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ABSTRACT

Six causal-influence diagrams introduce a model showing the difficulties of implementing school improvement policies in such areas as teacher expectations and student behavior. The first diagram deals with basic dynamics of improvement. Cybernetics of activities to correct student achievement are revealed in a second diagram, which portrays schools as rational institutions. A third diagram focuses on teacher motivation and side effects--workload pressures, for instance--that undermine innovation efforts. Diagram 4 illustrates negative influences on principals' effectiveness, and diagram 5 the press from factors like dealing with staff resistance and obtaining additional resources on their time and energy. A final diagram shows how principals' efforts to secure outside resources can be affected by other demands. In summary, the current work synthesizes improvement literature, describes improvement dynamics in a theoretical format, and provides a basis for activities like building computer simulation policy models. (KS)

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**IMPROVING SCHOOL EFFECTIVENESS:  
THE DYNAMICS OF IMPLEMENTATION**

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# IMPROVING SCHOOL EFFECTIVENESS: THE DYNAMICS OF IMPLEMENTATION

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## Abstract

The paper focuses on the dynamics of implementing school improvement programs. Based on an analysis of the literature on effective teaching, effective schooling, and social change, a causal model is proposed that describes how efforts to improve schools typically generate self-defeating dynamics. The causal model provides a theoretical framework for examining key issues of implementation. Implications for practice are discussed.

## Background

At the 1982 AERA Annual Meeting, 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, 1982a), in a subsequent paper (Clauset & Gaynor, 1982b), 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 research. It focuses on the problems of implementing policies which were 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 computer simulation 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 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.

A basic understanding which informs our analysis is that typical policy objectives include the effective implementation of actions to change teacher skills, teacher emphasis on low-achieving students, teacher expectations, student achievement, student behavior, and resources available for instruction (both human and material). 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 causal influence diagram shown in Figure 1.

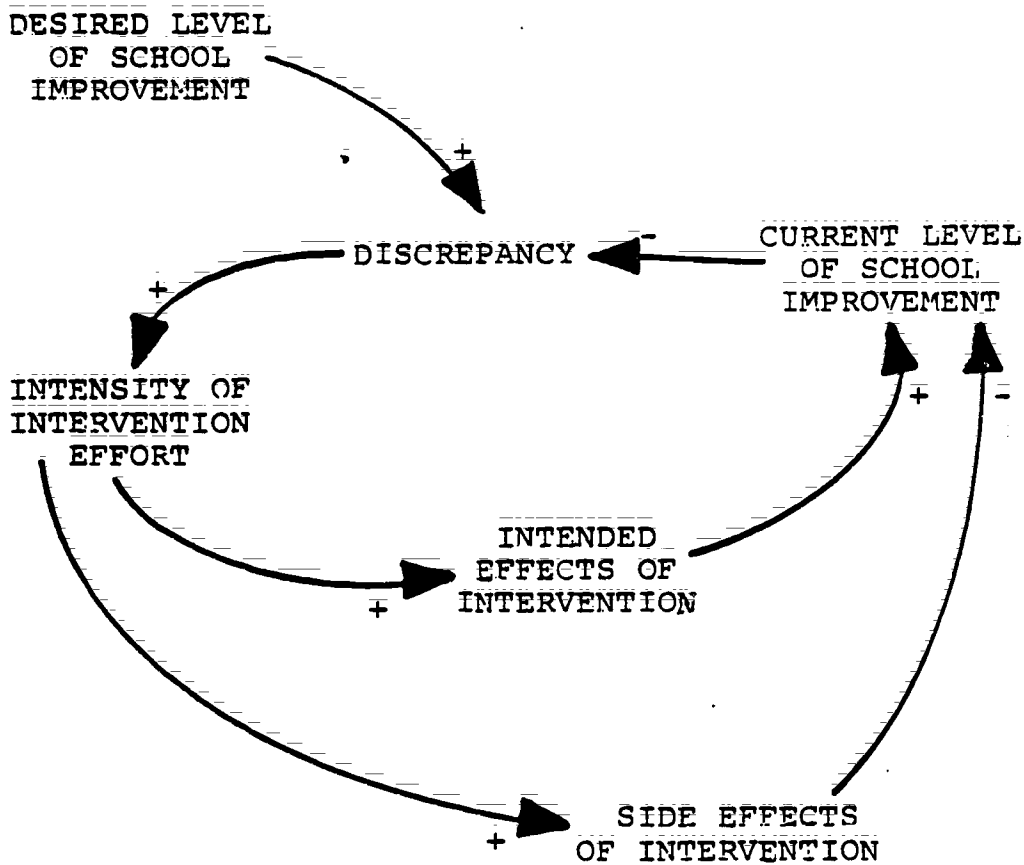


Fig. 1. The Basic Dynamics of School Improvement

The diagram depicts two feedback loops. The upper loop represents the desired corrective action of a policy intervention to improve a school. As the discrepancy between a desired level of school improvement and the actual level increases, the intervention efforts increase to raise the actual level and reduce the discrepancy. [1]

Note that the diagram also illustrates in the lower loop how unintended side effects operate to maintain the status quo ante. The impact of these side effects increases as the intensity of the intervention increases. These effects operate to lower rather than raise the actual level of school improvement and, therefore, maintain or widen the discrepancy. This feedback loop reinforces the discrepancy between the desired and actual levels of school improvement.

[1] A plus sign on the arrow linking two variables indicates a direct relationship between the variables; a minus sign indicates an inverse relationship.

The material which follows represents a report of the thinking we have been doing toward the development of a model describing the nature of these mediating variables. We are particularly interested in understanding the feedback systems that operate empirically in public school systems to undermine school improvement efforts and in understanding how certain implementation strategies may work more effectively than others. Our efforts to date have focused on the explication in the form of causal-influence diagrams of several key subsystems which appear to be critical in determining the life cycle of school improvement programs in the public schools. [2]

At present, we are working with several basic dynamic assumptions about the implementation of school improvement programs:

- . To the extent that school improvement programs represent deviations from existing norms and practices, add to teachers' workload requirements, place demands on teachers for new or improved skills, and alter traditional social relationships in the school, they tend to invoke responses from teachers (and others affected) that create pressures toward a return to the status quo ante;
- . School improvement programs are significantly dependent on effective administrative action by the principal, yet the implementation of these programs (and dealing with their social consequences) places increasing demands on the principal's time commitments; as the principal's time commitments rise, they tend to have an adverse impact on his or her effectiveness;
- . Finding external resources can aid in the implementation of school improvement programs and in increasing staff available to perform needed tasks of administration and supervision (i.e., to expand the principal's available time); however, seeking external resources is, itself, a time-consuming activity and its effects tend to be uncertain and delayed;
- . Teacher motivation to take corrective action (i.e., to support school improvement programs) lightens the press on the principal's time commitment by reducing staff stress and conflict and by increasing the assistance available (i.e., the time available) to implement the program and to seek external resources but the level of teacher motivation is, itself, dynamically

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[2] Causal influence diagramming is a part of the system dynamics method. System Dynamics is a particular form of systems analysis which was developed at M.I.T. in the 1950's and has been refined in a variety of applications over the last quarter century. It includes a set of tools and techniques for developing computer simulation models of dynamic causal structures (cf., Forrester, 1968; Richardson & Pugh, 1981; Roberts, et al., 1983).

embedded in the implementation problem system;

- Teacher motivation tends to be dependent upon deep-seated attitudes about change and about students which are difficult to alter and affected adversely by the pressures associated with school improvement processes; at the same time teacher motivation is embedded in a "success breeds success" syndrome: that is, teacher motivation is stimulated by evidence of their actual success in improving the learning of traditional low-achievers.

### The Basic Cybernetics of Actions to Correct Student Achievement

The actions that teachers and the principal can take to correct perceived discrepancies in patterns of student achievement are shown in general form in Figure 2.

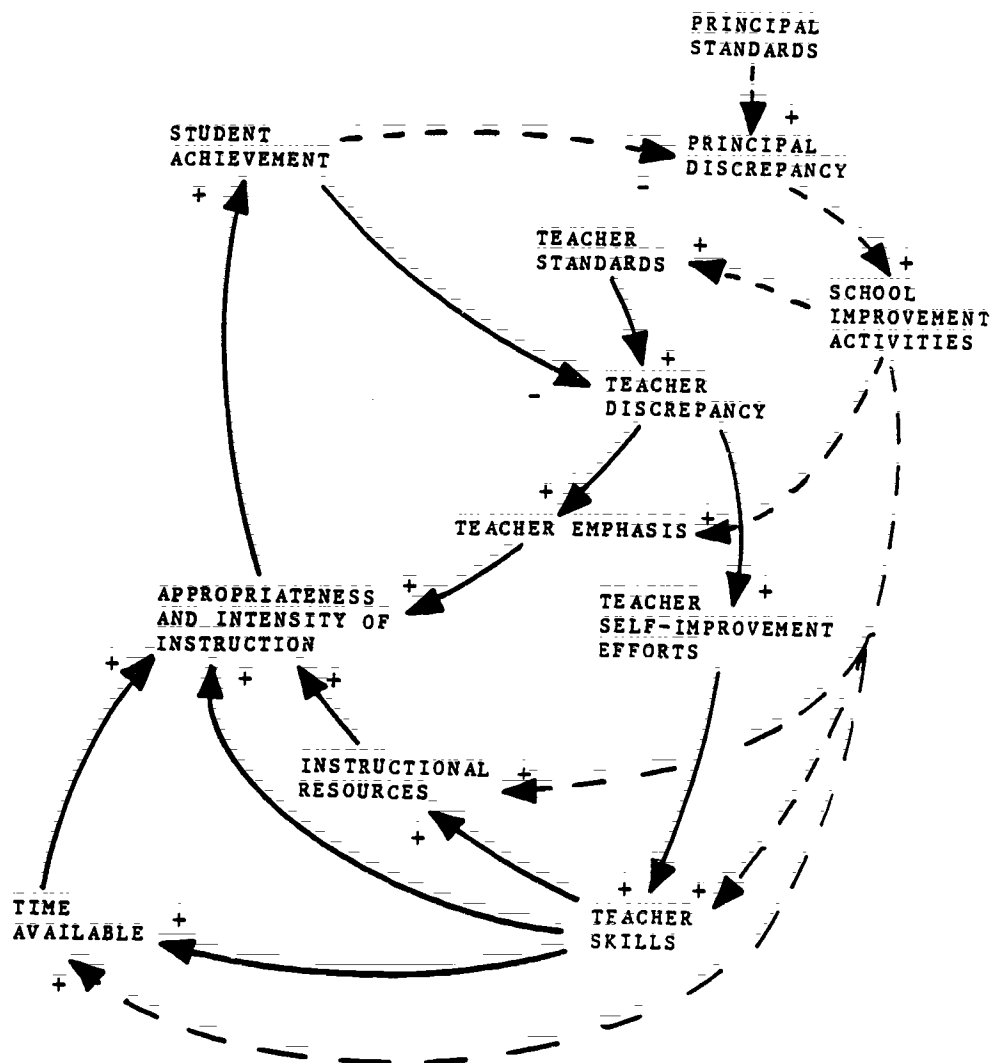


Fig. 2. Teacher and Principal Actions to Improve Achievement

The figure depicts two interrelated systems of feedback control loops. The first system, shown with solid lines, centers on teachers. Teachers monitor student achievement and adjust the appropriateness and intensity of instruction they deliver to correct for the discrepancy between current performance and the teachers' standards. These changes occur either by teachers placing more emphasis on the under-achieving students or through teachers' self improvement efforts to raise their level of skill. More highly skilled teachers use time and instructional resources more effectively.

The second loop system, shown with dotted lines, represents the supervisory function of the principal. The principal intervenes (by proposing and implementing school improvement activities) when he or she perceives that the teacher feedback control system is not functioning well enough to raise student achievement to the level of the principal's standards. These interventions ultimately seek to increase the appropriateness and intensity of instruction and to raise student achievement.

This diagram portrays the school as a rational institution in which professional knowledge provides a basis for corrective action with respect to student learning. Several substantive assumptions underlie the formulation of the diagram, assumptions that are more fully explicated and documented in our earlier work (Clauzet and Gaynor, 1982a; Clauzet and Gaynor, in preparation). These include the following ideas:

- . Student learning is significantly a function of the appropriateness and intensity of instruction;
- . The appropriateness and intensity of instruction are functions of teacher skill and the emphasis teachers place on the particular achievement group (e.g., low-achievers);
- . Teacher skills and instructional emphasis are potentially alterable by administrative and supervisory activities of the school principal.
- . Time available for instruction and the appropriateness of resources used are both functions of school (and district) policies and of teacher skills.

School improvement activities imply the implementation of policies by the principal designed to increase the level of the variables indicated. These policies may range from bureaucratic mandates about how teachers should allocate time in the classroom to a variety of supervisory practices including clinical supervision and formal programs of staff training and development (viz., Project RISE in the Milwaukee Public Schools: McCormack-Larkin and Kritek, 1982).



The concept of bureaucratic mandate implies, in the case of changing teacher emphasis on a particular group of students, that the principal uses his or her positional authority to direct teachers to give more time to low-achievers. This can occur either by reallocating more time to low-achievers in heterogeneous classes or by providing special resource rooms during or after school to low-achievers. Clinical supervision and programs of staff training and development imply strategies of what has been called "normative re-education." The goal of such strategies is to raise teacher expectations for low-achievers and, thereby, to stimulate them to increase their relative instructional emphasis on these students. For example, through a process of staff training and development, as in Milwaukee, teachers come to believe that traditional low-achievers are, in fact, capable of learning at or closer to grade level standards under improved instructional conditions. They then become motivated to provide these students with more appropriate and intense instruction.

In the bureaucratic scenario, teachers give more instructional time to low-achievers because they are told to do so; in the normative-reeducative scenario, teachers began to give relatively more weight in their assessment of what students can achieve to grade level standards than to observed student achievement because of significant modifications in their beliefs about traditionally low-achieving students. In either case, the changes in teacher instructional behavior lead to more effective instruction for traditionally low-achieving students and to higher levels of actual achievement.

### Teacher Motivation for School Improvement Efforts

It is a major thesis of this and earlier work of ours (Gaynor, 1979, 1980, 1981) that efforts at innovation generate, as the very consequence of their initial effectiveness, forces that ultimately undermine their longer-term success. In the current model, an important example of this dynamic is found in the side effects of school improvement activities (which are, in essence, corrective actions) on teachers' motivation toward the improvement project. There are several ways, we suggest, in which this occurs.

As indicated in Figure 3, teacher motivation to invest in school improvement efforts depends upon several factors. These include the managerial, supervisory, and political skills of the principal (principal effectiveness), the effects of the school improvement project on teacher workload, the teacher's latent attitudes toward the project's goals, and the teacher's sense of his or her own power to affect student achievement (i.e., what has been referred to in the literature as "internal" vs. "external" locus of power).

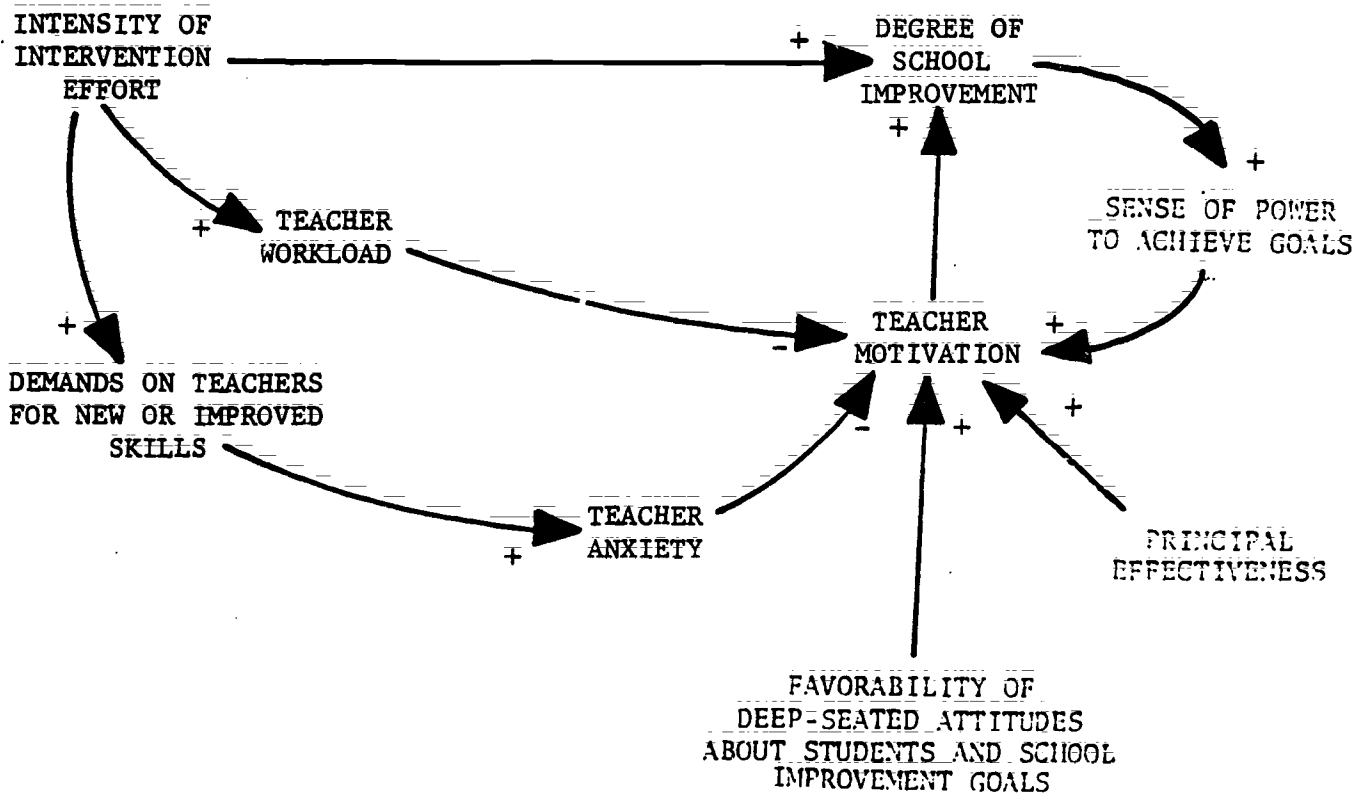


Fig. 3. Influences on Teacher Motivation

The teacher's sense of power to affect student achievement, at the individual level, has multiple roots, many of them idiosyncratic; however, collectively teachers seem to respond positively to documentary evidence that their efforts in past school improvement activities have had a positive effect. For example, much of the work in the various school improvement projects around the country has been targetted on convincing teachers, mainly through research findings, that many traditionally low-achieving children can begin to approach grade level standards and that the nature of instruction can make a significant difference in how well they learn.

Motivation can be undermined by anxiety and workload pressures. It is typical for school improvement efforts to increase teacher workload, especially in their early stages. There are meetings and staff training sessions to alter teacher attitudes and enhance their skills. There are new materials to master and new commitments to working with difficult students -- all of which increase anxiety and decrease motivation. As workload increases beyond tolerable levels, motivation begins to decline.

In addition, there is a likely interaction effect between the intensity of intervention efforts and deep-seated teacher attitudes about educational standards and students. In urban schools where there may be major ethnic, cultural, and socio-economic differences between

teachers and students, teachers may have a very different set of attitudes and standards that the principal has. This may produce a boomerang effect such that the harder the principal tries to change teacher expectations and instructional emphasis, the more stubborn the resistance of latently hostile teachers.

According to almost every piece of research on school effectiveness, the managerial, supervisory, and political skills of the principal are crucial to the success of school improvement efforts. Some of the determinants of principal effectiveness are exogenous to the model (e.g., prior training and stable personal characteristics) but others, described later on, are embedded in the internal dynamics of the model.

### Principal Effectiveness

In a recent issue of Educational Leadership (November, 1983) entitled "Transplanting Success: Good News from a Study of School Improvement", success in implementing and institutionalizing school improvement projects is seen as being directly related to the commitment, direction, and support of the project's leaders. Huberman and Miles report on the importance of:

- . stable project leadership
- . strong commitment to implementation
- . buffering the project from environmental turbulence and staff turnover
- . support and training for teachers in making the necessary changes
- . modifications in organizational structure and procedures to accommodate the project
- . monitoring project implementation
- . clear directives to teachers and others about expected performance
- . resistance to "watering down" the project
- . understanding the organizational environment
- . choosing programs that "fit" both the organization and the ultimate beneficiaries of the project -- the students

At the building level, the presence or absence of these features is often directly linked to the school principal. The ability of the principal to function effectively as an administrator, a supervisor, and a political agent is seen as determined exogenously by his or her prior training and stable personal characteristics and endogenously by the press of his or her time commitments. As school improvement activities are planned and implemented, increasing demands on a principal's time and energy can reduce the principal's effectiveness and undermine the degree of improvement resulting from project activities. These dynamics are illustrated in Figure 4.

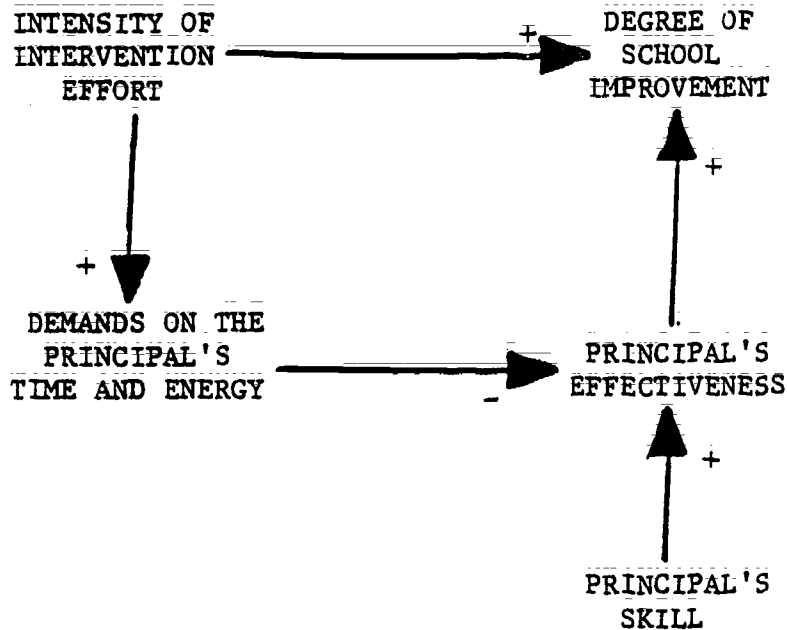


Fig. 4. Influences on the Principal's Effectiveness

Although there is reference here to the school principal, *per se*, there is crucially implicit the concept of the "expanding principal." Central to this concept is the idea that there are what Barnard referred to as the "functions of the executive" (Barnard, 1938), that these functions are generally performed in a school by someone called the principal, but that these functions can also be performed by others in a (formal or informal) "administrative staff." Thus, the principal's time and energy can be expanded by the performance of administrative and supervisory functions by motivated teachers (informally) or by additional administrative or supervisory assistance made available (formally) through the acquisition of additional external resources.

The principal's time is committed to (or "captured" by) the range of required school improvement activities. As illustrated in Figure 5, these include seeking external resources (or in managing those resources once acquired), dealing with teachers' resistance to

change, planning and managing staff training, and dealing with political issues arising from project implementation. Research on school improvement projects (cf., Educational Leadership, November, 1983) suggests that all of these needs are important for the success of a school improvement project. We are currently engaged in efforts to understand more clearly how the intensities of these needs change over the life cycle of a project and how these needs are affected by other organizational and contextual variables.

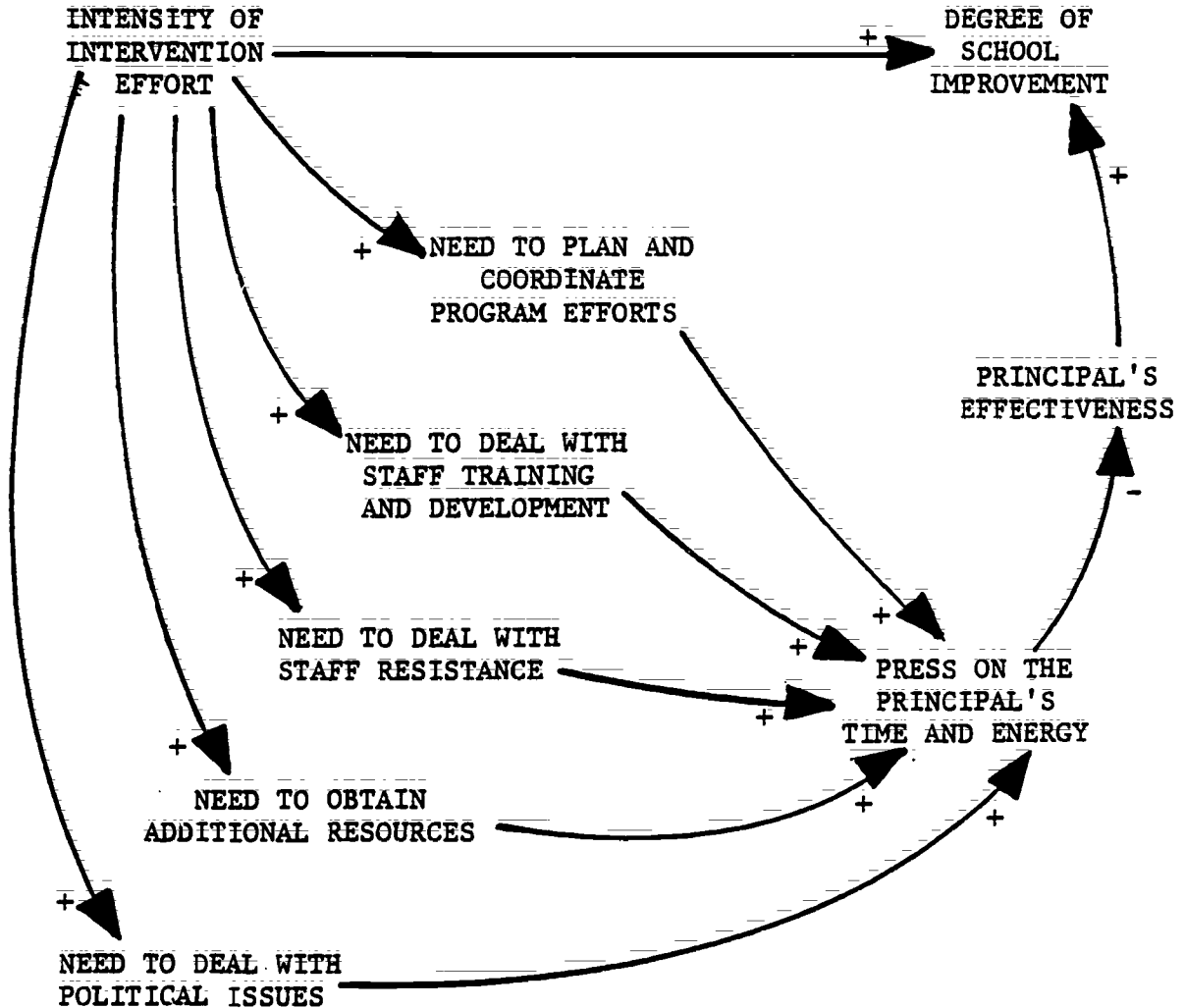


Fig. 5. Press on the Principal's Time and Energy from School Improvement Efforts

### Resource Aggregation and Expenditure

The final subsystem of the model in its present stage of conceptualization deals with the dynamics of resource acquisition and allocation. Resources are expended in implementing school improvement projects. They are acquired internally and externally through efforts of the principal and motivated teachers. Since only available resources can be committed to school improvement efforts, the actual intensity of the efforts might be significantly different from the desired intensity. The principal's efforts to secure outside resources can be directly undermined by other demands on the principal's time and energy and indirectly affected by the impact of principal burnout (from over-commitment) on his or her effectiveness.

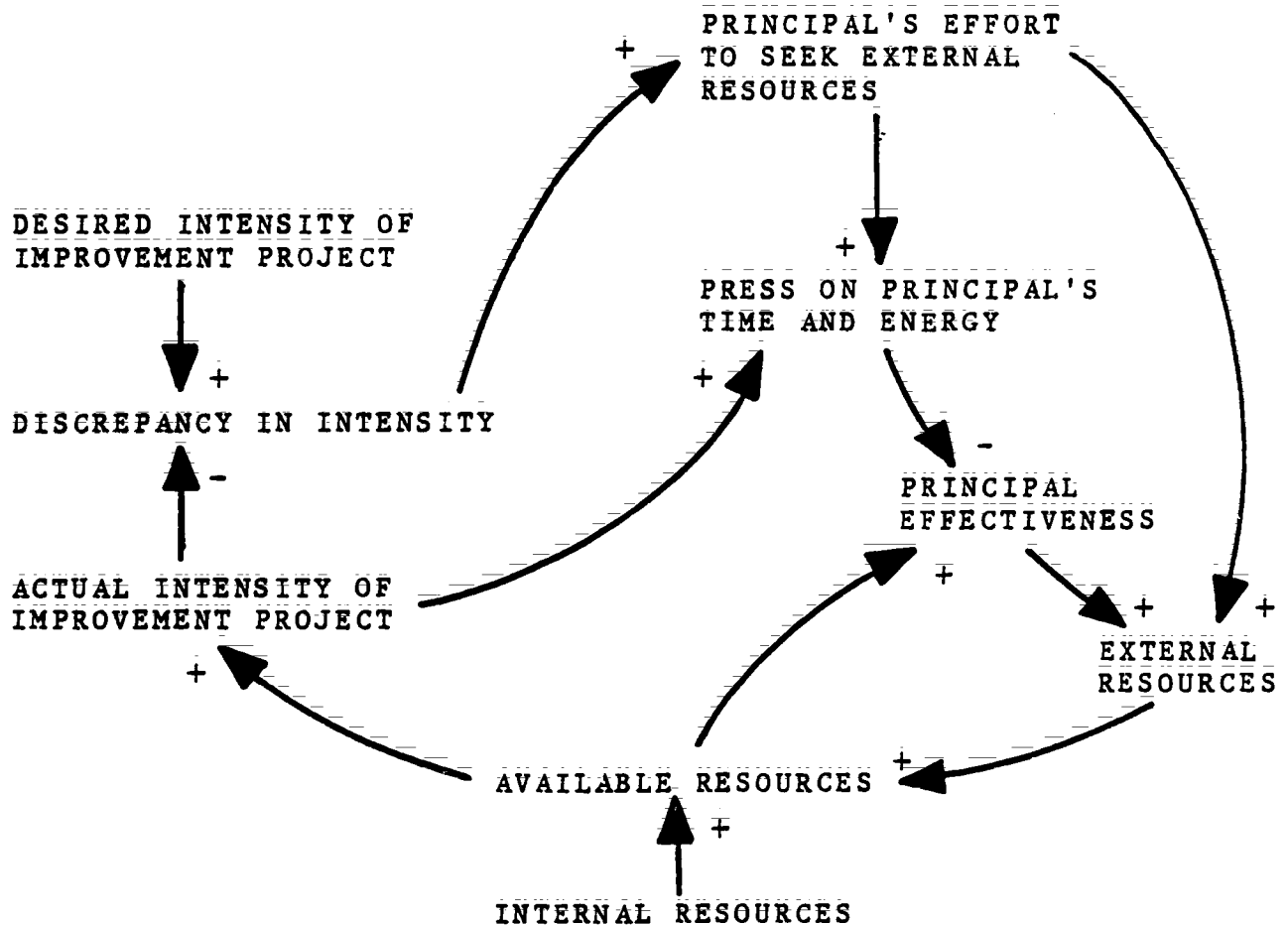


Fig. 6. The Dynamics of Securing External Resources

### Summary

A key issue in the school improvement movement in the United States at the present time is how to get beyond definitions of school effectiveness to the actual implementation of school improvement programs. The importance of the current work lies in its emphasis on synthesizing a great deal of writing about effective teaching, effective schooling, and educational change, describing some of the fundamental dynamics of improving schools in a coherent theoretical format, and establishing a basis for two important kinds of activity: (1) designing school improvement programs on the basis of a strongly specified theory about what makes schooling effective and how efforts to improve schools typically generate self-defeating dynamics, and (2) building computer simulation policy models that facilitate more systematic, and less expensive, examination of proposed policy alternatives. In short, we believe that a central research task is that of theoretical synthesis and that the system dynamic approach is one useful approach to the task at hand.

In the preceding pages, a model has been presented in the form of a series of causal-influence diagrams. The model describes our present thinking about the dynamics of implementing school improvement programs. These diagrams suggest a "mine field" of unwanted and unintended side effects that are sown when a school embarks on a major improvement project. This mine field can sink projects with even the best of intentions. The implication is that successful interventions are those which act to neutralize or reduce the impact of these side effects.

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