

IMPLEMENTING EFFECTIVE SCHOOL IMPROVEMENT POLICIES:
A SYSTEM DYNAMICS POLICY ANALYSIS

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Background

At the last System Dynamics research conference held in the United States, we presented a paper which described a computer simulation model of an elementary school. The purpose of the model was to examine the structural differences between schools which are effective and ineffective for what we have come to call "initially low-achieving children." In that paper (Clauset & Gaynor, 1981), in a subsequent paper (Clauset & Gaynor, 1982), and in a book manuscript (Clauset & Gaynor, in preparation), we have described in varying degrees of detail tests which examined a number of school improvement policies. Policies tested included the following:

- . Changing policies affecting time allocations
- . Improving teacher skills
- . Encouraging teachers to place more emphasis on low achievers
- . Raising teacher expectations for low-achievers
- . Improving classroom or school-wide behavior
- . Changing class size
- . Changing the demographics of the student body (e.g., size, percent low achievers).

The central conclusion of the policy analysis was that there do exist policies which can either erase or greatly reduce the achievement gap for low-achievers. The most effective school improvement strategies are those which better teacher skills, raise teacher expectations for low-achieving students, and maximize time available for instruction.

The work in which we are currently engaged goes beyond the earlier work in that it focuses on the problems of implementing policies examined earlier without regard to the demonstrated difficulties of implementation. The earlier work drew on an extensive review of the literature on effective teaching and schooling and on the working knowledge of educational researchers and practicing school administrators and teachers as a basis for understanding the dynamics of effective and ineffective schooling. The current work, in process, draws on the literature about educational innovation, on empirical research into the processes of school improvement, and, again, on the expertise of knowledgeable actors to describe the dynamics of effective and ineffective school improvement policies.

We expect that the ultimate product of the current work will be the marriage of our earlier model with additional sectors currently under development which describe the implementation dynamics. We hope to understand better how policies which seem to work theoretically in the abstract founder in the rough seas of practical implementation. Our focus, consistent with a

preliminary study of implementation begun several years ago (Gaynor, 1979, 1980, 1981), is on the ways in which the implementation of an educational innovation sets up response patterns which tend toward a return to the status quo ante. We are particularly interested in the ways in which alternative implementation strategies engender differential systemic effects. The paper in preparation, for which this brief description is simply a placeholder, will, itself, constitute but a progress report.

The School Effectiveness Model

Our initial work involved the construction of a circular theory of causality that links student variables with organizational and instructional variables. The causal-loop diagrams which follow (Figures 1 and 2) highlight the essential structural differences between schools that are effective and ineffective for initially low-achieving children. [1]

[1] For a full description of the School Effectiveness Model and a complete listing of model equations, see Clauset, 1982.

time among subjects and for allocating time between instructional and non-instructional activities (assemblies, lunch, recess, etc.) and (2) time the teacher must spend dealing with classroom behavior problems. Time spent on behavior problems depends on the level of student behavior in the class, the teacher's effectiveness, and the impact of the behavior of other students in the school. Teacher effectiveness refers to both the teacher's instructional and classroom management skills. Effectiveness is mediated by class size, although more highly skilled teachers are less affected by larger and more able to take advantage of smaller class size.

The third component of appropriateness and intensity of instruction is the amount of emphasis a teacher gives to a particular achievement group. In heterogeneous classes, this emphasis is a function of a teacher's desired emphasis and the competing demands of other groups. It is central to our theory of schooling that the perceived learning gap between teacher expectations and the level of achievement is a major determinant of teacher emphasis. A teacher will devote more emphasis to a particular achievement group if the teacher perceives a gap in achievement. If there is no gap between expectations and achievement, there will be no effort to increase the emphasis for a particular group. In the effective school, expectations are based solely on standards and not on past achievement. Consequently, there is a significant gap in achievement for the

initially low achievers and teachers want to place more emphasis on these students to raise their achievement.

In systems terms, the basic driving force in the effective school structure is a negative feedback loop which operates to control the level of student achievement by adjusting the appropriateness and intensity of instruction. The goal of this control system is to close the discrepancy between teacher expectations (which are based on fixed standards for all children) and student achievement.

The school which is ineffective for initially low-achievers is driven by a different causal configuration (Figure 2). This difference may not be immediately apparent to the reader. Actually, the two structures are identical except that teacher expectations are no longer based on a fixed set of achievement standards.

For low achieving students in the ineffective school, teachers' expectations respond directly to student achievement. This is the essence of the ineffective school. Students who do poorly are expected to do poorly. Thus, from the teacher's perspective, there is no sense of a learning gap, no need to alter the nature of instruction, no ownership of an instructional problem, and no motivation to work at improving teaching skills. In essence, "The kid can't learn, or doesn't want to. It's his problem, not mine."

The effect of directly linking teacher expectations and

student achievement in the ineffective school is to collapse the negative feedback loop which operates in the effective school to control the level of student achievement. What now dominates the system is a positive feedback loop which reinforces existing achievement patterns. It works well enough for students who are above average in achievement when they enter school. The system works to reinforce their motivation, their behavior, and ultimately their further achievement. However, for students who enter school with poor readiness skills, this "multiplier system" works to depress their motivation to learn, to reinforce dysfunctional behavior patterns of "acting out" or withdrawal, to reduce teacher emphasis on them, and to further diminish their future achievement. Thus, instruction becomes less appropriate and intense in response to declining achievement.

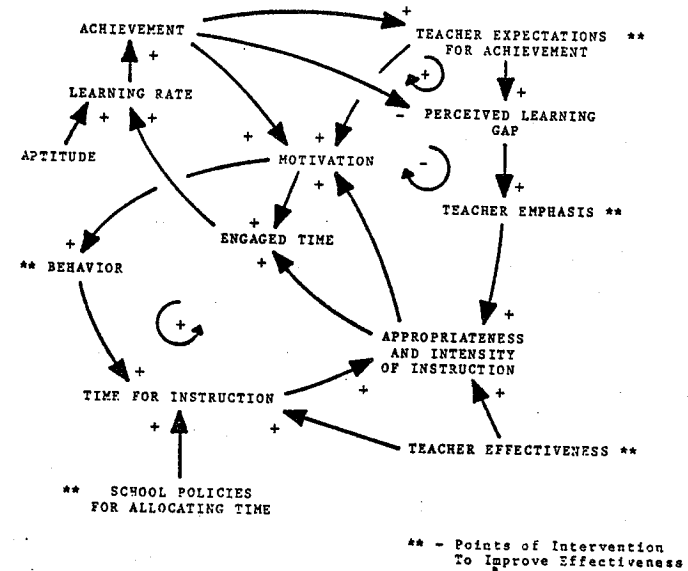


Fig. 2. The Basic Feedback Structure and Points of Intervention in an Ineffective School.

The School Improvement
Policy Implementation Model

The purpose of the expanded model is to describe the important structural connections between the system within which school improvement policies are implemented and the system within

which students with differing entry characteristics learn in schools. The depiction of the expanded School Improvement Policy Implementation Model is intended to provide a strongly specified theoretical base for examining the probable effects of different policies for improving schools for initially low-achieving students.

In developing the policy model it seems important to consider the responses of three system constituencies and their counter-effects on the policy implementation sector. These include teachers, administrators, and parents. Parents include those of average, above-average, and below-average achieving students. These constituencies constitute the sources of human response in the implementation system.

A basic understanding which informs our analysis is that typical policy objectives include the effective implementation of actions to impact on teacher skills, teacher emphasis on low-achieving students, teacher expectations for low-achieving students, student achievement, and student behavior. Structurally speaking, the purpose of these actions is, in each instance, to close a discrepancy between the observed level of the variable and a desired level. This is illustrated in the following diagram:

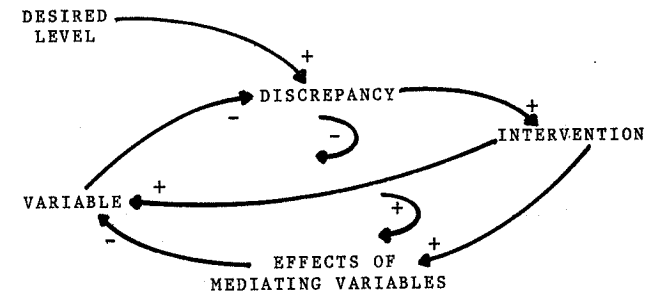


Fig. 3. The Counter-Effects of Mediating Variables On Policy Interventions to Close Undesirable Discrepancies.

Note that the diagram also illustrates how what are referred to collectively as "mediating variables" represent responses to policy actions which have the (unwanted) effect of maintaining the status quo ante.

Mediating variables in the implementation system include the following:

- . Support/resistance to the policy
- . Resources available to implement the policy
- . Conflict among constituencies
- . Communication and clarity about goals and expectations
- . Discrepancy between policy expectations and existing norms and practices
- . Teacher stress
- . Administrator stress

- . Teacher workload
- . Administrator time/workload
- . Administrator skills
- . Decision functions for
 - allocating resources
 - allocating administrator time
- . Energy available.

The model assumes that implementation involves the exercise of skills and the allocation of time and resources as available. The model also rests upon a number of additional assumptions, including the following:

- . Discrepancies between existing states and the desired states implied by any particular policy affect levels of support/resistance
- . Discrepancies in support/resistance among constituencies produce conflict among constituencies
- . Resistance and conflict produce stress for teachers and administrators
- . Stress reduces energy available
- . Energy available and the level of support/resistance combine with skills to affect adjustment times
- . Conflict and administrator skills affect the quality of communication
- . The quality of communication affects clarity about goals and expectations
- . Clarity about goals and expectations affects perception of discrepancies and adjustment times

- . Adjustment times affect workload for teachers and administrators
- . Workload affects stress and support/resistance
- . Resources and administrator time are finite
- . Resources may be increased but only at a cost in time and energy
- . Resources have different effects as they are allocated differently.

A more precise progress report will be presented at the time of the conference. An up-to-date paper will be made available to interested participants at that time.

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