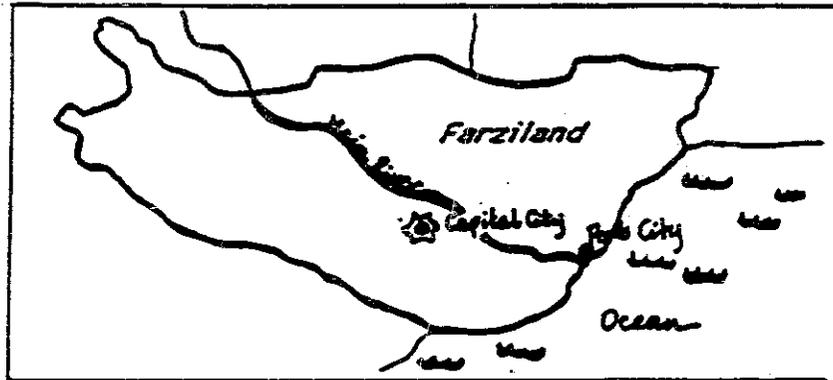
1.12 EPICS

Basic Information

- Time span of 25 years
- 5 year cycles of play
- Budget allocation of 1,000 Kf

1-13. The Country Scenario . . . (continue to read the overhead).

1.13 EPICS



Country Scenario

Farziland is a country with a per capita income of \$358. Economic development is concentrated in two of its four provinces where most of its agriculture and industrial production take place.

The majority of its people live in villages or hamlets in its fertile plains and valleys. The urban population constitutes about a quarter of the total. In urban areas, most households live in makeshift housing. Between 1956 and 1972 the population increased by half. Family organization is strongly patriarchal. Women do not take part in the cash economy. In the rural areas women maintain the homestead gardens which are the source of most of the family's food produce.

^c The last census took place 10 years ago.

1-14. These are the most recent statistics available officially in the country of Farziland.

1.14  EPICS

Federal Republic of Farziland Statistics (Estimates based on the 1979 census)	
Total population:	100 million
Total school-aged children (7-16):	25 million
Number of literates:	32 million
Male literacy:	35 %
Female literacy:	16 %
Percent of age group enrolled in primary school boys/girls	55/32
Annual population growth:	3.1%
Life expectancy at birth:	50 years
Birth rate:	47/1000
Death rate:	21/1000
Infant mortality rate (under 1):	135/1000
Under 5 mortality rate:	210/1000
Maternal mortality rate per 100,000 live births):	600
Estimated percentages of labor force:	
Agriculture	55%
Industry	15%
Services	30%

1-15. Here is a view of the gameboard that is on the table before you. The 1000 khazanas for the five rounds are located in the center of the board. Red chips have a value of 25, blue chips are 5, and white chips are 1.

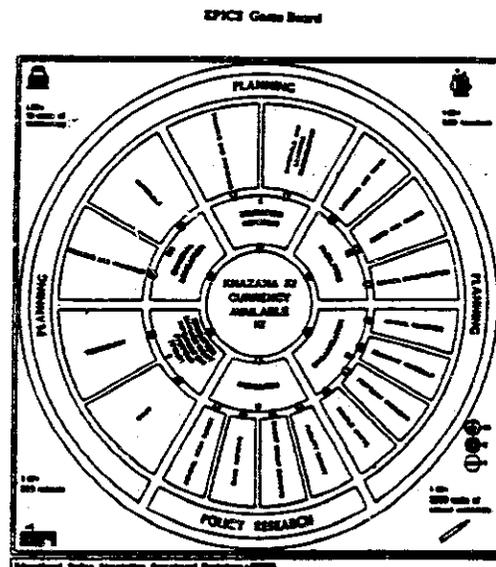
As you begin each round, you must allocate funds to the general categories located in the inner circle.

You must then move your chips to the outer wheel, where you will decide which policies to invest in. You do not have to invest in all the policies, or in all the categories. That is for you to decide as a group.

The numbers in the inner circle represent the amount of money that was allocated to each category by the previous administration.

To begin the first round, the Minister of Education will call a meeting. This is the first time that members of various departments in the Ministry have met. The Minister will request that each player introduce her/himself, summarize the information available in the role sheet, and make suggestions for a plan of action to improve the primary school system in Farziland.

1.15 **EPICS**



1-16. This is a list of the policy options that are available to you with a brief description of each.

1.16  EPICS

POLICY OPTIONS

POLICY RESEARCH: *Applied research to determine specific policy recommendations.*

- | |
|---|
| School Area Survey - Collects data on the number of school age children in the country. |
| Case Reports - Collects longitudinal or in-depth data about a specific topic such as family norms or school conditions. |
| Target Group Survey - Collects information about specific population groups. |
| Facility Survey - Collects information about the number of schools in different parts of the country. |

GENERAL EDUCATION: *Provides funds for a broadly based national education program.*

- | |
|---|
| Materials & Learning Technologies - Includes textbooks, materials such as pencils, chalk boards and curriculum development. |
| Teacher Training - Pre-service and in-service training for teachers. |

DIFFERENTIAL EDUCATION: *Provides funds for reforms to benefit specific population groups.*

- | |
|---|
| Materials & Learning Technologies - Includes textbooks, materials such as pencils, chalk boards and curriculum development. |
| Teacher Training - Pre-service and in-service training for teachers. |

FACILITIES: *Provides funds to build new facilities or improve the quality of existing facilities.*

- | |
|--|
| School Construction - Build new school buildings. |
| Water and Latrines - Improves the quality of existing schools. |
| Desks and Chairs - Improves the quality of existing schools. |

ORGANIZATION: *Redistribution of resources within the school system to increase efficiency.*

- | |
|---|
| Academic Schedule - Takes into consideration seasonal changes that affect enrollments. |
| Textbook Subsidies - Issues textbooks free of charge. |
| Double Shifts - Allows two groups of students to attend one school. |
| School Clusters - Allows several schools to share resources and management (such as a library, a headmaster or specialized teachers). |

EMIS: *Education management information systems to create computer networks for the collection, processing and analysis of school data.*

- | |
|---|
| Staff - Hiring and training for development and use of EMIS. |
| Technology - Provide mini-computers and software for development and use of EMIS. |

1-17. This is an example of the decision sheet that you have on your table, which the Secretary of Education will fill out at the end of each round.

1.17  EPICS

DECISION SHEET		MINISTRY _____				
	ROUND 1	ROUND 2	ROUND 3	ROUND 4	ROUND 5	
POLICY RESEARCH						
School Area Survey						
Case Reports						
Target Group Survey						
Facility Survey						
GENERAL EDUCATION						
Materials						
Teacher Training						
DIFFERENTIAL EDUCATION						
Materials						
Teacher Training						
FACILITIES						
School Construction						
Water and Latrines						
Desks and Chairs						
ORGANIZATION						
Academic Schedule						
Textbook Subsidies						
Double Shifts						
School Clusters						
EMIS						
Staff						
Technology						
TOTAL EXPENDITURES						
Bank Loan						

1.18 and 1.19. Country Report: This is an example of the kind of information you will receive in your country report. Participation rates by gender and location; ranking of access and disparity; quality ratings on the school system and quality of life. The quantity and quality of the information you receive will depend directly on how much you invest in research and EMIS.

1.18 EPICS

YOUR OWN COUNTRY REPORT

Participation Rates	
Total	60%
Male	70%
Female	50%
Access	
Disparity	LOW
Quality Ratings: Scale 1-10	
Quality of Teaching	4
Quality of Facilities	4
Efficiency of System	3
Quality of Life	4
Health	3
Food Production	4
Agricultural Development	5
Industrial Development	4
School System	
No. of Teachers in Training (in 1000s)	5
Total No. of Teachers (in 1000s)	150
No. of Schools Planned (in 1000s)	3
Total No. of Schools (in 1000s)	50
Total Budget Spent	
Total Budget Remaining	1000

1.19 EPICS

SPORT ON SCHOOL DATA

Round 1

Participation Rates	
Overall	60%
Girls	50%
Boys	70%
Urban Girls	
Population	1,865,000
In School	1,146,000
Out of School	719,000
Participation Rate	68.3%
Urban Boys	
Population	1,978,900
In School	1,433,000
Out of School	545,900
Participation Rate	85.2%
Rural Girls	
Population	5,055,800
In School	1,980,755
Out of School	3,075,045
Participation Rate	45.2%
Rural Boys	
Population	5,523,600
In School	3,175,000
Out of School	2,348,600
Participation Rate	70.5%

1.21. Ask yourself the following questions as you make your decisions
... (continue reading the overhead).

And now it is time to begin to play *EPICS*. The Secretary of Education should note that all the decisions in the first round should be made and entered into the computer within 30 minutes time.

The Minister of Education will begin by calling the meeting to order.

1.21 **EPICS**

- How will expenditures be balanced between education policies?
- How will expenditures be allocated between General Education and Differential Education?
- How will the money be allocated over time?
- What impact will policy choices have on different population groups?

1.20. Here are some of the policy issues to consider . . . (*continue reading the overhead*).

1.20  **EPICS**

Policy Issues to Consider

Supply		Demand
policies to increase supply	vs.	policies to increase demand
policies to increase overall enrollments	vs.	policies to increase enrollments of groups currently underrepresented
policies to improve opportunities to enroll	vs.	policies to increase retention of those who are already enrolled

1.21. Ask yourself the following questions as you make your decisions
... (continue reading the overhead).

And now it is time to begin to play *EPICS*. The Secretary of Education should note that all the decisions in the first round should be made and entered into the computer within 30 minutes time.

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1.21  **EPICS**

- How will expenditures be balanced between education policies?
- How will expenditures be allocated between General Education and Differential Education?
- How will the money be allocated over time?
- What impact will policy choices have on different population groups?

1.20. Here are some of the policy issues to consider . . . (*continue reading the overhead*).

1.20  **EPICS**

Policy Issues to Consider

Supply		Demand
policies to increase supply	vs.	policies to increase demand
policies to increase overall enrollments	vs.	policies to increase enrollments of groups currently underrepresented
policies to improve opportunities to enroll	vs.	policies to increase retention of those who are already enrolled

Part II: Post-Simulation Materials

Debriefing Script for Overhead Transparencies

2-1. *(At the end of the last round, the coordinator will want to draw the attention of the groups again toward the front of the room. While the EPICS transparency is being projected, you can call the group to order.)* The debriefing section of the simulation takes place in two parts. During the first part, we will hear the results you achieved during the simulation. During the second part, I will describe the characteristics of the **EPICS** model and give examples of the outcomes of contrasting policy strategies.

2-2. You have proceeded through several steps during the simulation in placing your investments, filling out the decision sheets, entering decisions into the computer for calculations on the state of the system and receipt of the country report. Please give a brief report on the decision-making process you experienced during the run of the game and report on the state of the education system of your country and the quality of life that you have achieved.

2-3. Please consider the following questions in your report . . . *(read the questions)*.

2-4. *(After listening to reports on the process and the state of the system, move on to a discussion of the EPICS model.)* This simulation model was prepared following the framework presented in the research review entitled *Improving Access to Schooling in the Third World: An Overview* by Dr. Mary B. Anderson . . . *(read overhead)*.

2-5. This figure illustrates the **EPICS** conceptual model. It shows the factors associated with access to education and retention. Resources and governmental factors are indicated on the supply side, and household factors on the demand side.

2-6. The policy model used in the computer simulation looks like this . . . *(review the model briefly)*. On the left we see the dynamic

relationships among the policy options as they relate to access to schooling; on the right side, the illustration shows the path model of the relevance of primary education to quality of life indicators.

2-7. Looking more closely at the policy relationships, we can see that the solid lines with arrows represent causal relationships that are quantified in the model; the broken lines with arrows represent compounding values that are quantified in the model; and the solid lines (with no arrows) indicate a relationship in the simulation represented by quantitative or qualitative data presented during the simulation by either feedback sheets or role descriptions.

2-8. A closer look at the path model reveals that the *EPICS* model is designed to show outcomes based on distinct divisions of labor in the Farziland scenario. Thus, changes in quality ratings are directly related to the education access levels achieved by the four population groups in the country. The quality ratings rate four areas of development. They are (1) agriculture, (2) industry, (3) health, and (4) food production. A fifth quality rating (Quality of Life) is an average of these four categories.

A description of the division of labor associated with these categories reveals some hidden patterns. Most of the food grown for consumption by the general population is produced by indigenous subsistence methods used by the women and children of the households. In the rural areas, the men are involved in agricultural production on ranches, and this food is produced largely for export. Most of the industrial development is concentrated in the city where urban boys provide the labor force, and the urban and rural girls are responsible for the health care of the population.

The division of labor in the Farziland scenario is such that quality ratings of food and health are a result of girls' access to education, while agricultural and industrial development ratings are a result of boys' access to education. Access levels in education by rural boys

affect agricultural development; urban boys affect industrial development; rural girls affect food production; urban and rural girls affect health. Access by residence (rural or urban) and gender (girls or boys) affects the average access rating, which in turn affects the overall quality of life rating.

2-9. The *EPICS* model looks at the relationships between education and productivity and social welfare. Investments in underrepresented groups through the Differential Education category and in those who already have access through investments in the General Education category are correlated with productivity and social welfare in terms of agriculture, health, food and industrial development.

2-10. These two graphs compare the system behavior that is characterized in the *EPICS* model through an emphasis in either General Education or Differential Education as they affect boys' and girls' participation rates.

The General Education category favors an increase in the quality of education for those who already have access to education and maintains the status quo of Farziland. Consequently, investments concentrated in this policy category will increase participation rates of boys first. Dramatic increases in girls' participation rates will occur when the boys' participation rate reaches 75%. At this point, most families have their sons in school, and the social norms have changed so that there is greater acceptance of the value of education for both genders, and the demand has increased for girls' education.

The Differential Education category favors access to education by the underrepresented groups and changes the status quo of Farziland. Consequently, investments concentrated on this policy category will increase girls' participation rates before boys' participation reaches 75%, and much earlier in the game. Boys' participation rates increase slowly, while girls' increase more rapidly from the beginning of the run.

2-11. An investment strategy in General Education affects the disparity and quality ratings in this way: Disparity between girls' and boys' participation rates remains high, and the gender gap is large throughout the first three rounds of the game (representing the years 1990-2005). However, in round 3, boys' participation rates reach 75%, and by round 4 (year 2010), dramatic increases occur in girls' participation rates that begin to close the gender gap. By round 5 (year 2015), with a 10% difference in participation rates between boys and girls, disparity is low — the gender gap is greatly diminished.

Quality ratings change over time with the changes in the participation rates. General Education maintains the status quo and the education of boys. Therefore, an investment strategy emphasizing General Education will show increases in industrial and agricultural development, with little improvement in health and food production until girls' access increases and the gender gap is closed. Under this scenario, Farziland will develop its industrial and agricultural capabilities, but there will be little or no increases in food production and the health of the population will remain poor.

2-12. Investments with an emphasis on Differential Education show very different behaviors. Differential Education favors education for girls. Therefore, an investment strategy emphasizing Differential Education will show earlier and more rapid increases in health and food production. Industrial and agricultural quality will not improve as rapidly, but the general health and welfare of the country will improve. In a Differential Education scenario, participation rates for girls grow rapidly from the beginning of the simulation (year 1990). By the second round (year 2000), the disparity level is low, and the gender gap is reduced to less than 15% difference between boys' and girls' participation rates. Corresponding quality ratings show increases in food and health. Agriculture and industry ratings increase slowly.

2-13. The scenarios presented here for the fictitious country of Farziland are based on the results of studies on the importance of family, school and community factors in education. The effects of education policy on the education of girls and women have been shown in different low-income countries and point out the gains from female education. These four scatter plots show data that correlate the enrollment rates of girls with economic productivity and social welfare. A World Bank study of 200 countries shows that nations that have invested heavily in female primary education benefit through higher economic productivity, lower infant and maternal mortality, longer life expectancy for both men and women, and lower fertility rates than countries that have not achieved as high education levels for women.

2-14. These three scatter plots show the influence of the gender gap on development. The study shows lower economic production in countries with a large gender gap (measured as the ratio between male and female enrollment rates). Other countries with the same amount of capital stock and labor force but a smaller gender gap show higher levels of economic productivity. Furthermore, when comparing two countries with similar per capita income and patterns of expenditures in the social sectors, the country with the larger gender gap will experience worse indicators of social welfare. King points out that "an implication of this finding is that a country with a wide gender gap will have to raise per capita income more than will a country with a small gap in order to achieve similar levels of social well-being. . . . Countries that are economically better off also have longer life expectancy and lower fertility and infant mortality than poorer countries. However, some poorer countries with a narrow education gender gap achieve levels of social well-being comparable to those of some richer countries with a larger gender gap."

2-15. The *EPICS* model was designed to show how policymaking at the national level may be implemented in ways that affect four

population groups in very different ways. This is of great concern when education systems are in the process of decentralization, and as cultural diversity is acknowledged and better understood. Cultural and socioeconomic diversity is represented in the *EPICS* model by four population groups: boys, girls, urban and rural. However, these groups may also be analogous to other diverse population groups. The data for *EPICS* were gathered from Pakistan. This graph shows how participation ratios differ across the four provinces in Pakistan from 1977 to 1987. The trends shown in this graph could be analogous to participation outcomes of the four population groups of Farziland with the rural girl population analogous to the Balochistan population (the group with lowest access in Pakistan), NWFP to rural boys, Sind to urban girls and Punjab to urban boys (the group with highest access). The four population groups could also be analogous to racial groups or religious groups.

2-16. There are many outcomes possible in any given run of the *EPICS* simulation, and most of them will produce surprises because you will rarely achieve the exact results you expected. One of the reasons for this is that the model accounts for delays between the time a policy is implemented and the time maximum outputs are achieved. Some of the important delays are . . . (*continue reading the overhead*).

2-17. This figure shows an example of a policy delay in population growth. Decisions made in 1980 to increase girls' participation rates here begin to show changes in school population two decades later in the year 2000 . . . (*briefly discuss the graph*).

2-18. *EPICS* depicts some of the problems common to all policymakers and planners. Some of the common problems are . . . (*read the transparency*).

2-19. To improve the performance of education policymakers and planners as experienced in the *EPICS* model, it is suggested that ministries of education . . . (*continue reading*).

2-20. As we have said, the framework for the *EPICS* model was based on the work of Mary B. Anderson, who presented her discussion in economic terms. But we know that there are many ways of stating the same problems. This transparency quotes the work of Carlos Muñoz Izquierdo and Sonia Lavin de Arrive on access in Latin America . . . (*briefly read through this, or present your own examples here*).

2-21. (*This overhead continues with statements on complexity and diversity addressed in other ways throughout the EPICS simulation. Again, you may want to read through this, simply touching on areas you want to emphasize, or use your own examples here.*)

2-22. To summarize, we want to end with three guides for policymakers . . . (*continue reading*).

2-23. Finally, just as the saying goes, “the whole is greater than the sum of its parts,” the *EPICS* simulation is based on the principle that . . . (*continue reading*).

2-24. As H. G. Wells wrote in *The Outline of History*: “Human history becomes more and more a race between education and catastrophe.” Thank you for your efforts to improve the educational system to avoid catastrophe in Farziland.

Post Script

The scenarios presented here emphasizing investments in General Education and Differential Education indicate extreme case outcomes possible in the EPICS model. There are many other possible outcomes that result from a variety of policy investment combinations. Our experiences with the simulation indicate that teams choose investment strategies that combine General Education and Differential Education. It is most likely that the results from any given simulation run you

experience will also reflect a combined approach to investments in policy options. However, the extreme outcomes characterized by the simulation dramatize some of the implications of investing in policies that favor the education of one population group over another and can be used to begin discussions and debates about these and other issues. Remember that, although the simulation is based on empirical data from many countries, the country of Farziland does not exist: EPICS is many countries and no country. If time allows, after you have finished this part of the debriefing, you might plan for a short break and then begin a discussion facilitated by the coordinator but organized by the players themselves to address education policy issues in their own countries where they work.

2-1. (At the end of the last round, the coordinator will want to draw the attention of the groups again toward the front of the room. While the *EPICS* transparency is being projected, you can call the group to order.) The debriefing section of the simulation takes place in two parts. During the first part, we will hear the results you achieved during the simulation. During the second part, I will describe the characteristics of the *EPICS* model and give examples of the outcomes of contrasting policy strategies.

2.1 EPICS

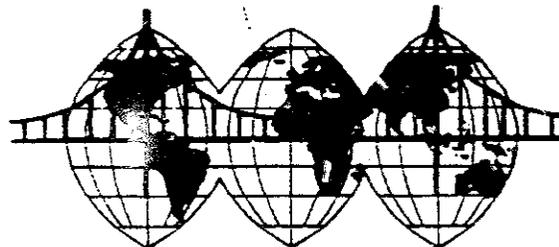
"Human history becomes more and more a race between education and catastrophe."

H.G. Wells

The Outline of History

EPICS

EDUCATION POLICY SIMULATION



by

Claire Brown, Haroona Jatoi

and

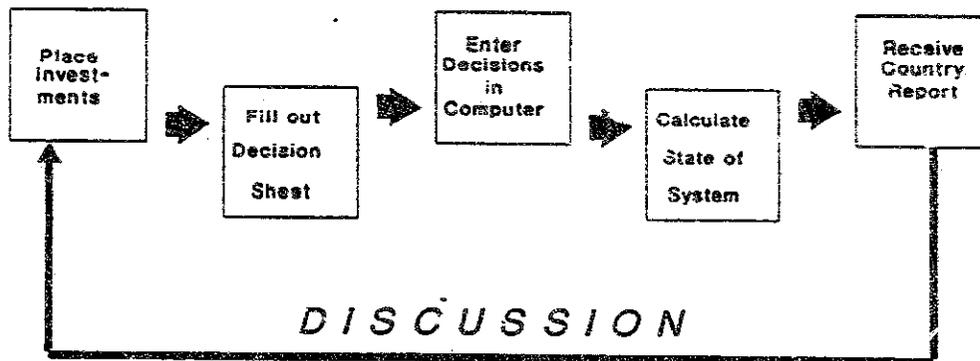
Christina Rawley, Coordinator

Harvard Institute for International Development

2-2. You have proceeded through several steps during the simulation in placing your investments, filling out the decision sheets, entering decisions into the computer for calculations on the state of the system and receipt of the country report. Please give a brief report on the decision-making process you experienced during the run of the game and report on the state of the education system of your country and the quality of life that you have achieved.

2.2  EPICS

Structure of Simulation



2–3. Please consider the following questions in your report . . . (*read the questions*).

2.3  EPICS

COUNTRY REPORT

- What were the outcomes?
- What was the strategy?
- Did the strategy change over time?
- Give examples

2-4. (After listening to reports on the process and the state of the system, move on to a discussion of the EPICS model.) This simulation model was prepared following the framework presented in the research review entitled *Improving Access to Schooling in the Third World: An Overview* by Dr. Mary B. Anderson . . . (read overhead).

2.4 EPICS

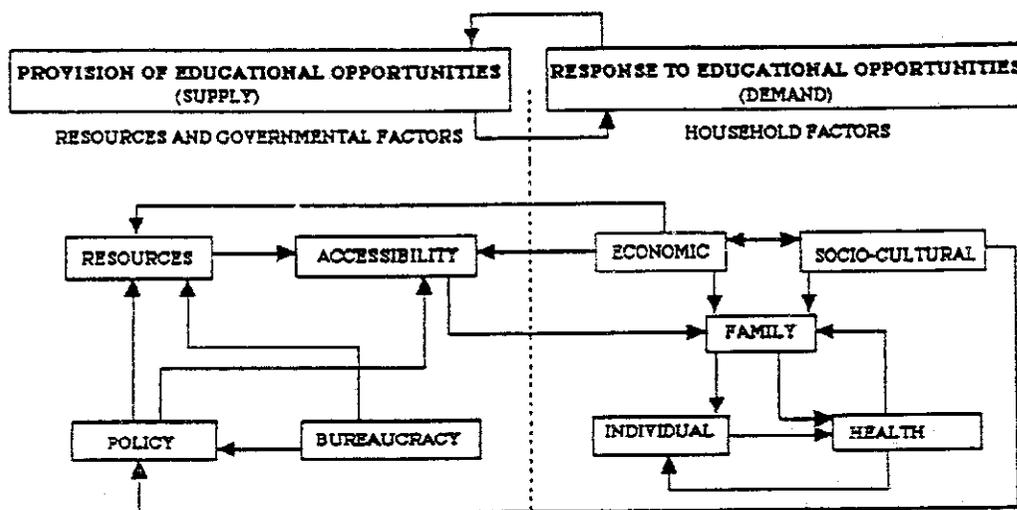
Framework for Discussion

- **Policies to increase supply vs. policies to increase demand**
Patterns that arise from insufficient or inefficiently used resources (supply-side) and those that result from differences in the demand for education.
- **Policies to increase overall enrollments vs. policies to increase enrollment among groups currently underrepresented**
General and differential access and retention
- **Policies to improve opportunities to enroll vs. policies to increase retention of those who are already enrolled**
Visible and invisible patterns of access and retention

2-5. This figure illustrates the *EPICS* conceptual model. It shows the factors associated with access to education and retention. Resources and governmental factors are indicated on the supply side, and household factors on the demand side.

2.5  EPICS

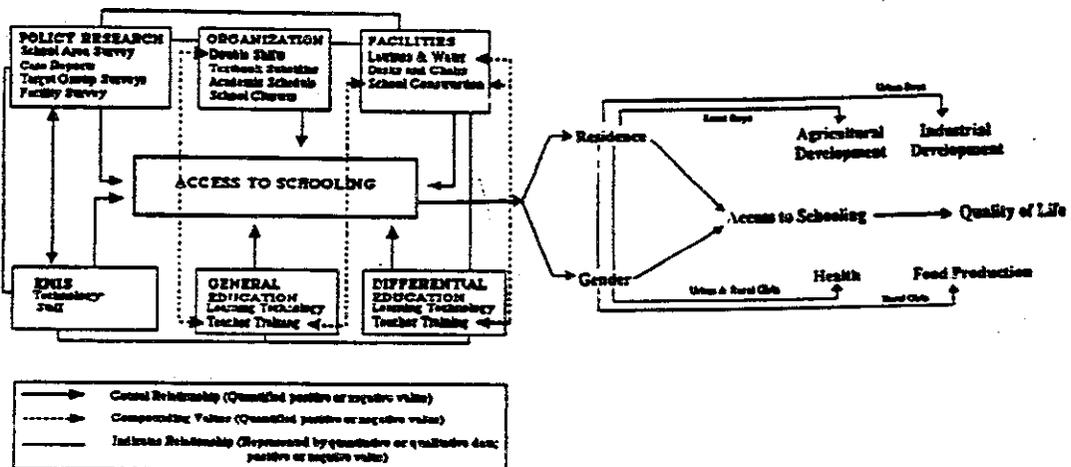
Conceptual Model
Factors Associated with Access to Education
and
Retention



2-6. The policy model used in the computer simulation looks like this . . . (review the model briefly). On the left we see the dynamic relationships among the policy options as they relate to access to schooling; on the right side, the illustration shows the path model of the relevance of primary education to quality of life indicators.

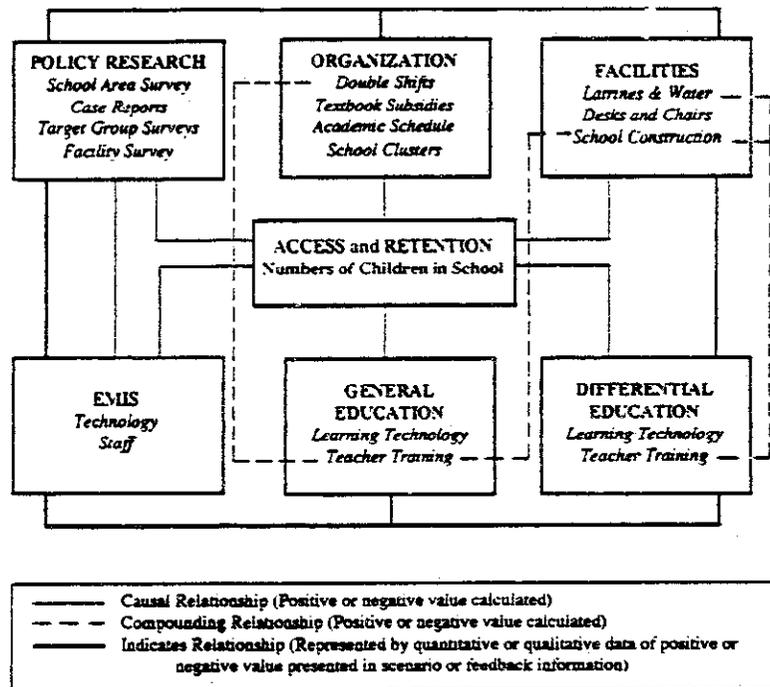
2.6  EPICS

Education Policy Simulation Model



2-7. Looking more closely at the policy relationships, we can see that the solid lines with arrows represent causal relationships that are quantified in the model; the broken lines with arrows represent compounding values that are quantified in the model; and the solid lines (with no arrows) indicate a relationship in the simulation represented by quantitative or qualitative data presented during the simulation by either feedback sheets or role descriptions.

2.7 EPICS



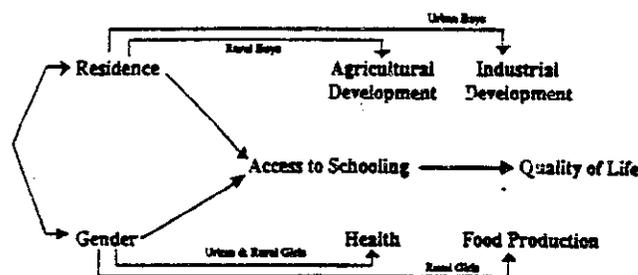
2-8. A closer look at the path model reveals that the *EPICS* model is designed to show outcomes based on distinct divisions of labor in the Farziland scenario. Thus, changes in quality ratings are directly related to the education access levels achieved by the four population groups in the country. The quality ratings rate four areas of development. They are (1) agriculture, (2) industry, (3) health, and (4) food production. A fifth quality rating (Quality of Life) is an average of these four categories.

A description of the division of labor associated with these categories reveals some hidden patterns. Most of the food grown for consumption by the general population is produced by indigenous subsistence methods used by the women and children of the households. In the rural areas, the men are involved in agricultural production on ranches, and this food is produced largely for export. Most of the industrial development is concentrated in the city where urban boys provide the labor force, and the urban and rural girls are responsible for the health care of the population.

The division of labor in the Farziland scenario is such that quality ratings of food and health are a result of girls' access to education, while agricultural and industrial development ratings are a result of boys' access to education. Access levels in education by rural boys affect agricultural development; urban boys affect industrial development; rural girls affect food production; urban and rural girls affect health. Access by residence (rural or urban) and gender (girls or boys) affects the average access rating, which in turn affects the overall quality of life rating.

2.8 EPICS

Path Model: Relevance of Primary Education to Quality of Life Indicators



2-9. The *EPICS* model looks at the relationships between education and productivity and social welfare. Investments in underrepresented groups through the Differential Education category and in those who already have access through investments in the General Education category are correlated with productivity and social welfare in terms of agriculture, health, food and industrial development.

2.9 EPICS

Economic Productivity and Social Welfare

Correlation of

- Differential Education (targeting of underrepresented groups)
- General Education (increased quality for those who have access)

to

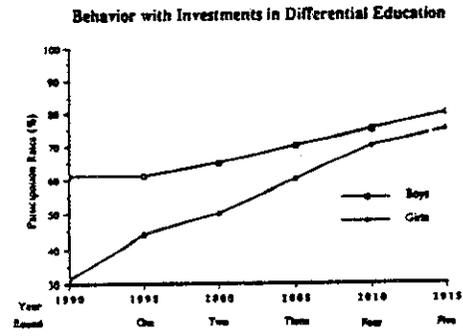
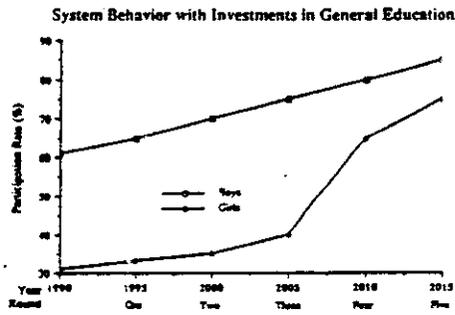
- Agricultural and industrial productivity
- Health and food production

2-10. These two graphs compare the system behavior that is characterized in the *EPICS* model through an emphasis in either General Education or Differential Education as they affect boys' and girls' participation rates.

The General Education category favors an increase in the quality of education for those who already have access to education and maintains the status quo of Farziland. Consequently, investments concentrated in this policy category will increase participation rates of boys first. Dramatic increases in girls' participation rates will occur when the boys' participation rate reaches 75%. At this point, most families have their sons in school, and the social norms have changed so that there is greater acceptance of the value of education for both genders, and the demand has increased for girls' education.

The Differential Education category favors access to education by the underrepresented groups and changes the status quo of Farziland. Consequently, investments concentrated on this policy category will increase girls' participation rates before boys' participation reaches 75%, and much earlier in the game. Boys' participation rates increase slowly, while girls' increase more rapidly from the beginning of the run.

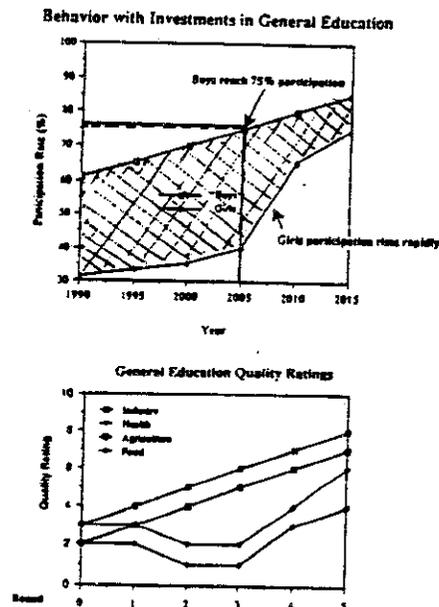
2.10  EPICS



2-11. An investment strategy in General Education affects the disparity and quality ratings in this way: Disparity between girls' and boys' participation rates remains high, and the gender gap is large throughout the first three rounds of the game (representing the years 1990-2005). However, in round 3, boys' participation rates reach 75%, and by round 4 (year 2010), dramatic increases occur in girls' participation rates that begin to close the gender gap. By round 5 (year 2015), with a 10% difference in participation rates between boys and girls, disparity is low — the gender gap is greatly diminished.

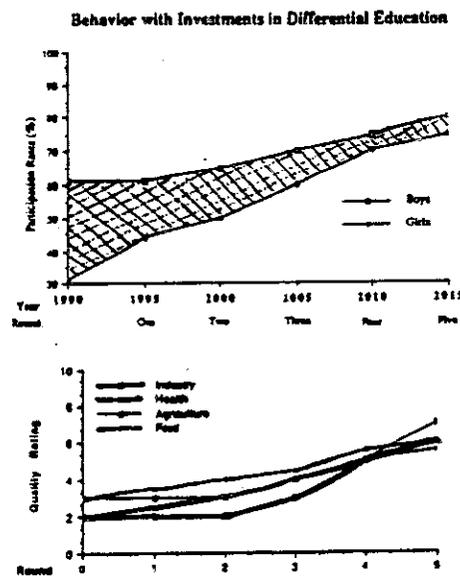
Quality ratings change over time with the changes in the participation rates. General Education maintains the status quo and the education of boys. Therefore, an investment strategy emphasizing General Education will show increases in industrial and agricultural development, with little improvement in health and food production until girls' access increases and the gender gap is closed. Under this scenario, Farziland will develop its industrial and agricultural capabilities, but there will be little or no increases in food production and the health of the population will remain poor.

2.11 EPICS



2-12. Investments with an emphasis on Differential Education show very different behaviors. Differential Education favors education for girls. Therefore, an investment strategy emphasizing Differential Education will show earlier and more rapid increases in health and food production. Industrial and agricultural quality will not improve as rapidly, but the general health and welfare of the country will improve. In a Differential Education scenario, participation rates for girls grow rapidly from the beginning of the simulation (year 1990). By the second round (year 2000), the disparity level is low, and the gender gap is reduced to less than 15% difference between boys' and girls' participation rates. Corresponding quality ratings show increases in food and health. Agriculture and industry ratings increase slowly.

2.12 **EPICS**

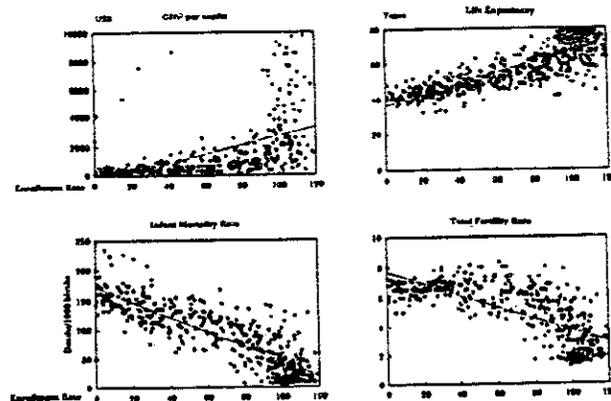


2-13. The scenarios presented here for the fictitious country of Farziland are based on the results of studies on the importance of family, school and community factors in education. The effects of education policy on the education of girls and women have been shown in different low-income countries and point out the gains from female education. These four scatter plots show data that correlate the enrollment rates of girls with economic productivity and social welfare. A World Bank study of 200 countries shows that nations that have invested heavily in female primary education benefit through higher economic productivity, lower infant and maternal mortality, longer life expectancy for both men and women, and lower fertility rates than countries that have not achieved as high education levels for women.

2.13  EPICS

**Primary school education for girls
improves economic productivity and social welfare***

Scatter plot of 200 Third World countries shows that nations that have invested heavily in female primary education in the past benefit. Enrollment refers to gross enrollment rates of girls in primary schools.



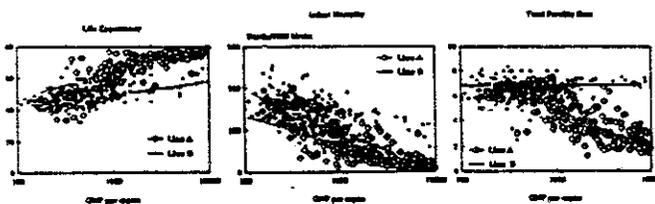
*Educating Girls and Women: Investing in Development by E.M. King (The World Bank, 1990)

2-14. These three scatter plots show the influence of the gender gap on development. The study shows lower economic production in countries with a large gender gap (measured as the ratio between male and female enrollment rates). Other countries with the same amount of capital stock and labor force but a smaller gender gap show higher levels of economic productivity. Furthermore, when comparing two countries with similar per capita income and patterns of expenditures in the social sectors, the country with the larger gender gap will experience worse indicators of social welfare. King points out that "an implication of this finding is that a country with a wide gender gap will have to raise per capita income more than will a country with a small gap in order to achieve similar levels of social well-being. . . . Countries that are economically better off also have longer life expectancy and lower fertility and infant mortality than poorer countries. However, some poorer countries with a narrow education gender gap achieve levels of social well-being comparable to those of some richer countries with a larger gender gap."

2.14 ◆ EPICS

Influence of gender gap on economic productivity and social welfare

The upward slope of these lines means that countries that are economically better off also have longer life expectancy and lower fertility and infant mortality than poorer countries. However, some poorer countries with a narrow education gender gap (notably Sri Lanka) achieve levels of social well-being comparable to those of some richer countries with a larger gender gap.



Line A: Countries with almost zero gender gap (ratio boy-girl gross enrollment rates)

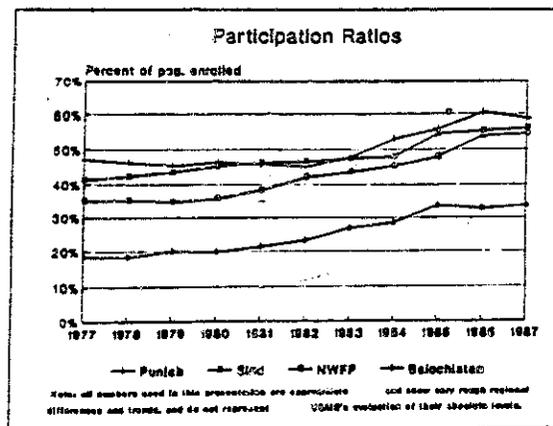
Line B: Countries with wide gender gap (boy's enrollment 40% higher than girl's)

*Educating Girls and Women: Investing in Development by E.M. King (The World Bank, 1990)

2-15. The *EPICS* model was designed to show how policymaking at the national level may be implemented in ways that affect four population groups in very different ways. This is of great concern when education systems are in the process of decentralization, and as cultural diversity is acknowledged and better understood. Cultural and socioeconomic diversity is represented in the *EPICS* model by four population groups: boys, girls, urban and rural. However, these groups may also be analogous to other diverse population groups. The data for *EPICS* were gathered from Pakistan. This graph shows how participation ratios differ across the four provinces in Pakistan from 1977 to 1987. The trends shown in this graph could be analogous to participation outcomes of the four population groups of Farziland with the rural girl population analogous to the Balochistan population (the group with lowest access in Pakistan), NWFP to rural boys, Sind to urban girls and Punjab to urban boys (the group with highest access). The four population groups could also be analogous to racial groups or religious groups.

2.15

~~333~~ EPICS



2-16. There are many outcomes possible in any given run of the *EPICS* simulation, and most of them will produce surprises because you will rarely achieve the exact results you expected. One of the reasons for this is that the model accounts for delays between the time a policy is implemented and the time maximum outputs are achieved. Some of the important delays are . . . (*continue reading the overhead*).

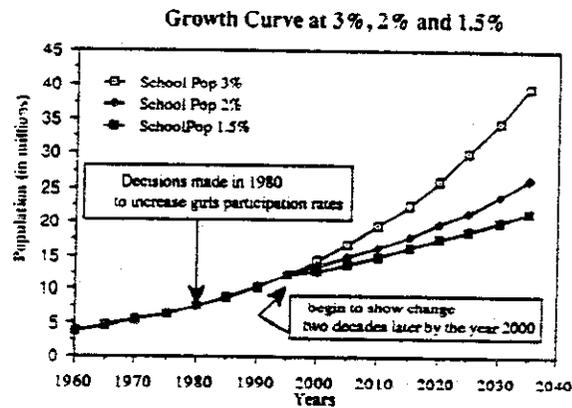
2.16 ~~933~~ **EPICS**

Important Delays

- **Survey information**
- **Development of Educational Materials**
- **Training teachers**
- **Changing Behavior**

2-17. This figure shows an example of a policy delay in population growth. Decisions made in 1980 to increase girls' participation rates here begin to show changes in school population two decades later in the year 2000 . . . (briefly discuss the graph).

2.17 EPICS



2-18. *EPICS* depicts some of the problems common to all policymakers and planners. Some of the common problems are . . .
(*read the transparency*).

2.18 EPICS

Common Problems

- **Inaccurate information on knowledge, attitudes and practices of the general population and the disaggregated population groups.**
- **Budgetary constraints**
- **"Tunnel Vision", not viewing overall program and interaction of policies.**
- **Political motivations**
- **Lack of planning.**
- **Poor communication between sectors.**
- **Poor training and follow-up of personnel.**

2–19. To improve the performance of education policymakers and planners as experienced in the *EPICS* model, it is suggested that ministries of education . . . (*continue reading*).

2.19 EPICS

Improving Performance

- **Improve communication between offices within the Ministry and with provincial offices**
- **Gather accurate data**
- **Spend time and money training teachers and providing them with appropriate materials**
- **Use multiple strategies**
- **Account for delays in your planning and budgeting process**
- **Do periodic assessments to estimate program impact and make necessary changes.**

2-20. As we have said, the framework for the *EPICS* model was based on the work of Mary B. Anderson, who presented her discussion in economic terms. But we know that there are many ways of stating the same problems. This transparency quotes the work of Carlos Muñoz Izquierdo and Sonia Lavin de Arrive on access in Latin America . . . (*briefly read through this, or present your own examples here*).

2.20 EPICS

Carlos Munoz Izquierdo and Sonia Lavin de Arrive
Access to Primary Education in Latin America

Solutions offered have advanced from proposals to change one determining factor to proposals that emphasize a combination of:

- teaching that conforms to the differing socio-geographic and cultural realities
- tracking students according to their individual differences
- modifying the school's structure and organization.

Methodology

Methodology is evolving:

- from almost exclusive application of statistical techniques to the parallel use of qualitative measurements
- from experimental and quasi-experimental designs to models of cultural action, where "explanatory" evaluations are emphasized
- to techniques developed within the framework of participatory, action-oriented research

2-21. (This overhead continues with statements on complexity and diversity addressed in other ways throughout the EPICS simulation. Again, you may want to read through this, simply touching on areas you want to emphasize, or use your own examples here.)

2.21 EPICS

Carlos Munoz Izquierdo and Sonia Lavin de Arrive
Access to Primary Education in Latin America

Complexity and Diversity

We are faced with complex situations that have multiple economic and social origins, requiring individualized solutions. There are certain ethnic groups and classes of people who historically have been affected to varying degrees by analyzable and characterizable problems.

But the solutions cannot be generic prescriptions aimed at all "marginal urban classes," "rural classes," "indigenous groups," or "regions." Rather, the answers seem to be in the recognition of different learning styles of target populations, and in the legitimization of the curriculum by making it relevant to the student and his/her community. As a result, of this process, model programs can be created that will benefit from the richness of each individual's experiences and cultural heritage, and incorporate them into the educational system.

Diversification, a crucial element for raising the quality of education, does not happen in isolation nor in a vacuum. It will only be possible with the generation of integrated strategies.

2-22. To summarize, we want to end with three guides for policymakers . . . (*continue reading*).

2.22  EPICS

Three Guides for Policymakers

- Patterns of demand differ among different groups in societies as a result of historical/economic forces.
- Patterns of demand are repeated from generation to generation so that, once having identified the groups who do not send their children to school, policymakers can focus their efforts on these groups rather than having to consider all determinants of access.
- Policies that focus on single determinants of demand, even where these are clearly important, often fail. Policies should take into account the interaction of factors that cause families to keep their children away from school or to enroll them.

2–23. Finally, just as the saying goes, “the whole is greater than the sum of its parts,” the *EPICS* simulation is based on the principle that . . . (*continue reading*).

2.23  EPICS

- **The combined affects of investments in several policies are greater than the sum.**

2-24. As H. G. Wells wrote in *The Outline of History*: "Human history becomes more and more a race between education and catastrophe." Thank you for your efforts to improve the educational system to avoid catastrophe in Farziland.

2.24  EPICS

**"Human history becomes more and more
a race between education and catastrophe."**

H.G. Wells
The Outline of History



Section Six

***EPICS* Sample Case Study A Gender Analysis**

The Scenario

Discussion of International Issues

Education for all children is valued as a basic right; education is a means to achieving other goals, usually economic and social development, national and political integration, and individual dignity (UNESCO, 1985; Anderson, 1988; Gillis, 1987). The importance of education for women is accepted worldwide because it improves their earning ability (Psacharopoulos, 1985); influences the number of children they have (Cochrane, 1979); and contributes to their better health and well-being (United Nations, 1985; UNICEF, 1986). In 1984, the United Nations proclaimed the right of "every one" to education.

But in reality, the provision of equal rights for women has remained an unfulfilled promise (United Nations, 1985). Almost everywhere women have a higher illiteracy rate than men (Anderson, 1988; UNESCO, 1985; World Bank, 1986). Worldwide data reveal that in 1980, 33.9 percent of women were illiterate, as compared to 23.3 percent of men. This gap is even wider in the case of developing countries, where 48.5 percent of the women are illiterate as compared to 32.3 percent of the men (UNESCO, 1985). If one considers primary school age to be from 6 to 11 years, UNESCO gives participation rates as 69 percent for males and 56.5 percent for females in Africa; 77.4 percent for males and 59.3 percent for females in Asia; and about the same for males as for females in Latin America. The percentage of girls admitted into school continues to be lower than that of boys in many developing countries, and the "higher the grade the lower the enrollment of girls" (Anderson, 1988).

There are several factors that explain why girls are less likely to be educated than boys. Girls are less likely to attend school if the school building is remote from their home. Poor families are less likely to educate girls than boys. Both of these factors have more impact in

countries with cultural or religious traditions that discourage the education of girls. Education of the boys is preferred in many cases because the structure of the economy provides employment for educated men but not for women (Anderson, 1988; Dove, 1983; Bhatti, 1988; Hasan, 1981; Shah, 1986).

Education in Pakistan

As in many other developing countries, the quality of primary education in Pakistan is not high. The World Bank (1988:6) sums up education in Pakistan as follows:

Literacy rates one of the lowest in the world, declining participation rates, very low system efficiency and a lack of educational opportunities for many, particularly for girls in the rural areas....perhaps the most critical problem impeding expansion of education is the unavailability of female teachers.

In Pakistan, according to the latest census, the population is 100 million. Women make up almost half the population (there are 1000 women per 1100 men).¹ The country has 41 million illiterates, and the overall participation rate at the primary level is 48 percent, 63 percent for males and 32 percent for females.² Half of the female population is of school-going age.³ Yet only 20 percent of those girls are actually enrolled in schools. Within the male population, 50 percent of all school age boys are enrolled.⁴

In addition to this, dropout rates remain persistently high, especially for rural children and females.

In 1983-84, dropout rates for primary school children ranged from a low of 18% in Punjab for males in urban

¹ Census Bureau, Government of Pakistan, Islamabad, 1981.

² Government of Pakistan, Ministry of Education, *Action Plan for Educational Development: 1983-88* (Government of Pakistan, 1984).

³ Source: The Sixth Five-Year Plan 1983-88, and Pakistan Economic Survey (1982-83).

⁴ Government of Pakistan, Ministry of Education, *Action Plan for Educational Development: 1983-88* (Government of Pakistan, 1984).

areas, to a high of 93% for females in Baluchistan. In 1985, only a third of five-year-old girls (940,000) were in school, and only half of those who entered school were expected to finish the fifth grade. By the age 12, only about 4% of the rural girls are still in schools.⁵

The literacy rate in Pakistan is 26 percent⁶ (men 35% and women 16%).

In 1951, literacy rate was estimated at 16.4% of the total population (all age groups), in spite of a liberal definition of literacy: "ability to read any printed language." Comprehension was not a condition. In 1961, this parameter was added, and the ratio came down to 13.6% (of the total population). The definition was "ability to read with understanding in any language"—writing ability was not included. In 1972, the definition was "the ability to read and write with understanding in any language." The literacy rate was estimated at 21.7%. In 1981, the criterion became more precise: "the ability to read a newspaper and write a simple letter in any language." The changing criteria detract from the comparability of the time series. At any rate, literacy was estimated at 26.2% in 1981. Behind this unflattering figure, there are large disparities—in terms of rural/urban (17.3% against 47.1%) and male/female (35.1% against 16.0%). Rural female literacy is only 7.3%, the worst case being literacy in Baluchistan, only 1.8%.⁷

There is wide disparity between the urban and rural populations. To be more specific, the literacy rate for both sexes in urban areas is 47 percent as compared to 17 percent in rural areas. Even within each setting, the male/female disparities are pronounced. For example, 55 percent of urban males as compared to 36 percent females are literate. In rural areas, where the overall literacy rate is 17 percent, only 7 percent of females are literate in comparison with 26 percent of males.⁸

⁵ The World Bank figures quoted from *Effective Classroom Practices in Primary Schools of Pakistan* by Andrea B. Rugh, Harvard University, Project BRIDGES.

⁶ "We mark the borders of the bottom category of countries like Bhutan, Nepal, Afghanistan, Ethiopia, Sudan, Chad, Mali and Zaire."

⁷ Government of Pakistan, Ministry of Education, *Action Plan for Educational Development: 1983–88* (Government of Pakistan, 1984).

⁸ Government of Pakistan, Ministry of Education, Islamabad, *Sixth Five-Year Plan 1983–88*.

There are fewer schools for females in Pakistan, both in rural and urban areas.

In Primary level, there are 2146 schools for females; there are 6754 total including male and female. Urban/rural distribution is 1146/1000 for females against 2579/4175 total. The figures are in thousands.⁹

There are also fewer teacher-training institutions available for women.

There are 56,394 female teachers versus 176,721 total, including male and female teachers; number is even disappointing when further break-down of provinces and urban/rural areas is considered.¹⁰

It is quite obvious that cultural, religious and social circumstances in a society like Pakistan can lead to different conditions for different populations. Society creates classes, which contribute to the differences in levels of schooling and training opportunities. These differences get further strengthened by the different conditions and facilities available in urban and rural schools.

The EPICS Model: Increasing Girls' Access to Education

Introduction

The *EPICS* model is designed to characterize outcomes of various combinations of policy options. There are two distinct scenarios offered in the model, and between the two distinct scenarios there are many possibilities. All approaches offer opportunities for increasing girls' access to education, but at different times and with different implications for development within the fictitious country of Farziland.

⁹ Source: Planning Commission, Islamabad and Central Bureau of Education, Islamabad; Pakistan figures are as of June 1983.

¹⁰ Source: Central Bureau of Education, Islamabad, June 1983.

To help in the presentation of the analytical discussion, the policy options are reviewed as they affect girls' access to education in the scenario presented in the *EPICS* model. This discussion is followed by a brief discussion of the information presented in the computer-generated feedback. The results of two extreme scenarios are discussed with reference to educational and development outcomes. The case ends with some examples of supporting data on educating girls and a list of suggested readings.

Policy Option Investments to Increase Girls' Participation Rates

There are several policy option investments that increase girls' participation rates. They are indicated in the following table. Table ___ lists the policy options available in the *EPICS* model and indicates (1) the level of impact of each option on girls' participation rates, (2) the supply side or demand side effect of the option, (3) the source of information related to the option within the *EPICS* simulation, and (4) a source of empirical data related to a policy option.

The options that have the greatest immediate effects on girls' participation are case reports and target group studies in the research category, teacher training and materials and technology in differential education, school construction in the facilities category, and academic schedule in the organization category. The combined effects of investments in these categories will be greater than the sum of their parts. It is important to note here that although EMIS does not have a large direct impact on girls' access, it is its use in conjunction with policy research that determines the efficiency of the system. To put it simply, the knowledge of different population groups can be more easily accessible through this technology, and its use in the system will have an effect on the overall efficiency of the system. An inefficient system will effect all population groups. Once again, we must look at particular factors with regard to their relationships within the whole system.

Table 1
POLICY OPTIONS TO INCREASE GIRLS' ACCESS TO PRIMARY EDUCATION

Policy Option	Impact Level ¹	Related Information Source				Empirical Data Citation ²
		Supply	Demand	Feedback Sheets	Role Cards Scenario	
POLICY RESEARCH						
School Area Survey	(+)	*		*		Davis 1985
Case Reports	(+++)		*	*	*	Fuller 1985
Target Group Survey	(+++)		*			Anderson 1988
Facility Survey	(+)	*				Fuller 1985
GENERAL EDUCATION						
Materials & Learning Tech	(+)	*				Lockheed
Teacher Training	(+)	*	*	*	*	& Verspoor 1990
DIFFERENTIAL EDUCATION						
Materials & Learning Tech	(+++)	*	*	*	*	Ankhra-Dove
Teacher Training	(+++)					1986
FACILITIES						
School Construction	(+++)	*	*	*		Anderson 1988
Water and Latrines	(++)	*	*	*		Ankhra-Dove '86
Desks and Chairs	(+)	*	*	*		UNESCO 1981
ORGANIZATION						
Academic Schedule	(+)	*	*	*		Jayaweera 1981
Textbook Subsidies	(+++)	*	*	*		Bhatti 1986
Double Shifts	(++)		*	*		
School Cluster	(+)		*	*		Cummings 1988
EMIS						
Staff	(+)	*	*	*		Cassidy 1990
Technology	(+)	*	*	*		Cassidy 1990

1. Impact Levels: (+)Low; (++)Medium; (+++)High.

2. Citations are included here as an example of empirical studies supporting policy options and can be used as a source on which to begin discussions. Coordinators may wish to refer to other preferred sources, or to those listed in the bibliography at the end of this manual.

Computer-Generated Feedback

EPICS feedback presents information to analyze access levels to primary education among girls and boys in several ways:

(1) Numerically:

Total Population: Figures given by gender and location. Note that the annual population increase is 3%.

In School Population: Figures given by gender and location.

Out of School: Figures given by gender and location.

(2) Total Participation Rates: The percentage of the gross enrollment of the total population.

(3) Access: High or Low. High access is determined when more than 75% of the total population is in school.

(4) Disparity Rate: High or Low (ratio boy-girl gross enrollment rates). High disparity means a wide gender gap, which is determined when boy's enrollment is 40% higher than girl's enrollment.

(5) Policy Research Feedback: Returns on investments in policy research include data providing facts and clues on general demographic information and school organization, the number, location and quality of schools, and the social, cultural and educational norms within the country that affect supply and demand issues for the different population groups.

Two Scenarios: General Education vs. Differential Education

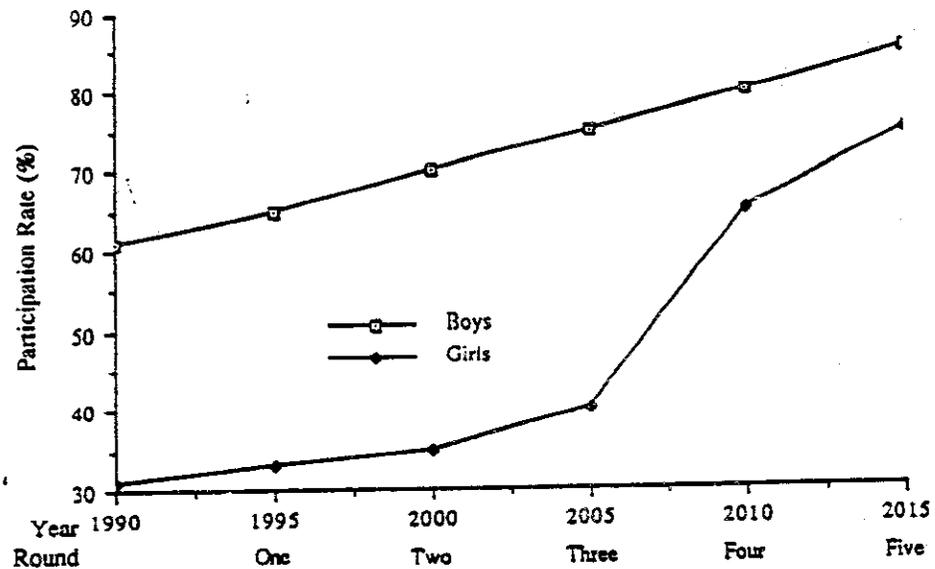
Now we will discuss the behavior changes in the **EPICS** model following two possible investment strategies: one concentrated on the general education category and another on the differential education category. Participation rates of girls will increase with both strategies at different time intervals and with different consequences to the overall development outcomes of Farziland.

General Education: The General Education category favors an increase in the quality of education for those who already have access to education and maintains the status quo of Farziland. Consequently,

investments concentrated in this policy category will increase participation rates of boys first. Dramatic increases in girls' participation rates will occur when the boys' participation rate reaches 75%. At this point, most families have their sons in school, and the social norms have changed so that there is greater acceptance of the value of education for both genders and the demand has increased for girls' education.

The following illustration characterizes the General Education scenario. Disparity between girls and boys participation rates remains high, and the gender gap is large throughout the first three rounds of the game (representing the years 1990–2005). However, in round 3 boys' participation rates reach 75%, and by round 4 (year 2010) dramatic increases occur in girls' participation rates that begin to close the gender gap. By round 5 (year 2015), with a 10% difference in participation rates between boys and girls, disparity is low, reflecting that the gender gap is greatly diminished.

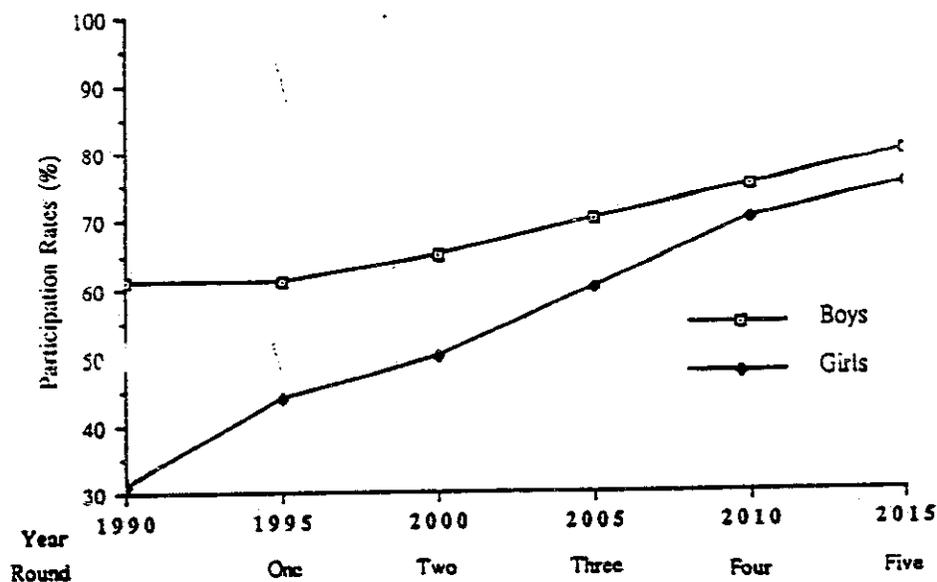
System Behavior with Investments in General Education



Differential Education: The Differential Education category favors access to education by the underrepresented groups and changes the status quo of Farziland. Consequently, investments concentrated in this policy category will increase girls' participation rates before boys' participation reaches 75%, and much earlier in the game. Boys' participation rates increase slowly, while girls' increase more rapidly from the beginning of the run.

The following illustration characterizes the Differential Education scenario. Participation rates for girls grow rapidly from the beginning of the simulation (year 1990). By the second round (year 2000), the disparity level is low and the gender gap is reduced to less than 15% difference between boys' and girls' participation rates.

Behavior with Investments in Differential Education



Comparison of Quality Ratings: General Education vs. Differential Education

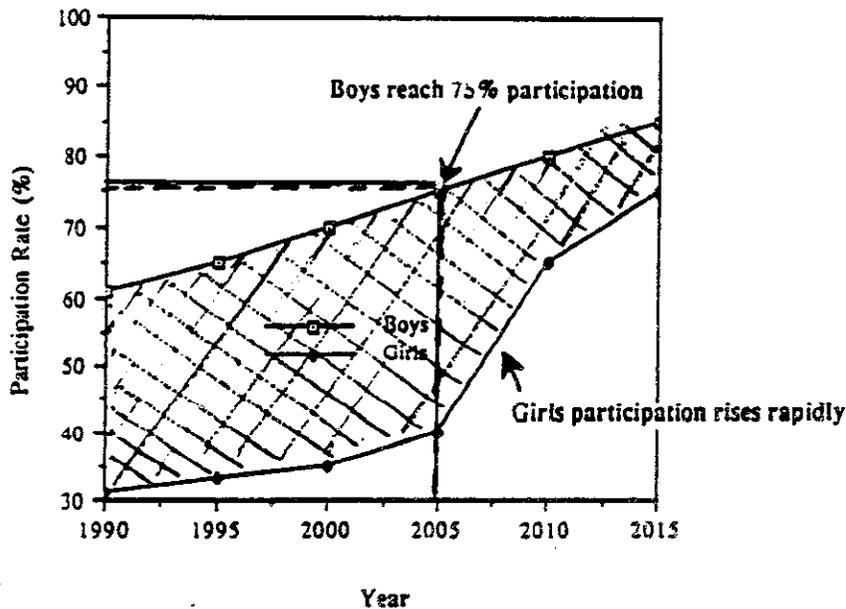
A comparison of the quality ratings related to investment strategies focused on General Education or Differential Education shows changes in the development outcomes of Farziland. The *EPICS* model is designed to show outcomes based on distinct divisions of labor in the Farziland scenario. Thus, changes in quality ratings are directly related to the education access levels achieved by the four population groups in the country.

The quality ratings focus on four development ratings. They are (1) agriculture, (2) industry, (3) health, and (4) food production. A fifth quality rating (Quality of Life) is an average of these four categories. A description of the division of labor associated with these categories follows. Most of the food grown for consumption by the general population is produced by indigenous subsistence methods used by the women and children of the households. In the rural areas, the men are involved in agricultural production on ranches, and this food is produced largely for export. Most of the industrial development is concentrated in the city where urban boys provide the labor force, and the urban and rural girls are responsible for the health care of the population. The division of labor in the Farziland scenario is such that quality ratings of food and health are a result of girls' access to education, while agricultural and industrial development ratings are a result of boys' access to education.

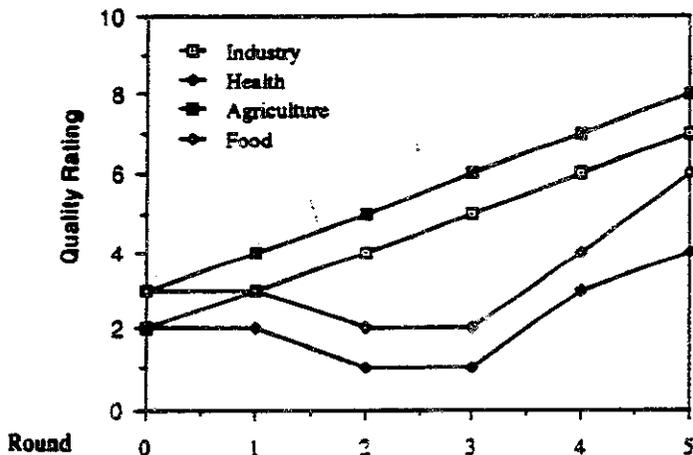
Quality ratings change over time corresponding to the changes in the participation rates. The illustrations below show the quality ratings and the development of the country as they are related to the participation levels of girls and boys in the *EPICS* model. Again, we see the results of investment strategies emphasizing General Education and Differential Education.

General Education and Quality Ratings: General Education favors maintaining the status quo and the education of boys. Therefore, an investment strategy emphasizing General Education will show increases in industrial and agricultural development, with little improvement in health and food production until girls' access increases and the gender gap is closed. Under this scenario, Farziland will develop its industrial and agricultural capabilities, but there will be little or no increase in food production, and the health of the population will remain poor.

Behavior with Investments in General Education

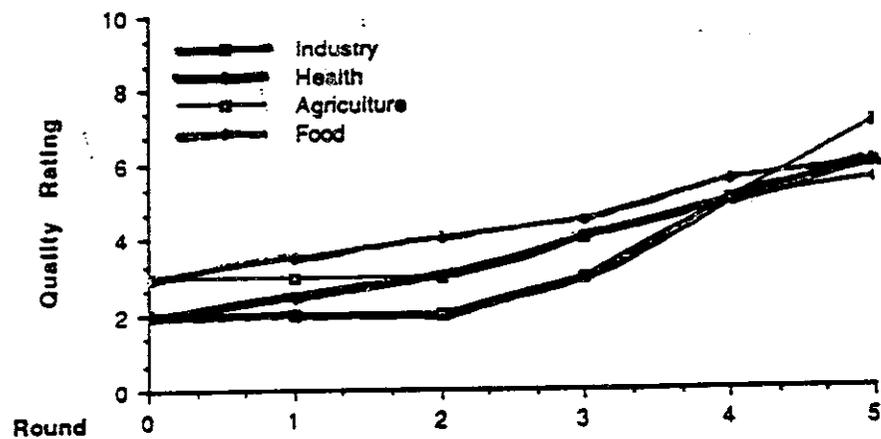
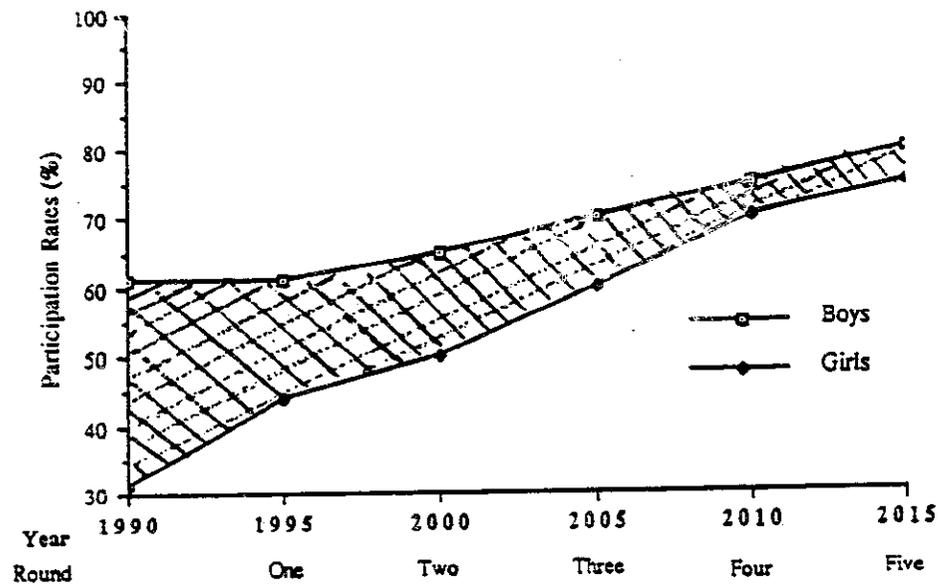


General Education Quality Ratings



Differential Education: Differential Education favors education for girls. Therefore, an investment strategy emphasizing Differential Education will show earlier and more rapid increases in health and food production. Industrial and agricultural quality will not increase as rapidly, but the general health and welfare of the country will improve.

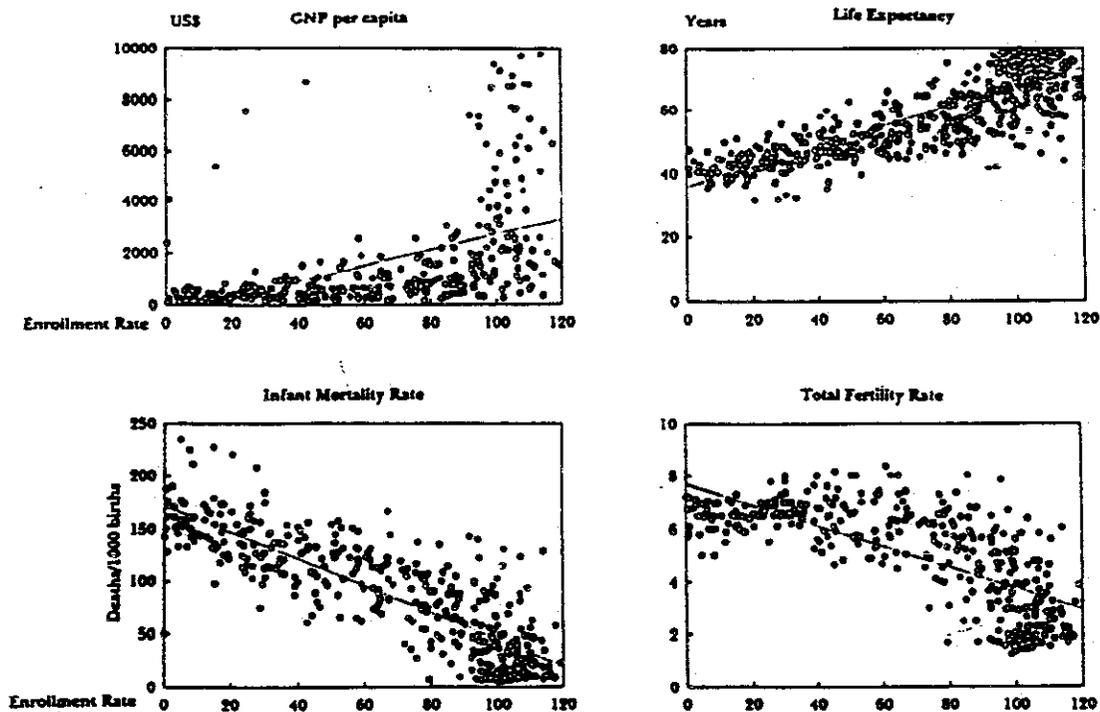
Behavior with Investments in Differential Education



Supporting Data: Educating Girls and Women

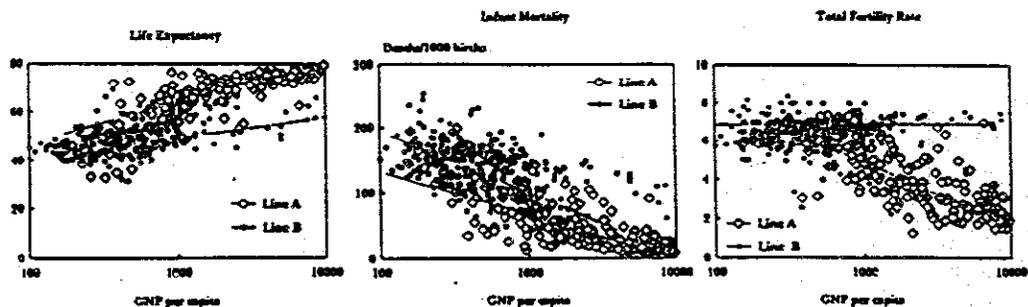
The scenarios presented above for the fictitious country of Farziland are based on the results of studies examining the importance of family, school and community factors on education. The *EPICS* model illustrates effects of education policy on increasing the education of girls and women in different low-income countries, and points out the gains from female education.

Economic Productivity and Social Welfare: The set of four scatter plots below shows data that correlate the enrollment rates of girls with economic productivity and social welfare. A World Bank study of 200 countries shows that nations that have invested heavily in female primary education benefit through higher economic productivity, lower infant and maternal mortality, longer life expectancy for both men and women, and lower fertility rates than countries that have not achieved as high education levels for women.*



* E. M. King, *Educating Girls and Women: Investing in Development* (Washington: The World Bank, 1990).

The three scatter plots below show the influence of the gender gap on development. The study shows lower economic production in countries with a large gender gap (measured as the ratio between male and female enrollment rates). Other countries with the same amount of capital stock and labor force, but a smaller gender gap in education, show higher levels of economic productivity. Furthermore, when comparing two countries with similar per capita income and patterns of expenditures in the social sectors, the country with the larger gender gap will do worse in social welfare. King points out that “an implication of this finding is that a country with a wide gender gap will have to raise per capita income more than will a country with a small gap in order to achieve similar levels of social well-being. . . . Countries that are economically better off also have longer life expectancy and lower fertility and infant mortality than poorer countries. However, some poorer countries with a narrow education gender gap achieve levels of social well-being comparable to those of some richer countries with a larger gender gap.”



Line A: Countries with almost zero gender gap (ratio boy-girl gross enrollment rates)

Line B: Countries with wide gender gap (boy's enrollment 40% higher than girl's)

*Educating Girls and Women: Investing in Development by E.M. King (The World Bank, 1990)

Summary Note

The scenarios emphasizing investments in General Education and Differential Education illustrated above indicate extreme case outcomes possible in the *EPICS* model. There are many other possible outcomes that result from a variety of policy investment combinations. Our experiences with the simulation over a two-year period indicate that teams choose investment strategies that combine General Education and Differential Education. It is most likely that the results from any given simulation run you experience will also reflect a combined approach to investments in policy options. However, the extreme outcomes shown above dramatize some of the implications of investing in policies that favor the education of one population group over another and can be used to begin discussions and debates about the issues. You may want to further the debriefing discussion on gender by asking questions about implications suggested in the model.

Section Seven

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