DOCUMENT RESUME

ED 089 686 IR 000 398

AUTHOR Creager, John A.
TITLE Policy-Oriented Analysis in an Interactive System.
PUB DATE Apr 74
NOTE 7p.; Paper presented at the American Educational Research Association Annual Meeting (Chicago, Illinois, April 15 through 19, 1974); For parts I and III of this study, see IR 000 399

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS Computer Oriented Programs; Educational Planning; Information Systems; *Management; *Management Information Systems; *Occupational Information; *Policy Formation; Program Descriptions; Simulation; *State Programs; Vocational Education
IDENTIFIERS Dynamic Simulation; Massachusetts; *MISOE

ABSTRACT

The Management Information System for Occupational Education (MISOE) supports policy formation at two levels. On the static level, MISOE provides managers with data about students, teachers, administrators, costs, and the social impacts of educational programs which are essential to the accurate analysis of present policy. On another level, the technique of dynamic simulation is available to help the policy maker to foresee the future consequences of policy decisions before those decisions are made. Although MISOE is designed to support the manager of occupational education in the Massachusetts state system, the basic principles of its design are applicable to similar systems in other states and to systems at other levels and in other sectors of the educational enterprise. (Author/PB)

POLICY-ORIENTED ANALYSIS IN AN INTERACTIVE SYSTEM

John A. Creager
Division of Educational Statistics
American Council on Education

Prepared for presentation at the meeting of the American Educational Research Association, April 15-19, 1974, Chicago, Illinois.

Policy-Oriented Analysis in an Interactive System

John A. Creager
American Council on Education

The structure and scope of MISOE, as just described by Dr. Conroy, constitutes a documented data base of interconnected information on students, teachers, administrators, schools, and programs. With MISOE's longitudinal design, the double connectability over observation units and time is just what is needed and is so often lacking in educational data bases...if they are to be useful to managers of educational systems in policy formulation and decision making. With such a data base accessible to the manager via a scope terminal in his office, information and analytic results can be quickly retrieved in a series of probes which he, the manager, defines according to his needs. The results of each probe stimulate the manager to define the next probe. Thus, MISOE is an interactive system.

Management is inherently policy-oriented: either the manager is formulating policy, implementing it, or evaluating how it is working. For this he needs the information in the data base and the results of various levels of analysis of that information. Often he only needs simple descriptive information about the domain of his responsibilities and concerns: distributional information and summary statistics on enrollments, costs, and program completion or attrition such as that available from the Census Data System of MISOE.

An educational manager who defines his task as facilitation of student development will need similar statistical information about students: what they are like when they enter a program, what characteristics of the educational process they have been exposed to, what specific skills they have learned. And when we think of characteristics of the educational process, we cannot forget the teacher and administrator as inherent parts of that process. Nor does such a manager forget that the educational process is supported by a society that rightly expects something in return for its investment, i.e., impacts on society of a skilled and productive citizenry. Each of these concerns can be met in part by the relatively simple descriptive level of analysis, using the information in the Sample Data System. To know, qualitatively and quantitatively, what it is one is trying to manage and the level of resources available to accomplish organizational goals is the first step in management. If his domain is complex, or heterogeneous, there is too much to keep in mind at once, properly sorted out in required categories, even if the information is stored in a systematic way. More likely, he has bits and pieces of information scattered throughout reports and the heads of subordinate personnel...if he can just remember where to look for the information desired. How much easier to walk over to the terminal and query the data base, getting what he needs in the form he needs, and in reasonable time!

A manager may be faced with a definite but general problem, e.g., high overall attrition of students in occupational education. To analyze his problem as a possible failure of educational policy, he needs diagnostic listings and comparative statistics by type of school, type of student, and by program in order to identify where high attrition is occurring. To obtain this information, he must specify to the information system the parameters of a single probe: one or more targets, criteria, output modes, and classifications. In a comparison of attrition rates among programs, the target population is students in occupational education, the criteria may be the number of completors, number of noncompletors, total, and percent attrition, the output mode a tabular display at the terminal of these data, classified by program and some student type variables. Having obtained this information, he may wish to examine the attrition rates in various schools giving this program -- another probe with slightly changed parameters. Alternatively, he might have done both on a single probe by calling for a classification parameter of schools within programs or programs within schools. Further probes could also determine whether attrition in the longer programs occurs early or late in the program sequence. A somewhat different kind of probe, determining whether higher attrition occurs in high cost or low cost programs, capitalizes on the ability to relate the economic and non-economic components of the data base. The manager might also want to compare completors and noncompletors on impact

variables to ascertain the long-run nature and seriousness of the problem.

Having thus obtained a rather more precise idea of the nature of his attrition problems by working interactively with actual data, the manager may now begin to play his hunches about policy changes he needs to make in order to ameliorate the situation. This may well involve probes calling for a higher level of correlational or regression analysis. For example, he might want to call on stepwise regression to help pick those process variables, such as student attitudes toward their program or teacher characteristics, that might be adjusted by certain policy changes. For this the student might be the unit of analysis and completion vs. noncompletion the criterion or dependent variable. Better yet, he might do a two-stage regression analysis, first regressing the attrition criterion on student input characteristics, and then regressing the residuals on the process variables. The first stage regression may be useful not only in isolating student input variables related to attrition, and possibly controlled by guidance procedures, but also in controlling the process analysis for such input characteristics. Such analyses capitalize on the longitudinal elements of MISOE and the connectability of data across observation units.

While time does not permit detailed delineation of the nature and order of probes for the various possible results of each interim probe, one can begin to appreciate the flexibility and generality of MISOE as a management tool even

for a particular area of concern, like attrition. Certainly, the choice and sequence of probes might well be different for a different general problem. For example, the manager may be faced with the complaint that costs rather than attrition is too high. Before blindly supporting and implementing a policy of wildly wielding the budgetary ax, he may want to look carefully at benefits as well as costs. If he must still cut total costs, he may well want to adopt policies that involve minimum loss of benefits. Conversely, he might develop a position requiring closer priority considerations of the benefits, which would then be achieved under a policy of minimizing costs under specified constraints. This is not the kind of real problem that even a genius manager can solve by gathering partial and disconnected information from the field and then staring at the ceiling. Much less can most managers afford to have at hand a well-chosen and functioning research unit with its own ad hoc computerized data base developed for each problem that comes along.

The policy-oriented analysis system of MISOE, designed for interactive support of management has another major feature, noted by Dr. Conroy, and called "dynamic MISOE." Also interactive, dynamic MISOE permits the manager to look at policy implications over time as a gestalt, by using a class of models called, "dynamic simulation." These models have demonstrated utility in certain industrial applications and interesting, though speculative possibilities in demographic, economic, and other applications. Their potential

for the formulation and evaluation of educational policy remains to be demonstrated. The development of MISOE has envisioned such a possibility by providing the capability for management-interactive generation of such models with the data base supplying the empirical values of model parameters. The manager can use a given model in either of two ways: (1) running the model with status quo parameter values retrieved from the data base to ascertain long-range consequences of present policy, and (2) manipulating certain parameters which reflect contemplated policy changes. This enables him to ascertain consequences before such policy changes are, in fact, implemented. In that way, he can be alerted to unexpected side-effects and interactions in the system, resulting from an otherwise highly plausible policy change. The role of management, in formulating such models, is regarded as critical, if such models are to be useful to management in policy decisions.

Although MISOE has been designed to support the manager of occupational education in a particular state system, the basic principles of its design are applicable to similar systems for other states, and for systems supporting managers of other levels and sectors of the educational enterprise. The educational researcher has a critical role in the design and implementation of such management information systems to ensure their scientific integrity, without which the manager's interactive use in policy decisions would be dangerous, rather than useful, in meeting his responsibilities.